



Executive Summary

Congress established Gateway National Recreation Area (Gateway) in 1972 as one of the first urban parks in the National Park System (NPS). A distinct, biologically diverse area on the footsteps of New York City, Gateway is home to many natural, cultural and recreational resources. Gateway's General Management Plan (GMP), written in 1979, acknowledges the need for a dynamic management strategy based on changing environmental and social conditions. Given the increased scientific knowledge on the likely impacts of climate change on the New York harbor, Gateway should consider incorporating climate change adaptation into its new GMP.

Climate change refers to a significant alteration of the average climate persisting for several decades or longer. Increased levels of greenhouse gases drive modern climate change, and changes in future human behavior will determine the extent of climatic changes. Globally, the evidence for climate change is strong; we are now beginning to understand local impacts. The Intergovernmental Panel on Climate Change (IPCC), the Metro East Coast (MEC) Assessment, and the New York City Panel on Climate Change (NPCC) provide data on likely local climate change impacts. This report identifies four climate change impacts that may significantly affect Gateway: sea level rise, precipitation changes, temperature changes and changes in extreme weather events' frequency or intensity.

These four, primary impacts will exert many secondary effects on Gateway, including coastal erosion, saltwater intrusion, species range shifts and mistimings between species migrations and their food sources. These secondary effects will overlap and interact, resulting in three combined impacts throughout the park: species composition changes, habitat loss and cultural resource damage and loss. Biodiversity loss and recreational infrastructure damage resulting from these combined effects would diminish Gateway's ability to fulfill its mandate to preserve and protect its resources.

Many opportunities exist for Gateway to incorporate climate change adaptation into long-term planning across its three park units at Sandy Hook, Staten Island and Jamaica Bay. This entails continuing to adopt an adaptive management approach in order to respond effectively to observed impacts and changing climate projections. Specific options to protect Gateway's resources include integrating long-term planning into park operations, monitoring climate sensitive species, implementing adaptive restoration and documenting resources. Implementing the options outlined within this report can help Gateway address the multiple effects of climate change on the park.

The information and recommendations presented in this report may prove useful in informing and shaping Gateway's approach to climate change adaptation and its new General Management Plan, 2009. While much of the information provided is specific to Gateway, the ideas and conceptual framework may also guide other NPS units as they incorporate climate change considerations into their own management plans.

By raising awareness and developing plans, our National Parks will have the best opportunity to adapt to the changing climate so that they may continue to serve this generation of Americans, as well as the next.



1 Introduction

1. Purpose of this paper

Congress established Gateway National Recreation Area (Gateway) in 1972 as one of the first urban parks in the National Park System (NPS). Gateway is a distinctive and biologically diverse area embedded within the New York-New Jersey Metropolitan Area, the largest metropolis in the United States. Gateway's annual visitation ranks third highest in the nation; in 2008, over 10 million visitors came to take advantage of the park's many natural and cultural resources.

Gateway consists of three units: the Sandy Hook Unit in New Jersey, the Staten Island Unit and the Jamaica Bay Unit, both in New York. These three units are quite distinct, with different ecological and cultural resources.

Within this context, the park must balance ecosystem protection, historic monument preservation and provision of recreational activities. Gateway's urban context creates unique challenges for meeting these goals, including managing

highly altered ecosystems and limited space. As such, successfully managing Gateway requires adapting to an ever-changing environment, finding creative solutions to new problems as they arise.

Gateway management is currently creating a new General Management Plan (GMP). The General Management Plan serves as a guide for the park's management and development, outlining a strategy to fulfill the National Park Service's goals. The current GMP was written in 1979 with a 20-year outlook. While Gateway is long overdue for a new management plan, the 1979 GMP remains an important, forward-looking document, advocating for an adaptive management process at Gateway:

"It would plainly be a mistake to make a static plan, a confining plan, for Gateway. Because of the very complexity of its geography and structure, this multiple-purpose park will need additional management techniques and a more complex administrative philosophy than is commonly found in other parks" (General Management Plan, 1979, p.ix).

The new GMP will follow in the spirit of the previous plan, acknowledging both the need for a dynamic management strategy based on changing environmental conditions, and Gateway's unique position among other National Park Service units.

Science is constantly developing, and since 1979 climate science has matured significantly. Climate change, also commonly called global warming, is a significant alteration of the average climate, or its variability, persisting for several decades or longer (IPCC 2007). Interactions between the atmosphere, hydrosphere and land surface create long-term, average weather patterns in a given area. Climate patterns determine what



Gateway National Recreation Area. This map shows Gateway's three Units in relation to the larger New York-New Jersey Metropolitan Area.

kinds of species can survive in a given location; thus, changes in the climate may heavily influence ecosystems at Gateway.

Given advances in climate forecasting since the previous GMP and the potential for profound changes at Gateway due to climate change, Gateway's management may consider incorporating climate change adaptation into its new General Management Plan.

In order to successfully incorporate resource management under changing climate conditions into the GMP, managers need reliable information on potential climate change impacts on the Park's ecological, cultural and recreational resources. Once impacts are established, the park will need strategies to respond to these effects.

The information in this white paper can assist Gateway's long-term investments and management decisions. It may also help educate the public about climate change, and eventually guide other NPS units in integrating climate change impacts into their own decision-making.

The key sections of this report include:

1. A summary of climate change science, including local projections relevant for planning at Gateway;
2. A focused assessment on how climate change impacts will affect Gateway's resources, both natural and cultural;
3. An overview of Gateway's guiding policies and how or whether these policies address adaptation to climate change;
4. Recommendations for a climate change adaptation strategy within the 2009 General Management Plan.



Responses to climate change include mitigation and adaptation; it is important to distinguish between the two. Mitigation refers to efforts to reduce greenhouse gas emissions. While global mitigation efforts are essential to ensure that greenhouse gas concentrations decline, lessening climate change's extent, this report will focus exclusively on adaptation measures. Adaptation is an attempt to respond to climatic changes. For a more detailed definition of adaptation, see Box 12. Defining Adaptation.

These analyses and recommendations are not intended to provide a comprehensive overview of all existing climate change adaptation options, nor does this report represent a complete plan, ready for implementation. Rather, this report is a guiding document, that can inform Gateway management's decisions relating to climate change. A climate adaptation strategy may become a core component of the new GMP. In the spirit of the 1979 Plan, Gateway management may also use these guidelines in an adaptive manner to best fulfill the National Park Service's mission.