

Prepared in cooperation with the National Park Service

# **Bibliography of Water-Quality Studies in Gateway National Recreation Area, New York and New Jersey**

Open-File Report 2024–1035



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By Philip Savoy, Maria Marionkova, and Christopher Schubert

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**U.S. Department of the Interior**  
**U.S. Geological Survey**

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## Abstract

The U.S. Geological Survey (USGS) provided technical assistance to the National Park Service (NPS) as part of the USGS-NPS Water-Quality Partnership, by gathering references related to water-quality research conducted in the three units of Gateway National Recreation Area (GATE): Jamaica Bay and Staten Island in New York, and Sandy Hook in New Jersey. As part of this effort, a literature search was performed to compile previous water-quality research conducted within the boundaries of GATE. The resulting bibliography is meant to assist GATE resource managers in understanding the extent of available data and developing plans to close data gaps.

## Introduction

The U.S. Geological Survey (USGS), in cooperation with the National Park Service (NPS), compiled a bibliography of water-quality research done within Gateway National Recreation Area (GATE), as part of the USGS-NPS Water-Quality Partnership. Research on multiple water-quality topics has been conducted over several decades within the Lower Bay area between New York and New Jersey. The USGS-NPS Water-Quality Partnership assists the NPS with water-quality issues and, as part of this partnership, the USGS provided

technical assistance to GATE by compiling a bibliography of water-quality research done within the park. Water-quality data have been collected within the boundaries of GATE for more than 40 years but relatively few sites and water-quality parameters have been sampled with any consistency over the past decade. Monitoring programs have primarily focused on the Jamaica Bay unit of the park, with limited monitoring in the Staten Island and Sandy Hook units (fig. 1). The lack of consistency in monitored water-quality parameters and sampling frequency makes it difficult to perform analysis and inform management decisions within GATE. Other State, Federal, academic, and local parties also conduct water-quality monitoring within GATE, and the park could potentially work with these entities to develop a comprehensive water-quality monitoring program. However, not all data collected by other parties has been placed into a central repository that can be used by GATE staff to help inform park decisions.

To help address this issue, the USGS performed a literature search of journal articles and reports on water quality within GATE. This summary is intended to help identify what topics have been researched, which water-quality parameters have been monitored, and which parties were responsible for conducting the research. GATE staff members can use this information to inform decisions on designing future water-quality monitoring efforts, conducting research, and identifying potential collaborators.

## 2 Bibliography of Water-Quality Studies in Gateway National Recreation Area, New York and New Jersey



**Figure 1.** Map of Gateway National Recreation Area including the three park management units: Jamaica Bay, Sandy Hook, and Staten Island and locations of interest in New York and New Jersey.



## Approach

This bibliography was compiled by searching three databases: Web of Science, owned by Clarivate (<https://www.webofscience.com/wos/woscc/basic-search>), the NPS DataStore (<https://irma.nps.gov/DataStore/>), and the USGS Publications Warehouse (<https://pubs.usgs.gov/>). The database searches were concluded on January 19, 2024; therefore, no references published after that date are included in this bibliography. Keywords were selected to cover the geographic location of the park, including the three management units of Jamaica Bay, Sandy Hook, and Staten Island, as well as multiple topics related to water quality. Owing to differences in search features among the three databases, the following exact search process varied. Web of Science was queried using a Boolean string that consisted of a combination of terms related to geographical location and water-quality topics (table 1). Search terms from each row of table 1 were concatenated as a series of “OR” statements and the three concatenated strings were combined with “AND” statements to

generate the final Boolean string. NPS DataStore was queried by using the advanced search feature and selecting “Gateway” as the content unit. The search was limited to return only conference proceeding papers, dissertations, journal articles, or published or unpublished reports. The USGS Publications Warehouse had limited search features and was queried using various geographic names of the park or units within the park.

The returned search results were then manually screened based on their title and the contents of their abstract. Products were retained if the reported work was conducted within GATE or represented a regional study for the area in and around GATE, and if they pertained to water quality. The focus was on products that provided primary or secondary research. Products consisting of short summaries, such as conference abstracts were not retained. References that could not be verified in the literature review were not included in the results. While a reasonable effort was made to compile relevant literature within the scope of this project, this is not a guarantee that the search identified every piece of water-quality research conducted within GATE over its history.

**Table 1.** Search terms used as Boolean strings to search the Web of Science.

[Searches consisted of one term from column A, one term from column B, and one term from column C such that all possible combinations were tried. Boolean strings were searched as written inside quotation marks to find exact matches. An asterisk (\*) returned all words that started with the given string of characters]

A. Location terms	B. Water-quality topics	C. Study terms
Bergen Beach	bay	acid*
Breezy Point	beach	alga*
Canarsie Pier	coastal	chloride
Floyd Bennett Field	contaminat*	chlorophyll
Fort Hancock	contaminated water*	clarity
Fort Tilden	discharge	compound*
Fort Wadsworth	estuar*	conductivity
Frank Charles Memorial Park	fresh water	dissolved oxygen
Gateway	freshwater	<i>E. coli</i> *
Gateway National Recreation* Area	industrial waste	E.coli*
Great Kills Park	intertidal	Enterococc*
Hoffman Island	marine	fecal*
Jacob Riis Park	monitor*	metal*
Jamaica Bay	ocean	nitr*
Jamaica Bay Wildlife Refuge	palatable water	nitrogen
Plumb Beach	polluted water	nutrient*
Sandy Hook	pond	odor*
Swinburne Island	runoff	pH
	salt water	salinity
	saltwater	smell
	tributar*	solids
	wastewater	temperature
	water quality	turbidity
	water use	
	watershed	

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## Summary

The U.S. Geological Survey (USGS), in cooperation with the National Park Service (NPS), compiled a bibliography of water-quality research done within Gateway National Recreation Area, as part of the USGS-NPS Water-Quality Partnership. Three databases were searched for literature about the area near or in Gateway National Recreation Area. Sixty-two references for journal articles, reports, and other publications were found.



For more information about this report, contact:  
Director, New York Water Science Center  
U.S. Geological Survey  
425 Jordan Road  
Troy, NY 12180-8349  
[dc\\_ny@usgs.gov](mailto:dc_ny@usgs.gov)  
or visit our website at  
<https://www.usgs.gov/centers/ny-water>

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