

## **I. THE ECOLOGICAL CONTEXT OF FLUSHING MEADOWS**

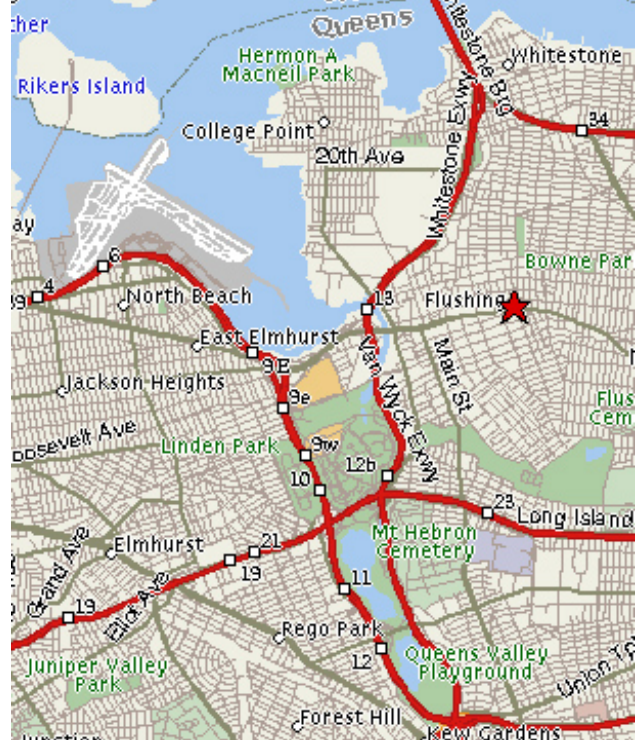
In the recent course of history, from the arrival of Dutch and English settlers in what is now New York City, Flushing Meadows and its surroundings was transformed from a high quality habitat for native plants and animals and a powerful biogeochemical water filter to an ash dump with negligible ecological productivity. The resulting blight on the landscape was dramatized in the early 20<sup>th</sup> century by F. Scott Fitzgerald in *The Great Gatsby*:

*About half way between West Egg and New York the motor road hastily joins the railroad and runs beside it for a quarter of a mile, so as to shrink away from a certain desolate area of land. This is a valley of ashes – a fantastic farm where ashes grow like wheat into ridges and hills and grotesque gardens; where ashes take the forms of houses and chimneys and rising smoke, and finally, with a transcendent effort, of ash-gray men who move dimly and already crumbling through the powdery air.*

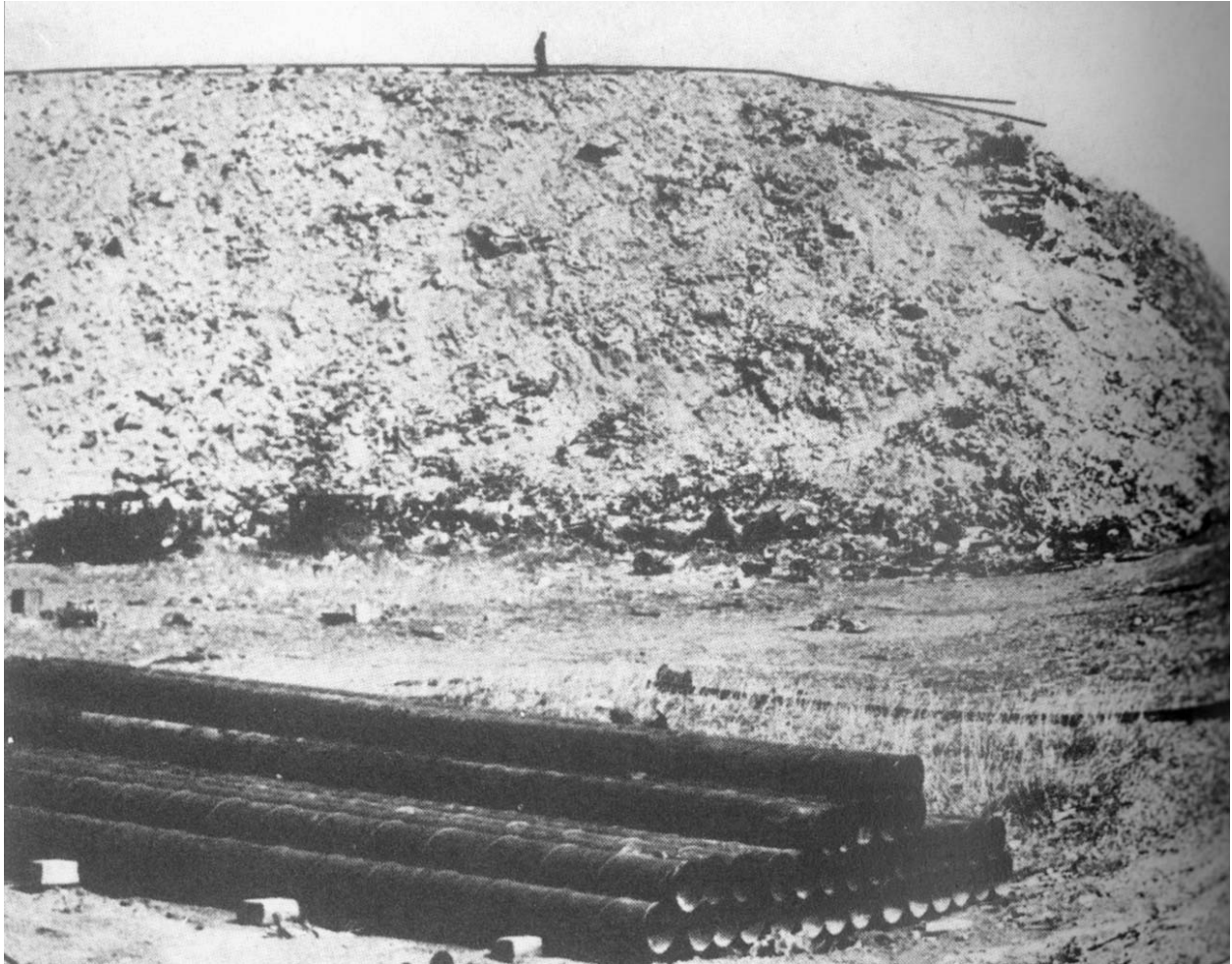
By his own account, this situation was “rectified” by the late Robert Moses, the most prodigious builder of parks and highway infrastructure the City of New York has ever known. By building the Whitestone Bridge, the Queens-Midtown Tunnel, the Grand Central Parkway and Van Wyck Expressway, Flushing Meadows became a central node on the transportation grid connecting the region. Who and whatever moved from New England and the Bronx to Brooklyn, Nassau, and Suffolk Counties, or from Long Island to Manhattan and New Jersey had to pass within minutes of Flushing Meadows. While all boroughs were to some degree fragmented by the Moses highway program, Queens may be the most divided by speeding cars and trucks.

Amidst these hard roadbeds of infrastructure, Moses also created “public amenities” in Flushing Meadows-Corona Park. By fixing the water level in the former wetland complex with a tide gate near the high tide mark, two water features – Willow and Meadow Lakes – were formed. These provided the World’s Fairs of 1939 and 1964 with an aesthetic centerpiece. From the onset, however, they were designed to capture stormwater runoff from the miles of surrounding roadway. While little attention was probably given at the time to pollutants in the runoff from thirty-plus acres of highway, the fact that water was detained for weeks to months in these lakes was itself an early version of “stormwater treatment”, even if unintended. While the lakes were probably eutrophic (nutrient rich, oxygen depleted) from the time of their creation because of the high nutrient sediments, the long residence time would nonetheless have removed hydrocarbons, metals and sediment from the water before it entered Flushing Bay.

Although the park landscaping has undergone many changes over the years, the focus on lawns and specimen trees has allowed for limited ecological development. Whatever diversity of plantings may have occurred, the creation of uniform lake edges on landfill together with a lack of maintenance provided an extensive habitat for the invasive common reed (*Phragmites communis*), which has since the late 1980’s surrounded Willow Lake. So while the construction of the World’s Fair infrastructure may be credited with cleaning up the ash dump, it also established the landscape features that limit the biodiversity, growth and development of the ecological systems in Flushing Meadows. The landscape principally serves the original aim of construction, i.e., to support an infrastructure for moving people through the area. Other aims, such as enhancing biodiversity and creating natural filters, were not part of the plan.



The above map dates from 1897 and shows Flushing Meadows and environs with the tidal marsh as it existed before substantial human intervention. The image below is current road map of the area (courtesy of MapQuest).



The Corona Ash Dump (above), run by Fishhooks McCarthy from the beginning of the 1900's through the 1930's, was famous for its grotesque presence on the landscape. The so-called "Mount Corona" was a mountain of garbage that reached nearly 100 feet high. Less infamous is the industrial pollution that tainted Flushing Creek (left) during this same period of time. By his own account, both were cleaned up by the late Robert Moses in preparation for the 1937 World's Fair.



The entire perimeter of Meadow Lake was used as the primary parking field for the 1964 World's Fair (above). So closely tied to the culture of the automobile was Meadow Lake that it was the site of daily demonstrations of the "*amphicar – the car that swims*" in the amusement area (left).

Today, the landscape of Flushing Meadow principally serves the original aim of construction, i.e., to support an infrastructure for moving people through the area. Other aims, such as enhancing biodiversity and creating natural filters, were not part of the plan.



The surface areas of Willow and Meadow Lakes are 47 and 93 acres, respectively. These water bodies, together with surrounding watershed area in Flushing Meadows, however, may provide the single largest opportunity for ecological restoration of shrublands, meadows, lake-edge, and wetland habitat in the City of New York. Given the presently low plant biodiversity, a tenfold increase in native plant species (an order of magnitude change) in the area is probably within reach.

Flushing Meadows offers opportunities for conservation and enhancement. The landscape as it now exists supports coverage by the common reed *Phragmites* around much of Willow Lake, as well as turf grass lawn and specimen trees around Meadow Lake. Differences in urban fill at the lake edges and a few variations of depth at specific points on the lake margins support a patchwork of wetland plants in a number of habitats. However, widely distributed fill and stresses caused by nutrient-poor cinder-ash subsoil has led to habitat uniformity in much of the surrounding landscape. Uniformly poor, stressful environments support uniform plant coverage, a virtual monoculture in some areas. Changing these two parameters – landscape diversity and soil structure – would lead to greatly increased biodiversity.

The ecology of the twin lakes appears to be largely driven by pollutant loads, and may be



The common reed *Phragmites* has achieved near domination of the entire edge of Willow Lake, leaving no room for other species to establish themselves in this invasive monoculture.

described as at the last stages of “eutrophication” – the over-production of algae followed by the total depletion of oxygen in the water.



An experiment in eutrophication - this textbook example demonstrates the effect of increased phosphorus on lake ecology: the upper lake partition received added phosphorus, the bottom half did not. Meadow and Willow Lakes will most probably behave like the upper lake in this photograph indefinitely unless the phosphate-rich sediments are removed by dredging or otherwise covered with an inert material (taken from *Environmental Ecology*, 2<sup>nd</sup> Ed., by Bill Freeman, Academic Press, NY. 1995 p. 199).

The high density of algae in the water column, the blooms which make the twin lakes appear green or brown, indicate high levels of productivity, and eutrophic quality. While nutrients are the cause, in this case, much of the nutrient input is not caused directly by human input, but rather, by a human caused change in conditions. The lakes were created on intertidal marsh, a natural sink for sediments. The creation of the lakes created conditions that release the nutrients, especially phosphorus, from sediments stored during the long history of the marsh. The hypereutrophic conditions stem from man-made causes, i.e., the creation of the lakes over marshes, even though the sediments are derived from the natural behavior of the marsh.

The natural food chain from algae to zooplankton to planktivorous fish to fish eating fish stabilizes the flow of nutrients. At Meadow and Willow lakes this food chain apparently has never developed. Thus there is a build up of plankton, followed by a subsequent periodic die-off of life in the ponds. A smoother flow of materials through the lakes would require lower nutrient inputs, as well as fish species to fill all the necessary roles, from planktivore to piscivore.

Willow and Meadow Lakes are presently used by migratory neotropical birds and waterfowl. Present plant community coverage of the surrounding landscape probably supports a fraction of the native avifauna that formerly nested and migrated through. Increasing landscape diversity and habitat structure will increase habitat types, and hence provide more opportunities for plants and animals.

Limited habitat diversity also limits fish species – only six have been identified in surveys of the twin lakes. The reason for this relatively small number, which includes three saltwater species

that probably come in under the tide gate from Flushing Bay, is the all too frequent fish kills during warm weather. Removing nutrient-rich sediments from the bottom should allow for both more diversity and greater numbers of fish in these water bodies.

## **Goals of the Study**

This report provides a framework to inform decisions made for the purpose of improving environmental quality and ecological growth in the urban landscape in and around Flushing Meadows. Basic questions orient this investigation:

- What have human beings accomplished with, and done to, the landscape in terms of the ecological services in the Flushing Meadows watershed?
- What are the capabilities of the landscape and area in terms of providing habitat for a diverse assemblage of organisms in this region?
- What have and can these natural systems provide in terms of biological diversity, stormwater treatment, air filtration, and human health protection, and how can these ecosystem services be enhanced?

This report addresses potentials which could, or perhaps even should be realized through developments coupled with the aims and requirements of the Olympic Rowing proposal, but it also identifies goals which may be pursued independently of such future uses of Flushing Meadows and its associated lakes, natural landscapes, and human built infrastructure. This report will:

- Review existing conditions and identify problems.
- Describe how the geologic past, and recent development, has shaped Flushing Meadows, physically, ecologically and functionally.
- Describe principles and methods for enhancing “ecosystem services” i.e., natural, ecologically based solutions to environmental problems.
- Compare impacts, environmental and ecological costs, and mitigation plans for lake and shoreline edge modifications, as compared to a no-build option.
- Provide a framework for decision makers to choose amongst park development scenarios in order to achieve environmental quality goals in and around Flushing Meadows.
- Discuss potential effects and opportunities associated with building the Olympic Rowing course, for achieving ecological enhancement goals in Flushing Meadows-Corona Park.