The Gerritsen Creek Nature Trail

Marine Park, Brooklyn, New York

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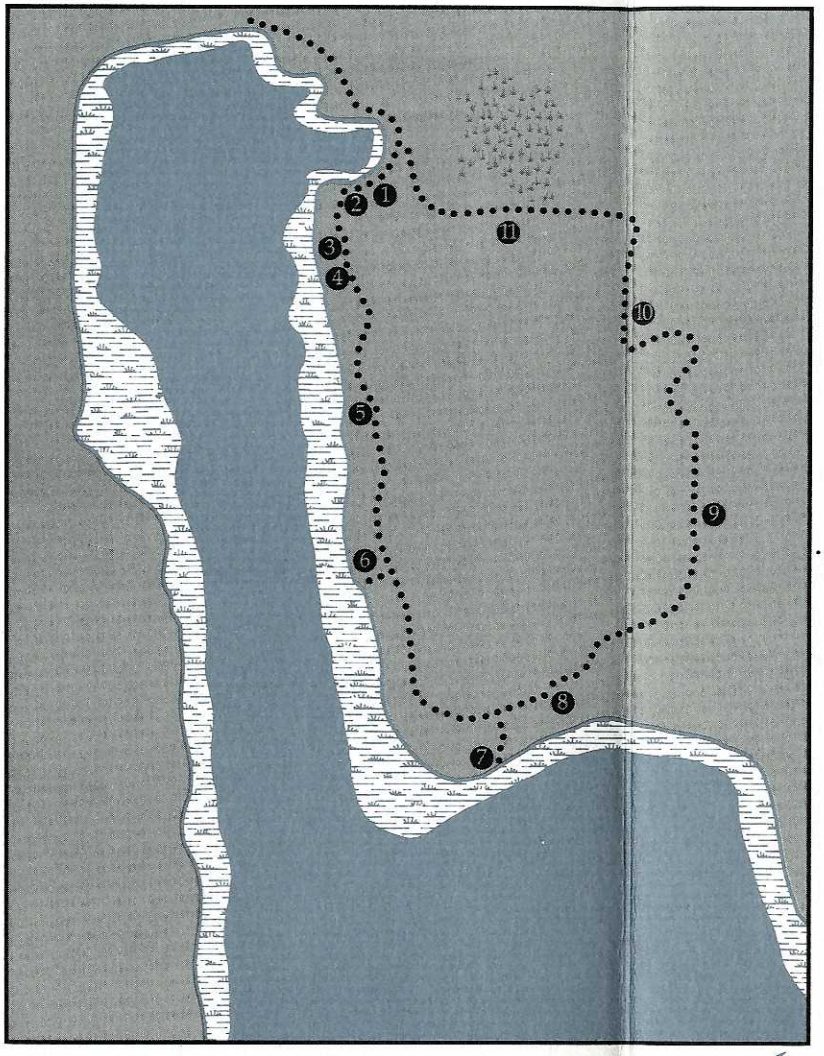

marsh

shrubby meadow

parkland

0 ¼ mile

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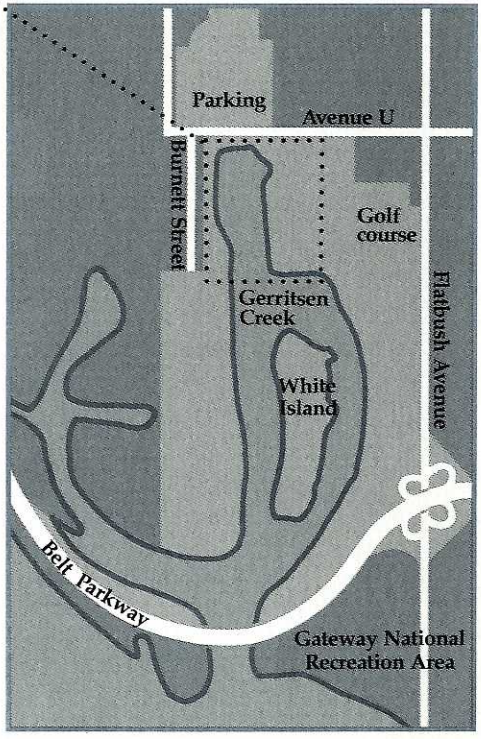
Marine Park Brooklyn



cover

Ruddy turnstones watch horseshoe crabs lay eggs. Shorebirds devour the eggs as fuel for their spring flights.

Brooklyn—3000 B.C.: Green marsh grasses wave in the briny sea breeze. Great blue herons stalk fiddler crabs in the pungent mud of the saltmarsh at low tide. As the day ends, the wind shifts and the warm air blows from the land out to sea.

Each season brings its own visitors to the shore: Indians fish for sturgeon in the spring; a variety of animals, from the timid grasshopper sparrow of summer to winter's bold, short-eared owl, seek their own nourishment amid the shore grasses.

Five thousand years later, Brooklyn is built up, and the Indians are gone. But little has changed on the shore. Time is still measured not by clocks and calendars but by moons and tides. The horseshoe crab leaves the open ocean to mate on the shore just in time to have its eggs gently washed by the highest spring tide. When the days grow short and the nights chilly, Canada geese take to the air in a wedge-shaped formation heading south.

The first half of the trail follows the shore of Gerritsen Creek, which empties into Jamaica Bay. From the trail's boardwalk and viewing platforms (which should keep your feet dry), you can observe the birdlife for which the park is famous, including the herons, egrets, ducks, and geese that frequent the marsh throughout the year. The second half winds through a prairie of tall grass, where cottontail rabbits bound off at your approach and the ring-necked pheasant calls "ah-oo-ga" — sounding like the horn of a Model T.

Allow about 40 minutes to walk the mile-long trail. Follow the arrows, and stop at the numbered posts along the route. The numbers on the posts correspond to the numbered stops in this guide. As you walk the trail, try to leave human time behind and set your pace to the rhythm of life in the saltmarsh.

1. History

Marine Park occupies the westernmost inlet on Jamaica Bay. The bay is one of several formed during the last 5,000 years as ocean currents deposited sand in a series of long strips off the south shore of Long Island. These strips of beach form a barrier against the pounding surf and allow saltmarshes to grow in the calm water on their protected bay side. The barrier beach that protects the wetlands of Jamaica Bay is Rockaway. (Other Long Island barrier beaches include Atlantic Beach, Jones Beach and Fire Island.)

Gerritsen Creek was a freshwater stream that once extended about twice as far inland as it does today. Around 1920, the creek north of Avenue U was converted to an underground storm drain. Yet it continues to supply the saltmarsh with fresh water, which helps the marsh support a wider range of organisms than ordinary salt water could.

The creek was probably a favorite hunting and fishing spot for Indians living in the Keshawchqueren village that once stood where Kings Highway and Flatbush Avenue intersect today. Archaeological excavations in Marine Park have turned up food preparation pits dating from 800 to 1400 A.D. and containing deer and turtle bones, oyster shells, and sturgeon scales.

The first Europeans to settle here were the Dutch, who found the saltmarshes and coastal plain of southern Brooklyn pleasantly reminiscent of Holland. Their villages – New Utrecht, New Amesfort (Flatlands), Flatbush, New Lots and Bushwick – were composed of sprawling farms, whose cows grew fat on salt hay. The Dutch supplemented their own diet with game and bountiful harvests of oysters and clams. So fruitful was this area that dairy farming continued until the 1930s and oysters were big business until the 1920s, when harbor development killed Jamaica Bay's oyster beds – among the largest in the world.

At the turn of the century developers began making elaborate plans to turn Jamaica Bay into a port, dredging Rockaway channel to allow large ships to enter the proposed harbor. Speculators, anticipat-

ing a real estate boom, began buying land along the Jamaica Bay waterfront. Fearing that the relatively pristine marshland around Gerritsen Creek would be wiped out by the developers, Frederic B. Pratt and Alfred T. White offered the city 140 acres of land around Gerritsen Creek for a park in 1917.

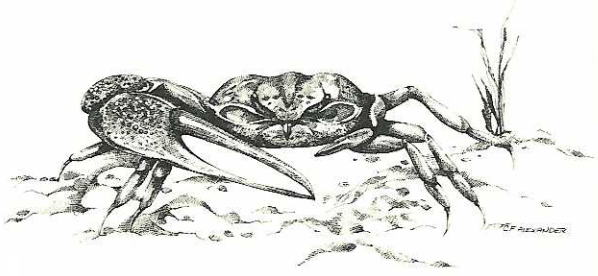
The city accepted the offer (after some delay) and by 1937, Marine Park had grown to 1,822 acres, through city land purchases. In 1974, New York City transferred ownership of 1,024 acres of the park to the National Park Service for inclusion in the Gateway National Recreation Area, reducing Marine Park to its present 798 acres (almost the size of Central Park).

2. The saltmarsh life cycle

Stretching out before you are the lush green grasses – or brown stubble, if it is winter – of a saltmarsh, its soil soaked with salt water. Very few plants can grow with their roots in salt water; even fewer can grow with both their roots and leaves in salt water. Only two salt-tolerant grasses grow well here: saltmarsh cordgrass and salt meadow cordgrass.

Saltmarsh cordgrass, the tall, lime-green grass growing near the water's edge, is submerged twice a day by high tide. Growing behind it is salt meadow cordgrass, shorter, matted, and blue-green. This wiry little grass is less salt-tolerant than its cousin and grows best where no more than two high tides a month can reach it.

The dense stems of saltmarsh cordgrass trap the remains of dead plants and animals washed in by the tide. Because the tides come in more forcefully than they recede, they constantly deposit decaying organic material in the fertile mud of the intertidal zone – the area between the high and low tide marks. When saltmarsh cordgrass dies, it decays slowly and adds its own organic material to the thick, rich mud. This nutritious stew is eaten by many tiny creatures, including soft-shelled clams, green-headed fly larvae, grass shrimp, killifish, and lugworms. These animals in turn become food for bluefish, green crabs, and sandpipers, which are



The male fiddler crab waves his large claw to attract a mate.

eaten by even larger animals. This interlocking series of meals is known as a food chain.

Although salt water severely limits the variety of plants in a saltmarsh, more animal species live here than in any other environment in North America. The vast array of animals living here – from tiny shrimp-like scuds to great blue herons – depend for food primarily on the two grasses that dominate the saltmarsh.

3. Eastern tidal time

The water level in the marsh is always changing: Salt water is either creeping into the marsh – almost to the boardwalk – or slowly receding until it exposes a broad band of mudflat between the cordgrass and the water-line. Tidal ebb and flow happens so slowly that you may not notice it, but every 12 hours and 25.5 minutes, an area up to 50 feet wide is covered and uncovered by the tide.

Tidal changes are caused by the gravitational pull of the moon. As the moon passes a particular latitude on the earth during its daily orbit, its gravitational influence causes the ocean in that area to bulge toward the moon. Twice a month, during full and new moons, the sun and the moon are in line with the earth. This added gravitational influence causes extra-high tides called spring tides.

Saltmarsh animals live according to the tides. Fiddler crabs emerge from their burrows as the tide is going out and scour the exposed mud for bits of

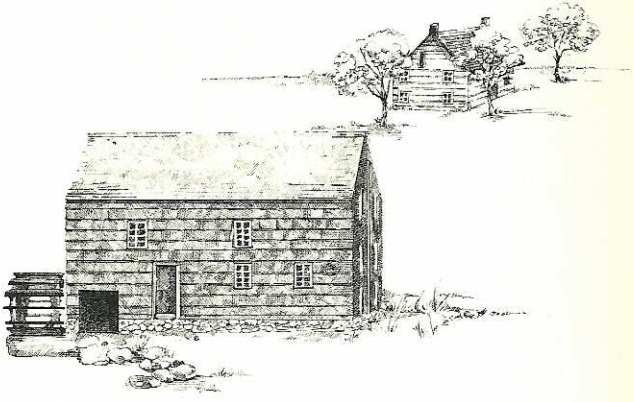
food. As the tide returns, they skitter back to their burrows on their eight legs, seal the entrance with a plug of mud, and wait until the tide begins to recede again. The ribbed mussel is active during high tide, when it draws in water, filters out food, and pumps the filtered water back out. At low tide, it closes its shell tightly to keep its soft moist flesh from drying out.

If the fiddler crab is removed from this marsh and put in an aquarium somewhere else in the world, it will continue to be active when the tide is low in this saltmarsh. The mussel, too, wherever in the world it is put, will open its shell at high tide in its home marsh and close again at low tide there. This behavior has led some scientists to conclude that many marsh creatures have "biological clocks" that keep their activities in time with the tides.

4. Gerritsen's gristmill

The wooden pilings that cross the creek a little to the left of this spot (not visible at high tide) are all that remain of the first mill powered by the tides to be built in North America. The mill, which ground grain into flour, is believed to have been built in 1645 by Hugh Gerritsen, a Dutch immigrant.

If you had stood in this spot in 1655 and looked across the creek, you would have seen a two-story, shingle-covered building on a rough stone founda-



Gerritsen's Mill operated continuously for almost 300 years.

tion. On the side of the building, a wooden wheel turned, dipping into the creek. Boards connected the pilings across the creek, forming a dam that forced the tide to flow under the wheel. Day and night the wheel turned, moving clockwise as the tide came in, counterclockwise as it went out.

The gristmill operated continuously until 1889, and the building stood for almost 300 years, until vandals burned it to the ground in 1935. Unfortunately, vandalism is still a serious problem. People continue to degrade the park's landscape by dumping cars and debris and riding motorbikes through fragile marsh and grasslands.

5. Reedgrass runs rampant

The towering plants lining the trail here are common reedgrass or *Phragmites*. Their presence suggests that something has gone wrong here, that the process of natural succession has all but stopped. Normally, succession is a predictable process in which plant species and communities replace one another in a sequence usually proceeding from meadow to shrubland to woods and forest.

When land is cleared of vegetation (plowed, mowed, burned), it is open to maximum sunlight, so sun-loving plants like grasses and wildflowers colonize the area. They soon grow so densely, however, that the shade they cast prevents their own seeds from growing. Each new species that follows alters the environment in some way that creates conditions unsuitable for its own offspring. Grasses and wildflowers usually would be shaded out by shrubs, which would in turn be shaded out by "pioneer" trees, and so on.

Phragmites, however, invades open ground and immediately grows so tall and dense that few other plants can grow beneath it. This seemingly endless stand of *Phragmites* was caused by the landfilling done here between the 1930's and the 1960's. This side of the park was once an expanse of water dotted with grassy islands of saltmarsh. The land you are standing on was formed by a blanket of garbage about eight feet thick dumped over the entire marsh.

Marsh wrens weave as many as five sock-like nests among the Phragmites, *but keep eggs in only one. The others serve as decoys to confuse predators.*

The filling interrupted the normal course of natural succession by creating prime conditions for the growth of *Phragmites* and the exclusion of most other plant species.

6. Birds of the season

From this platform, you have a fine view of the water birds for which Marine Park is famous. Since waterfowl, wading birds, and shorebirds visit the park at different seasons, regular visitors can look forward to a year-round spectacle.

In winter, the creek is a haven for waterfowl—ducks, geese, brant and an occasional loon or grebe. As northern lakes and streams freeze and frigid winds howl along the shore, both freshwater and marine waterfowl take refuge in this sheltered inlet. Winter visitors include canvasbacks, buffleheads, red-breasted mergansers, greater and lesser scaup, common loons, Canada geese, and brant.

Summer is the season for waders—egrets, herons, and their kin. In summer, you are likely to see a snowy egret or a great egret stealthfully walking through the marsh on its long, black legs, waiting patiently to straighten its snake-like neck and grab

The clapper rail, or marsh hen, is common but hard to spot. The clapper's long neck, slender bill, and chunky body make it look like a combination of heron and chicken.

an unwary fish in its lance-shaped beak. If you are very lucky, you may see a clapper rail running through the grass, searching for fiddler crabs.

Spring and fall bring scores of shorebirds, mostly small, long-legged birds that run along the waterline, probing the mudflats for food with their long narrow bills. Visitors include least sandpipers, ruddy turnstones, willets, semi-palmated plovers, sanderlings, and greater yellow legs. Many of them fly almost halfway around the world twice each year, breeding on the Arctic tundra during its fleeting summer, then flying to the southern tip of South America, where they spend our winter (summer there), then returning north in spring. East Coast marshes are vital stopovers for these long-distance flyers. Their arrival each spring coincides with the egg-laying of the horseshoe crabs. The birds gorge themselves on the eggs to fuel up for their journey.

7. Reading the breezes

Near the shore you can almost always feel a breeze, especially in summer. During the day, the breeze blows off the ocean and is called a sea breeze. Around dusk, it changes direction, blowing from land to sea. This daily pattern occurs not because of the prevailing winds farther inland but because land absorbs and releases the sun's heat more quickly than water does.

On a sunny day, the land will be much warmer than the ocean by mid-morning. This causes the air above the land to lose pressure as it expands and rises. The cooler air over the ocean moves toward the lower-pressure area over the land – the sea breeze. As the sun sinks toward the horizon, the situation is reversed. The land releases the heat it has absorbed all day and cools more quickly than the water. By evening the stiff sea breeze has changed to a gentler land breeze.

8. Ragweed: The real culprit

From midsummer to early fall, the blooming of two plants that grow here – goldenrod and ragweed – signals a season of suffering for many. Most people recognize the taller goldenrod with its cluster of showy yellow flowers, but few know ragweed, a plant with tiny green flowers so unobtrusive they are hardly recognizable as flowers.

All flowering plants need pollen to produce fertile seeds, and many – like goldenrod and ragweed – cannot pollinate themselves. Goldenrod's bright blossoms attract insects that pollinate the plants as they buzz from flower to flower. Because insect pollination is so efficient, goldenrod does not have to produce much pollen.

Not so the dowdy ragweed, however. Its flowers are too unattractive to entice insects, so ragweed relies on the wind to carry its pollen from one plant to another. Since wind pollination is random, ragweed must produce enormous quantities of pollen to ensure that pollination will occur.

Goldenrod relies on agents like the monarch butterfly to pollinate itself, while ragweed must fill the air with pollen to insure pollination by wind.

Because goldenrod is the flashier-looking plant, it has traditionally been blamed for causing so many people such misery, but the inconspicuous ragweed is the real culprit.

9. A wildflower procession

Along the trail, you have probably seen many wildflowers and grasses in various stages of flowering or bearing seed: the small white flowers of shepherd's purse in spring; the fragrant, purple clovers of early summer; the daisy-like blooms of asters in fall. By late autumn, spring and summer wildflowers have already gone to seed. Instead of flowers, they are adorned with berries, cottony tufts that catch the wind, or fuzzy seed pods that stick to your clothes.

The floral parade that begins in March with the tiny Carolina whitlow grass and ends in November with the club-shaped flower cluster of seaside goldenrod is no random event. Each plant has a specific period of time to put forth leaves, develop a flower, bloom, and produce seeds. A plant may flower just as a specific insect emerges that is especially good at pollinating that particular plant. Another may

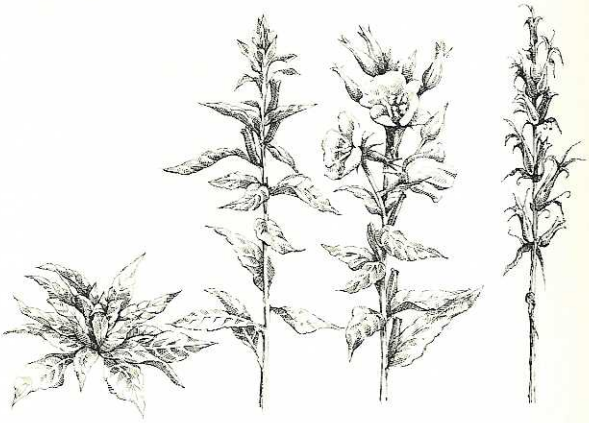
produce fruit just in time for it to be eaten by migrating birds that will carry the seeds far and wide.

Many adaptive factors make plants that flower at certain times successful at reproducing, but all plants are governed by one factor: the duration of darkness at night. Plants contain a chemical that inhibits the development of flowers unless the plant is in the dark for just the right amount of time.

Most plants are either long-day or short-day plants. Some short-day plants flower in the spring when nights are long and days shorter. Long-day plants bloom in summer, when days grow longer and nights shorter. Plants that bloom in autumn are also short-day plants, but they flower only when they have long periods of dark (spring), interrupted by short nights (summer), followed by short days and long nights (fall).

10. Round the mulberry tree

The tree in front of you is a white mulberry, a native of China and a species first planted in this area around 1830 near Flushing. Planting white mulberries was the first step in establishing an American silk industry, since its leaves are the preferred food of the silkworm, the larva of the silk moth.



Evening primrose by season: the basal rosette of winter; leafy stem of spring; leaves and flowers of summer; and dry stem and leaves with fruit in autumn.

The silkworm spends its larval stage eating mulberry leaves. After 25 days, the larva becomes a pupa by enclosing itself in a cocoon. Formed by the silkworm's saliva at the rate of six inches per minute, the completed cocoon is about 1,000 feet of silk thread. Before the caterpillar can emerge as a moth (and break the silk thread), it is killed; its cocoon is soaked in solutions; and its silk thread is unwound by hand.

Since it takes a ton of mulberry leaves fed to thousands of silkworms to produce one pound of silk, many white mulberries were planted in this country in the last century. Once sponsors of the fledgling silk industry realized that the labor-intensive process was too costly for the U.S., however, they abandoned the idea. All that remains of the industry are white mulberries, which are now fairly common in the Northeast.

11. The original Flatlands

Below you the level of the ground is about the level of the original land before it was filled in. The vegetation is similar to the original plant community that once grew from the edge of the saltmarsh to about a mile inland from here. The meadow filled with bayberry, marsh elder, and black locust is characteristic of the village of Flatlands or New Amesfort, as the area was known to the Dutch.

The Dutch and the Indians before them respected the marsh, while they made their living from it. But over time, respect was replaced by a reckless disregard for land that could not be built on, and many wetlands were filled in. Today, attitudes are changing once again to one of respect for the few marshes left, admiration for their particular beauty, and appreciation of their contribution to the health of coastal waters.

We have come full circle – and so has the trail. We have returned today to value marshes, meadows, and other open spaces that the earliest New Yorkers treasured. We must all support the preservation of these special places so that they will remain for future generations to enjoy.

TRANSPORTATION

For more information, call (718) 965-8917.

Bus: B-46, B-2, or B-41 to Kings Plaza; transfer for westbound B-3 bus to Burnett St. and Avenue U.

Subway: M or D train to Avenue U station; take eastbound B-3 bus to Burnett St. and Avenue U.

Car: Belt Parkway to Kings Plaza exit, then north on Flatbush Ave. to Avenue U; turn left on Avenue U and continue west for ten blocks; pass E. 33rd St. and look for Marine Park recreation area on right.

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