

Restoring New York's Oysters

How volunteers and scientists are fighting an uphill battle to bring the mollusk back to the city's waters.

Posted By [Eric R. Olson](#) on September 10th, 2008 in [environment](#) | [etc](#)

Maybe if oysters had teeth, it wouldn't be so weird to see one scrubbed with a toothbrush.

It's even stranger when you consider that the oyster was just pulled out of the Gowanus Canal, historically one of the filthiest and most wretched bodies of water in Brooklyn. The four-mile channel has been used as a dumping ground for industrial waste and sewage for most of its 138-year history and was recently [1] [noted](#) for harboring the sexually transmitted disease gonorrhea.

With her hands protected by only a thin layer of white latex, Jackie Godleski, a 47-year-old personal assistant to a music executive and a resident of Brooklyn, pulls a basket full of live oysters out of the canal. She selects one of the small, gray, rock-like mollusks from the hundreds in the clear plastic tub in front of her and begins to scrub it delicately with her little red toothbrush.

[2] [Click here](#) to see a video about oysters in Brooklyn's Gowanus Canal.

"What I normally do, because they have a lot of sediment on them, is I flush the oysters out. I give them a little bit of a shower," says Godleski from under a profusion of burgundy-red hair that partially obscures her face. "This water is really, really dirty today," she adds.

Godleski's goal in cleaning the oysters is to aid them in their survival and also to monitor their growth. She wants to determine if oysters can flourish in the canal at all.

And she is [3] [not alone](#) in her efforts. A small army of volunteers around New York City are trying to restore oysters to New York's waterways. At the nexus of the effort is the [4] [New York/New Jersey Baykeeper](#), an environmental organization dedicated to the preservation of the New York watershed. It has enlisted some 400 volunteers, mostly kids from public schools and adult volunteers like Godleski, to help get the ball rolling. Several other activist [5] [organizations](#) are involved in the movement, as well as some independent scientists and researchers.

The ultimate goal of the effort is to restore the oysters so that they can filter particles out of New York City's murky waterways and begin to restore balance to a fractured ecosystem. However, the initiative faces almost insurmountable odds. Although the waters around the five boroughs once supported a thriving ecosystem teeming with life, they are now largely polluted wastelands inhospitable to oysters and other marine creatures.

But even those outside of the movement remain hopeful. "It is well within the realm of possibility that oysters could return to populations from a century or two ago," says [6] [David Bushek](#), a marine scientist at the Haskin Shellfish Research Laboratory at Rutgers University in New Jersey, a stone's throw away from New York Harbor. And yet, that "realm of possibility" remains a long way from certainty.

Mollusks in Manhattan

It's four o'clock on a Saturday afternoon, and I find myself sitting at the long marble counter in the cavernous, dimly lit Oyster Bar hidden under Grand Central Station in Manhattan. As people above me scurry to their trains and subway routes, I slurp the slimy, gray mollusks out of their shells and sip on a cold Heineken.

I've ordered the local oysters, or at least as local as one can get. They're all from nearby Long Island and bear the names of the places where they were harvested: Mattitock, Shinnecock, Oysterponds and Fire Island. Looking at the hand-scrawled, catch-o-the-day board that hangs on the wall, I see that I can get oysters from a myriad of

other places including Rhode Island, Connecticut and even as far away as California, Washington State and Mexico's Baja peninsula.

Conspicuously absent from the menu are oysters from any of the five boroughs. Even though I am in a city surrounded by water that was once ideal for oyster-growing, local oysters—that is, ones pulled straight out of the harbor—aren't offered here or anywhere else. In fact, they've never been on the menu at the Grand Central Oyster Bar, even when it first opened in 1913.

This lack of homegrown oysters hasn't always been the case. The American oyster, *Crassostrea virginica*, once abounded in the waterways of New York. At one time there were close to 350 square miles (900 square kilometers) of oyster reefs in the area. Up until the early twentieth century, oysters were farmed on the shores of the East River, producing today's equivalent of a \$233 million annual trade.

Oysters were so abundant and readily available that they were sold as fast food in lower Manhattan. Mark Kurlansky writes in his book [7] *The Big Oyster: History on the Half Shell*:

"It was not necessary to go to a market to find an oyster stand unless one was overtaken by the urge late at night. They were located throughout the city, as commonplace as hotdog stands today—street carts or dilapidated shacks with a window through which oysters were passed."

But eventually overpopulation in New York led to an untenable situation for its oysters. In addition to the pressure of overfishing, the mollusks soon found themselves suffocating in the very things they like to eat: algae.

Like any other plants, algae need a nitrogen source to grow, and that's exactly what raw sewage provides: a nitrogen-based chemical called nitrate that acts as a fertilizer. In 1910, there were roughly 600 million gallons (2.3 billion liters) of raw sewage flowing into New York waterways every year, creating massive algal blooms.

On its own, excess algae isn't necessarily a bad thing. The problem is that this hyperactive growth of algae soon burns itself out, and the blooms begin to die off en masse. As they decompose, the tiny carcasses of the algae suck oxygen out of the water. This creates a state known as "environmental hypoxia," or lack of oxygen. And because aquatic creatures need oxygen to breathe, everything soon croaks—including the oysters.

Losing oysters created a serious problem for the ecosystems in the Big Apple's waterways. Aside from being a delicious snack for New Yorkers, oysters also provided a much more crucial service—keeping the water clean and clear.

Oysters are masters of filtration, sifting sand, sediment and algae out of the water. A single adult oyster can siphon about one to two gallons of water (four to eight liters) per hour, which adds up to 24 to 48 gallons (96 to 192 liters) per day. Without this filtering, sunlight cannot penetrate to the sea floor, and the whole ecosystem that is dependent on the plants growing there collapses.

[8] [Click here](#) to see how oysters can clean up waterways.

Besides spurring algae growth, raw sewage often contains infectious bacteria, which ultimately led to the demise of the New York oyster industry. In 1927, the New York City Health Department declared oysters unsafe to eat. The last oyster beds were closed due to a fear of infection by the *Salmonella* bacteria that cause typhoid fever.

With no one cultivating oysters in the five boroughs and deteriorating water conditions, the New York oyster population took a major hit from which it has never really recovered. And because the fear of typhoid fever was already around by the time the Grand Central Oyster Bar opened, New York City oysters never made it onto their menu.

Given the sewage bath that any remaining oysters are probably living in, I'm quite content eating my oysters from farther out on Long Island . . . or maybe even trying the ones from Mexico.

Getting Charged Up About Oysters

Standing on the sandy, litter-strewn beach in Queens on a small point that sticks out into Long Island Sound, you can see the Bronx in the distance across the water. Long Island Sound is the body of water sandwiched between Connecticut and Long Island that was once considered part of the East River—and was prime oyster-growing territory.

Nearby, several seven-foot tall [9] [helical metal structures](#) attached to pilings jut out of the water. Sitting a few feet away on the beach are square metal racks that look like over-sized versions of the cooling racks used for baking. Atop the pilings are solar panels reaching up to collect the sun's energy and turn it into an electrical current that will charge up all this metal.

"Tom if we're going to make a move now, I want to make it work, so I'll spend the money to get it. Let's just do it—we'll get a 200-watt panel and juice the hell out of them, man," exclaims [10] [James Cervino](#), a fast-talking native of Queens and marine pathologist at Pace University in New York City.

He is talking to [11] [Tom Goreau](#), a curly-haired, bearded geochemist with a non-profit group, the Coral Reef Alliance. Goreau is standing in waist-high water, wearing green, rubber hip waders and measuring the electric current around the base of the metal helices.

Electricity, water and people typically don't mix, but they do here at the [13] [Electric Oyster Project](#), the brainchild of the two scientists. They want to know if [12] [Click here](#) to see a slideshow about the Electric Oyster Project. electricity can help oysters to grow in New York's waters. Glued to the metal helices poking out of the water and sitting on the large metal racks are oysters being "juiced" with 17 volts of solar electricity, enough to power a low-wattage electric light bulb.

In previous research, Goreau has found that mild doses of electricity help sea corals to grow faster and stay healthy. Although he says that the mechanism is poorly understood, he thinks the same approach can be used with oysters. "The key thing we want to know here is how to get better survival, or better growth, or better filtration," says Goreau.

Shelled creatures like [14] [oysters](#) need calcium carbonate—more commonly known as limestone—to build their shells. Goreau has found that running an electric current through metal immersed in sea water plates the metal with the calcium carbonate found naturally in the surrounding water. It is possible to see faint traces of a white substance building up on the electrified metal.

The end goal of the Electric Oyster Project is to grow a synthetic oyster reef using this method. They hope to electrify all the rebar (the metal that reinforces concrete), dumped here after the 1964* World's Fair, and coat it in limestone. "Oysters don't want exotic crap, they don't want algae, they want good, clean limestone," says Goreau.

Oysters may need this extra boost from such a solar-powered, synthetic scheme. The beach we're standing on, much like the Gowanus Canal, was once heavily polluted. Through the years this area has served as a Navy shipyard, an illegal dumping ground for toxic waste, and a sewage treatment plant. Cervino, who grew up in this neighborhood now known as College Point, says that it wasn't until 15 or 20 years ago that marsh grass would even grow along the shore.

Now you can see marsh grass and a plenitude of red ribbed mussels growing in dense clumps along the shoreline. But no oysters.

Shelling Out Solutions

Improvement to local environments, like College Point or the Gowanus Canal, make oyster-growing seem more feasible. But the plan to restore oysters to their original levels has many hurdles to overcome. Perhaps the biggest challenge is that there simply aren't enough oysters to create a population that can renew itself without human intervention.

"It's like trying to push a boulder up a hill. You can hold it in place, but if you let it go it will roll back down. If you reach the top of the hill, the boulder rolls down on its own," says David Bushek of Rutgers University. He says that the situation is the same with oysters: Once they reach a large enough number, the population should gain enough momentum to sustain itself.

And the oysters will need to replenish their own numbers if they are going to reach a population level where any significant filtering can happen. Roger Newell, an oyster scientist at the University of Maryland's [15] [Horn Point Laboratory](#), says that billions of oysters would be required for substantial filtering to occur in the

Chesapeake Bay, where a similar restoration [16] [project](#) is underway.

But he says this currently isn't realistic in the Chesapeake. So far, their efforts have [17] [failed](#) because of oyster-killing parasites in the water and algal blooms caused by farm runoff. Oysters can be part of a water filtration plan, he says, but reducing the inputs from agricultural runoff and sewage treatment plants is an equally important factor in restoring ecosystems.

"Their idea of oyster restoration in the Chesapeake is just to take oysters by the millions and dump them in the water, but the reason that they died was due to infections. If you're going to take the oysters and put them back in the same water where they died from an infection, that's a top-down solution to a bottom-up problem," says Cervino, co-founder of the Electric Oyster Project.

According to Katie Mosher-Smith, New York coordinator for the Baykeeper's restoration project, untreated sewage, the stuff responsible for creating low oxygen levels, is still flowing into New York's water. This is because New York has a so-called [18] [combined sewer system](#), which means that when it rains, the human-waste sewer provides back up for the storm sewers that dump out into the ocean. "Every time there is more than a quarter inch of rain, the sewers drain out into New York Harbor," says Mosher-Smith.

In addition, Bushek says that the water conditions in New York Harbor have not just changed from sewage runoff but also from water entering the area from upstate via the Hudson River. There is now much more nitrogen fertilizer coming down the Hudson from upstream sources, like farm runoff, than when oysters were plentiful. "It's unclear how [the oysters] will be restored because the whole system has changed," says Bushek. However, despite these challenges to water quality, Bushek remains positive that oysters can and should be restored.

Ironically, another major challenge to repopulating oysters is that once their numbers begin to rise, people might start eating them illegally. This would be unwise because, in addition to a risk of bacterial infection, New York shellfish are known to be contaminated with harmful industrial pollutants like lead and polychlorinated biphenyls, commonly known as PCBs, that accumulate in their tissues. Suffice it to say, eating any restored oysters would pose a serious health hazard. This concern has caused the New York City Health Department to discourage the restoration of oyster reefs. Bushek says that enforcement of laws prohibiting oyster harvests for human consumption would have to be part of any restoration plan.

One solution to this gastronomic problem, proposed by Danielle Kreeger, a marine biologist at Drexel University in Philadelphia, is to grow another kind of shellfish altogether, called the ribbed mussel. Bushek says this type of shellfish isn't as desirable to eat as oysters but is actually better at filtering water. The New York State Department of Environmental Conservation has also pushed the idea of growing these mussels.

However, oyster proponents like Meredith Comi, oyster program director with the New York/New Jersey Baykeeper project, point out that while mussels are good filterers, they don't build reefs like oysters. Oysters create reefs when older oysters die and the younger ones take up residence on top of them. Through successive generations, a limestone reef is built up, creating habitat for other marine creatures. The mollusks naturally like reefs because of all the available limestone in the water seeping from the old shells, which they can, in turn, use to build new shells.

The Power of One, The Power of Many

As with many projects so grand in scale, the goal of restoring oysters comes back down to the effort of individual volunteers. Organizers want as many people as possible growing oysters and contributing their efforts to the reef-building project. "We want to overload the system with gardened oysters," says Comi.

Cervino of the Electric Oyster Project echoes this idea. He sees his work as much a social engineering project as an environmental one. "We want students to be able to use this [beach] as a classroom," says Cervino. "The goal is to infect other brains so we can create a domino effect."

Mosher-Smith of the Baykeeper group says that there are probably 30,000 oysters in the water now as part of the project but that it will take "millions and millions" of them to someday contend with the gargantuan task of filtering all the water flowing around and through New York City.

**Correction (October 12, 2008): This sentence originally mentioned the 1963 World's Fair. The World's Fair*

was in fact held the following year, in 1964.

Location: <http://scienceline.org/2008/09/10/env-olson-oysters/>

URLs in this post:

- [1] noted: <http://scienceline.org/2007/09/26/env-phillips-gowanus/>
- [2] Click here: <http://scienceline.org/2006/09/10/video-olson-oysters>
- [3] not alone: <http://www.gowanusoysters.com/>
- [4] New York/New Jersey Baykeeper: <http://www.nynjbaykeeper.org/programs/42>
- [5] organizations: http://www.riverproject.org/research_07Oyster.php
- [6] David Bushek: http://www.marine.rutgers.edu/faculty_dbushek.html
- [7] *The Big Oyster: History on the Half Shell*: <http://www.nytimes.com/2006/03/05/books/review/05royte.html>
- [8] Click here: <http://scienceofthetimes.com/sciline/oysterinteractive.html>
- [9] helical metal structures: <http://www.calamara.com/transcriptase.html>
- [10] James Cervino: http://www.pace.edu/page.cfm?doc_id=27888
- [11] Tom Goreau: <http://www.globalcoral.org/Goreau%20Bio.htm>
- [12] Click here: <http://scienceofthetimes.com/sciline/oysterslideshow.html>
- [13] Electric Oyster Project: <http://www.nytimes.com/2007/07/22/nyregion/thecity/22oyst.html?ex=1342756800&en=b92eb70924e6fccd&ei=5088&partner=rssnyt&emc=rss>
- [14] oysters: <http://www.sciencefriday.com/videos/watch/10055/>
- [15] Horn Point Laboratory: <http://hpl.umces.edu/ERI/oysters.html>
- [16] project: <http://www.dnr.state.md.us/fisheries/recreational/articles/oysterrestoration.html>
- [17] failed : <http://www.wtop.com/?sid=1234349&nid=25>
- [18] combined sewer system:
http://www.nytimes.com/imagepages/2007/08/11/nyregion/20070811_DRAIN_GRAPHIC.html

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