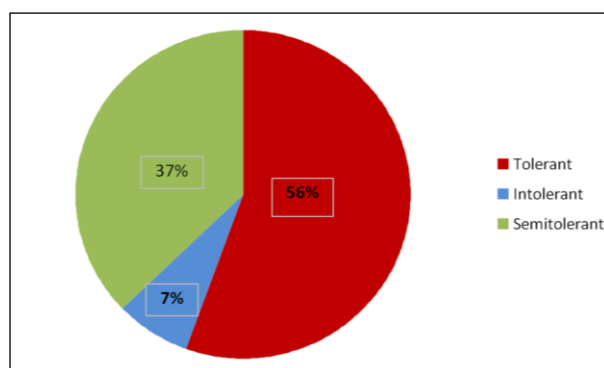


# THE NEW YORK BOTANICAL GARDEN

## Biological Indicators on the Bottom of the Bronx River

### Project Summary:

Since 2010, The New York Botanical Garden has been working with students, teachers and citizen science volunteers to gather data about benthic macroinvertebrates in the Bronx River. Benthic freshwater macroinvertebrates are animals without backbones that are visible with the naked eye, living on the bottoms of streams, rivers, lakes, and ponds. These samples are collected in leaf packs or mesh bags filled with leaves anchored to the river bottom. By catching, identifying and counting what is found in these mini-ecosystems, students connect with nature and establish their own conclusions about the level of pollution in the water. The demand for hands-on ecological monitoring experiences for middle school and high school students in New York City is high. Over 2,000, NYC students participated in benthic macroinvertebrate surveys at the Garden in 2010 to 2014. The data for the Bronx River and other small tributaries flowing into the river shows a dominance of pollution tolerant species (Figure 1, Table 1).



**Figure 1.** Benthic macroinvertebrates found in leaf packs in Bronx River 2010 to 2014.



**Figure 2.** Mayfly larvae found in a Bronx River leaf pack, Fall 2013.

|                           |             |
|---------------------------|-------------|
| Stoneflies                | 1           |
| Caddisflies               | 2           |
| Common Netspinners        | 2           |
| Other Caddisflies         | 2           |
| Dobsonflies-Hellgrammites | 15          |
| Alderflies                | 10          |
| Watersnipe Flies          | 0           |
| Snails                    | 39          |
| Dragonflies               | 1           |
| Damselflies               | 1           |
| Beetles, Water Pennies    | 0           |
| True Flies                | 0           |
| Crane Flies               | 1           |
| Crayfish                  | 0           |
| Midges                    | 609         |
| Black Flies               | 3           |
| Scuds                     | 1374        |
| Aquatic Sowbugs           | 1369        |
| Aquatic Worms             | 47          |
| Leeches                   | 100         |
| Planarians                | 235         |
| <b>Total</b>              | <b>3827</b> |

**Table 1.** Total benthic macroinvertebrates found in leaf packs in Bronx River, 2010-2014.

| Macroinvertebrate | Totals |
|-------------------|--------|
| Mayflies          | 16     |

“The citizen science volunteers who facilitate these student investigations love nothing more than an unexpected surprise. We take pride in the finding of mayflies (Figure 2.) – and even on occasion, a winter stonefly – in the Bronx River as far south as The New York Botanical Garden. We appreciate all the effort that has gone into environmental restoration for decades that makes this kind of survival possible. With these data, we also have a better understanding of how much more needs to be done to increase the populations of pollution intolerant insects in the Bronx River. These intolerant species of metamorphic aquatic insects—in their adult flying stage—are an important source of animals such as birds and frogs. Also, for our human comfort, dragonflies and damselflies significantly reduce mosquito populations,” Bob Ward, lead citizen science volunteer instructor and retired teacher.

**Survey Site for Monday, August 18, 2014:**

8:00–11:00, The New York Botanical Garden, south canoe portage.

**Organizations:** The New York Botanical Garden

**Contact:** Jessica A. Schuler, Director of the Thain Family Forest, The New York Botanical Garden. Email: [jarcate@nybg.org](mailto:jarcate@nybg.org) ; Cell: 914-329-6395

**Additional Resources:**

To find out more about the Garden’s Citizen Science Program, apply here:

[http://www.nybg.org/support\\_the\\_garden/volunteer/application.php](http://www.nybg.org/support_the_garden/volunteer/application.php)

If you are a **student**, **teacher**, or **principal** looking to incorporate more citizen science into your school's curriculum, please contact Jamie Boyer, Ph.D. ([jboyer@nybg.org](mailto:jboyer@nybg.org)) for more information.

NYBG Citizen Science, <https://sites.google.com/site/nybgcitsci/water-quality>

Stroud Leaf Pack Network, <http://stroudcenter.org/lpn/>

**Acknowledgements:**

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Thank you to school administrators and teachers that have made these hands-on learning experiences possible for NYC students.