

Organism Survey

Objective: Students will use field guides in teams to identify organisms in a particular area to gauge the biodiversity and ecological health of the area.

Materials: Worksheets, clipboards, field guides (to identify trees, birds, plants, insects, other organisms). Hand lenses, organism viewers or “bug boxes,” sketching supplies, digital cameras, and/or measuring tapes are nice additions. The advanced activity lists additional materials.

ACTIVITY SUMMARY:

Students prepare and undertake an organism survey along the Bronx River. Students work in groups to identify organisms they find in a predetermined area. Students make observations and note area conditions. Students share data and discuss how conditions impact species, populations, and individuals.

Advanced students may engage in data collection using a transect method, and expand their survey up to and including a full impact study.

BACKGROUND INFORMATION:

Ecologists survey the plants, animals and other organisms in an area to determine its ecological health. They hope to find balanced, working food webs and ecological services. Urban ecologists are also interested in which species are carrying out which jobs. Are they *native*? *Invasive*? *Has one species replaced another* (e.g. feral cat takes over niche formerly occupied by red fox, etc.)?

NOTE: It is unethical and illegal to collect living material and remove it from the site without a permit.

Be sure natural items like leaves are not picked from thriving plants. Check leaves and other items for amphibian and insect eggs, and encourage a “tread lightly” ethic. Explain that the areas along the river are for everyone to share, and each time we visit, it is our turn to take care of it.

See the special Inside Track box at the end of this lesson for policies and instruction regarding study and collection along the Bronx River.

SOME EXPERIENCE

IN THE CLASSROOM AT THE RIVER

Skills:

Reading/Writing, Communication, Using Scientific Tools, Research, Teamwork, Observe/Compare.

Subject/Discipline:

Science, Math, the Bronx

Science standards:

S2, S4, S5, S6, S7, S8

Grades 9 – 12; some portions may be adjusted for 3 – 8.

Time:

Several classroom preparation sessions; at least three outdoor sessions and planned assessment and reporting.

The Inside Track:

Contact the Bronx River Alliance (718-430-4665) for the latest site conditions. A native species list is available in the back of this guide and on the Alliance website: <http://www.bronxriver.org/theRiver.cfm#list>
2005 Bronx River BioBlitz information may be viewed at <http://www.bronxriver.org/bio blitz.cfm>



Urban food webs experience unique stresses different from those of undisturbed areas:

- Development impacts such as bulkheads, paving, and electrical current from buried and hung wires.
- Pollution impacts from automobiles, surface runoff, and CSO's.
- Invasive species introduction.
- Feral domestic species invasion.

These stresses can cause changes in biochemical cycling and in turn may cause organisms to change niches, behaviors, or leave altogether. Making matters more complex, some changes provide an optimal situation for non-native or invasive species to exploit and take over an area. For more information, see the introduction pages to *IS THE BRONX RIVER HEALTHY?* and *ECOSYSTEMS*.

PROCEDURE:

Prep

If possible, walk through the area you will be using ahead of time and ensure there are some plants and animals that you can point out to your students and that they can be found in the field guides the student will be using.

Review the site descriptions in this guide for information on the area you want to visit. Contact a local naturalist or environmental educator who is familiar with the area or habitat of your study. Ask them about specific species or phenomena you should be watching for and about potential hazards of the area or habitat. Invite them to join your group during the field study. If this is not possible, see if they can visit your group before or after the trip for a discussion and interview with your students.



Have a discussion with your students about the purpose and goals of the trip. Work together to generate clear procedure guidelines and a plan of action. To ensure that flora and fauna are protected, provide clear instructions to students on which types of organisms should be handled with care and those that should be only observed. Consider having viewing boxes available to protect creatures while on view. An animal should only be caught if doing so will not adversely affect its health, should be detained only briefly, and released in the same area where it was found.

Survey Design

Your survey should include the following:

1. State the problem or hypothesis you are addressing. Students must have an understanding of why they are conducting the study. Less experienced students may simply want to know what species of plants and animals are present at the site, while more advanced students may wish to answer a more complex question such as: *Do certain species of birds prefer certain species of trees for nesting?*

Once you have settled on what you are trying to find out, you can select the survey type that fits best:

- Descriptive survey: species diversity and abundances (basic sheet provided at the end of this lesson).
- Baseline survey: a reference to future comparisons (basic sheet).
- Impact study: detect changes due to a specific cause (advanced - requires a control site).
- Criteria for a control site: ecologically similar in every way to the impact site except for the absence of potential impact (advanced).

You may wish to use the basic data sheets we have provided or create your own.

2. Select a site to sample that fits your criteria for the study (the study site).
3. Decide where to sample at your site (the study area): consider the general characteristics of the area(s) in relation to the objectives of your study.
4. Use the appropriate method of study – direct-passive observation, photography, sketching, note taking, etc.
5. If you plan to revisit the area in the future, repeat sampling studies at regular intervals. Sample the same areas and be consistent in methods between surveys.

In the Classroom

1. Introduce the idea of an ecological survey. Ask students what plants and animals they saw on their way to the site and the specific names of trees, plants, animals, etc. They may not know many of them, and use this to make the point that these organisms are different and identifiable. Tell students the goal of the ecological survey is to get a better description of the area so we can learn more about it specifically.
2. Show students the worksheet, and explain the sections. (Don't break into groups yet – they will get distracted.) Point out that they are going to be identifying organisms, counting how many they see, and making observations about them. Give example observations such as: *I saw two grey squirrels. They were digging around the base of the large oak tree by the path.*
3. If you will be working with a naturalist who knows the area well or you know the area well yourself, use the second page of the worksheet: "Questions for a Local Naturalist." Introduce it by asking students if they think they can identify every single organism in your study area. What about birds that don't happen to be there while you are there? What about underwater animals? What about plants and animals that are not present at this time of year? Explain that the students will have an opportunity to interview a local naturalist who will be able to give them a more thorough picture, so they should keep in mind questions they might ask this person.



*Alewife reintroduction project, Bronx River, 2006.
Photo by Joyce Dopkeen, The New York Times.*

In the Field

1. Break students into groups of three and have them choose their roles: Animal Specialist, Plant Specialist, or Recorder. You may wish to add the option of switching roles at a pre-determined time.
2. Have the Animal and Plant Specialists pick up the appropriate field guides, while the Recorder gets the clipboard with the worksheet and pen or pencil.
3. Walk the students around the area you have selected for study. Keep the students engaged by emphasizing their roles and their responsibilities. As you see plants or animals you would like the students to identify, ask for the attention of the Plant or Animal Specialist as appropriate and walk them through using the field guide to identify the organism. Remind the Recorders to record the data accurately.
4. After completing your tour, have your students work in their groups for about five minutes to come up with three questions. Have students interview the local naturalist or present questions to the entire class as a group. You may find that species common to the area are absent on your survey. Make a note of this on the second page of the worksheet.
5. Review the experience with the students. Ask students if there was anything that surprised them, what their favorite plant or animal was, and if they think they did a complete job of surveying the area, etc.

Back in the Classroom

Remember, *data* are NOT *information*.

Information is knowledge gained through study, processing, manipulating and organizing data in a way that adds to the knowledge of the person receiving it. You will need to interpret your data. Work with your class to:

1. Generate species lists.
2. Compare concentrations of species in different areas.
3. Create charts, graphs, and reports to explain your findings.

Hold a discussion with your students regarding the biodiversity of the area. Did they see any patterns or things that surprised them? Your study can identify species that should be monitored or controlled and may identify aspects of the area that are not known. The more information we have about biodiversity in the Bronx, the better able we are to protect the habitats that support them.

You may also be able to provide recommendations on how to improve or maintain an area. For example, you may have found an area with a great number of species, and very few invasive or non-native species. Perhaps this area should be considered for protection. Likewise, it would be important to note if an invasive species appears to be spreading. A restoration crew may be able to stop it. Plan to share this information with the Bronx River Alliance, other people at your school or organization and your community.

ADVANCED:

Field scientists often employ a *transect* to ensure a fair representation of species populations. Transects may be a simple one-meter square: a grid with an x- y- axis (quadrants), or a measured line across a large area that denotes “bands” of study. For formal scientific study, one must sample at random. This type of collection yields a faithful and typical representation of the population in the sample.

Why is this different than writing down everything you see in an area?
 Species may seem to occur at random – but usually this is not the case. By analyzing transect data from many parts of an area – one may see patterns that can identify a pollutant, foreshadow an ecological event, or spot a species in trouble.

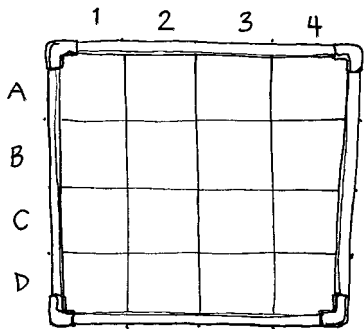
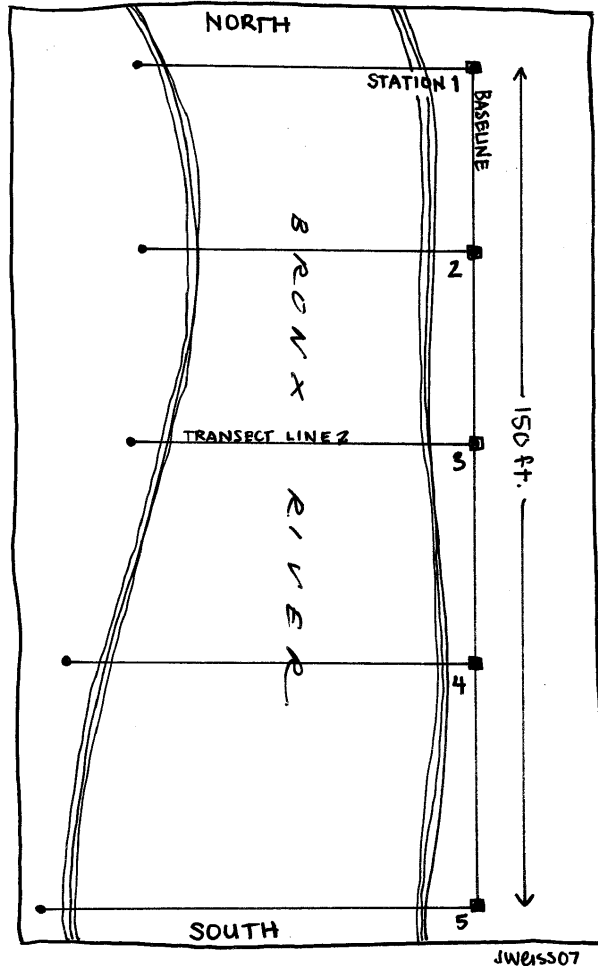
Transecting the River

STOP: YOU MUST HAVE PRIOR PERMISSION FOR THIS TYPE OF ACTIVITY ON THE BRONX RIVER. Contact the Bronx River Alliance before proceeding: 718-430-4665.

You will need a hammer, 10 stakes, 300 ft. of lightweight cord or rope, a 100+ ft. measuring tape, some flagging tape, a permanent marker, a pencil, your data sheets, and waders.

Select a 150 ft. stretch of river that is shallow enough for safe navigation in waders. On one side of the bank, hammer a stake in the ground at each end of the stretch. Tie the cord from stake to stake to establish a baseline.

Every 30 ft. hammer a stake and mark with flag tape. Mark each station consecutively with a marker. Run cord (this is the transect) from each station across at a 90° angle (perpendicular) and stake. Each stake along the baseline is a “station.” Number them with the marker north to south 1-5. Data collection takes place along the cord across the river. Each time you note a species, use the measuring tape to measure from the station stake to the species.



Transecting on Land

The most efficient transect method on land involves use of a grid. This can be made of PVC pipe (weatherproof and stays rigid) or 2x2 lumber fastened in a frame with string stretching across to form the grid. Data collection takes place as you work your way from quadrant to quadrant as per your group’s predetermined protocol. An entry may read:

A, 2 Purple loosestrife non-native; invasive

Your data sheet should include placement of the grid with GPS coordinates or measurement from a permanent landmark.

EXTENSIONS:

How can I make my data useful?

Ideally, you will want the information collected to be useful to other scientists now and in the future. Contact the Bronx River Alliance (718-430-4665) to check if current studies require data to be in a specific format. If the protocols are appropriate for your students, adopt their guidelines and forms. We have included a sample data sheet from the *2005 Bronx River BioBlitz* at the end of this lesson.

It is also essential that your data entry is consistent, organized, and error free:

Survey Execution: minimize errors

- Write/report clearly and legibly.
- Review data sheet during survey and make sure it is complete and you can read it.
- If several people are involved, standardize how the data are taken (requires training).

Data Management: considerations after the survey

- Have a data manager. Assign one person to collect and hold the data.
- Review data sheet after survey and make sure it is complete - including header/date/time/conditions, etc.
- Always make copies of data after fieldwork. Keep in different locations.
- Enter data into a spreadsheet program like MS Excel or a database on a computer maintained in a consistent format (Microsoft Access, for example).
- Verify database. Print out data and compare to raw data.
- This computer system should be on a back up schedule; copies should be kept in different locations.

Data Analysis: interpretation of results

- Summarize the data using means and standard errors for each combination of species, study area, and survey.
- Use graphs to display trends in means and standard errors in space and time.
- Test hypotheses using statistical methods appropriate for the data.
- Write a report, which summarizes the results and biologically interprets the trends discovered and hypothesis tested.
- Do something with what you have found: give a talk to your local community school, publish it in a newsletter or professional journal, and post it on the Internet. Submit a short article on your project for the Bronx River Biweekly Newsletter. Go to <http://www.bronxriver.org/calendarNews.cfm> to find out how to submit the piece.

Other ideas for extending the activity.

1. Have students research the area you plan to visit. Look for items on history, current level of protection, and how it is used (or not used) now. Select students to present their findings on site.
2. Have student lead overviews and tutorials of the different field guides, reference materials, and tools you plan to use in the study.
3. Make your own field guides. See *Nature Journaling* for bookbinding ideas.

4. Have students present their findings to another class featuring information about the different organisms they have found.
5. Have students lead a less experienced class on a field trip to the site.

Inside Track

Policies and Advice on Field Study and Collection

- If you are just making field observations, you do not need a permit.
- If you intend on collecting dead material such as leaves, seedpods or branches, please consider:
 1. You are removing biomass from the area. “Dead” material to you is potential energy and nutrients to the ecosystem.
 2. Removing seed and pollen material from an area can risk the spread of invasive species. Always identify specimens before removal.
- If you wish to capture or collect wildlife, the New York State Department of Environmental Conservation (NYS DEC) requires a permit for most species. To apply, contact:

The Division of Fish, Wildlife and Marine Resources
Special Licenses Unit
NYS DEC
625 Broadway
Albany, NY 112233-4725
518-402-8985
- If you wish to capture or collect wildlife in a NYC park, then in addition to the NYS DEC permit, contact NYC Parks Natural Resources Group (NRG) to discuss your proposed activity and obtain the necessary permits: 212-360-1464.



*Based on content submitted by Katy Guimond.
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Organism Survey Basic Data Sheet

Date/Time: _____

Location: _____

Recorder: _____

Plant Specialist: _____

Animal Specialist: _____

PLANTS FOUND

Name	# Found	Observations

ANIMALS FOUND

Name	# Found	Observations

QUESTIONS FOR THE NATURALIST

- | |
|----|
| 1. |
| 2. |
| 3. |

ADDITIONAL PLANTS AND ANIMALS MENTIONED BY THE NATURALIST

Plants	Animals

Advice for Designing and Advanced Data Collection sheet

Transect Grid Method

Quadrant	Species	# Observed	Notes Ex:
A,2	Purple loosestrife	19	invasive, spreading

Transect Band Method

Station #	Ft. from station	Location reference	Species	# Observed	Notes
2	13.5	In water column	Redfin pickerel	2	Swimming north into current

Bronx River BioBlitz

June 10-11, 2005

Observer: _____ Group: _____ Date: _____

Observation Session start: _____ Observation Session finish: _____ Sheet ___ of ___

	Genus	Species	Common Name	Location*	Notes
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

* Please record zone location. A-D located in Bronx River Forest, E=Shoelace Park, F= New York Botanical Garden, G=Bronx Zoo, H= Drew Gardens, I= Concrete Plant Park , J=Soundview Park

