Urban Ecology Muir Web
“When we try to pick out anything by itself, we find it attached to everything else in the universe.”
Food Web VS. Muir Web
Muir Web of Mannahatta

This Muir Web shows all the habitat relationships for all the species on Mannahatta. Visualization by Chris Harrison of Carnegie-Mellon University. © WCS
APARTMENT

(habitat)

Image: directoryofnewyorkcity.com
WHO LIVES HERE?

Humans, Rats, Mice, Bedbugs, Cockroaches
SOIL

(habitat)
WHO LIVES HERE?

Earthworm, Milkweed, Oak Tree
SUBWAY

(habitat)
WHO LIVES HERE?

Rats, Mice, Cockroaches, Squirrels, Pigeons
PARK

(habitat)
WHO LIVES HERE?

Rats, Mice, Cockroaches, Squirrels, Pigeons, Hawks, Earthworms, Milkweed, Oak Trees
STREET

(habitat)
WHO LIVES HERE?

Rats, Mice, Cockroaches, Squirrels, Pigeons
MILKWEED

(food source)
WHO NEEDS ME FOR FOOD?
Monarch Butterflies

WHAT DO I NEED FOR SURVIVAL:
Sun, Soil, Water
OAK TREE

(food source/ habitat)
WHO NEEDS ME FOR FOOD?
  Squirrels

WHO NEEDS ME FOR HABITAT?
  Squirrels, Pigeons, Hawks

WHAT DO I NEED FOR SURVIVAL:
  Sun, Soil, Water
HUMAN
Habitat
We occupy apartments, skyscrapers, subway stations, parks, bridges, streets

We are predators of:
Almost Everything!
Habitat
These insects can live almost anywhere! In Cities they have even made their way into our homes.

Food
Leaves, trees, sewage, cardboard, wallpaper, cloth, ink (almost anything!)

Predators
Toads, beetles, wasps, fungi
BED BUGS
Habitat
Seams and folds of mattresses, bed covers, and couches

Food
Blood (human)

Predators
Cockroaches, ants, humans (exterminator)
RATS

Image: exterminatorsnyc.com
Habitat
Subway Stations, Apartments, Large Buildings, Parks, Streets

Food
Almost anything: Trash, Food Scraps, Soap, Feces, grains, meat

Predators
Humans (exterminator), Hawk, Falcon, Snake
SQUIRREL
Habitat
Parks, Streets, Trees

Food
Nuts, seeds, fruits, Fungi, leaves, small insects

Predators
Humans (exterminator), Hawk, Falcon, Snake, Racoon
MONARCH BUTTERFLY
Habitat
Parks, Trees, Wetlands,
Food
Flower pollen, milkweed
Predators
Birds, Toads, Mice
EARTHWORM
Habitat

soil

Food

Soil (microbes, organic matter)

Predators

Humans, birds, moles, toads, snakes
GREY MULLET
Habitat
These saltwater fish live in oceans and estuaries

Food
Zooplankton, microalgae

Predators
Harbor seal, osprey
ATLANTIC SILVERSIDE
Habitat
These saltwater fish live in oceans and estuaries

Food
Phytoplankton

Predators
Blue crabs, ospreys, striped bass
PLANKTON
Habitat
These primary producers live in oceans and estuaries

Food
Sunlight, dissolved nutrients

Predators
Atlantic silversides, zooplankton
QUAHOG CLAM
Habitat
They live under the sand and mud of marine coasts in saltwater bays and estuaries and near bridge supports

Food
Plankton

Predators
Crabs, birds
Estuary/River Habitat
Habitat
An estuary is a brackish body of water where the river meets the ocean

What Lives Here
Osprey, piping plover, sand flea, clams, crabs, fish, plankton
The Sun is the main source of energy for life on Earth.

Energy enters the Muir web as plants absorb the ultra violet rays through photosynthesis.

The energy is transferred through the Muir web as plants are eaten by herbivores and herbivores are eaten by carnivores.
OSPREY
Habitat
Ospreys live along coastlines of rivers and estuaries, they build nests in trees and telephone poles

Food
Fish

Predators
Chicks are eaten by other birds such as hawks and owls
RED-EARED SLIDER TURTLE
Habitat
They live in and around ponds, rivers and marshes

Food
Fish, insects, plants

Predators
Snakes, large birds, large fish
RED-TAILED HAWK
Habitat
They soar in wide circles high over fields and parks to dive after food. They create nests in trees, under bridges, and top of skyscrapers.

Food
Mice, squirrels, rats, turtles, fish, earthworms

Predators
Owls, red fox
BRIDGES

(habitat)
Habitat

A bridge connects on piece of land to another crossing a river or estuary

What Lives Here

Clams, crabs, hawks, pigeon
SKYSCRAPERS

(habitat)
Habitat
These large buildings stand tall to allow for more horizontal space in urban areas

What Lives Here
Humans, hawks, pigeons, rats, mice, cockroaches
Habitat
They soar in circles high over buildings and dive after food into streets and parks. They create nests on high apartment buildings, atop of skyscrapers, and subways

Food
Grains, human garbage

Predators
Owls, red fox
PIPING PLOVER
Habitat
They are small shorebirds that nests and feeds along sand beaches along the coast and estuary.

Food
Plankton, sand flea

Predators
fox, crabs
SAND FLEA
Habitat
The sand flea lives in the intertidal zone and is capable of burying itself completely in 1.5 seconds

Food
plankton

Predators
birds
MICE
Habitat
Mice live in apartments, street, parks, subways, skyscrapers

Food
Garbage, grains, food scraps

Predators
hawk, ospreys, racoons,
Sanderson is calling this web a *Muir web* – named for John Muir, a California naturalist who emphasized the interconnection of all things in nature, and who worked to preserve wilderness in America. A Muir web shows how different species are connected to each other not only in that one may eat the other, but also, for instance, in that one species may provide shelter for another. A Muir web includes not only living species but also abiotic elements, like water, sun, soil and air. Such a web also includes habitats as discrete nodes. Though Sanderson has developed the Muir web model for Mannahatta, a Muir web could be applied to analyze relationships within any other ecosystem.