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Brooklyn's Urban Forest

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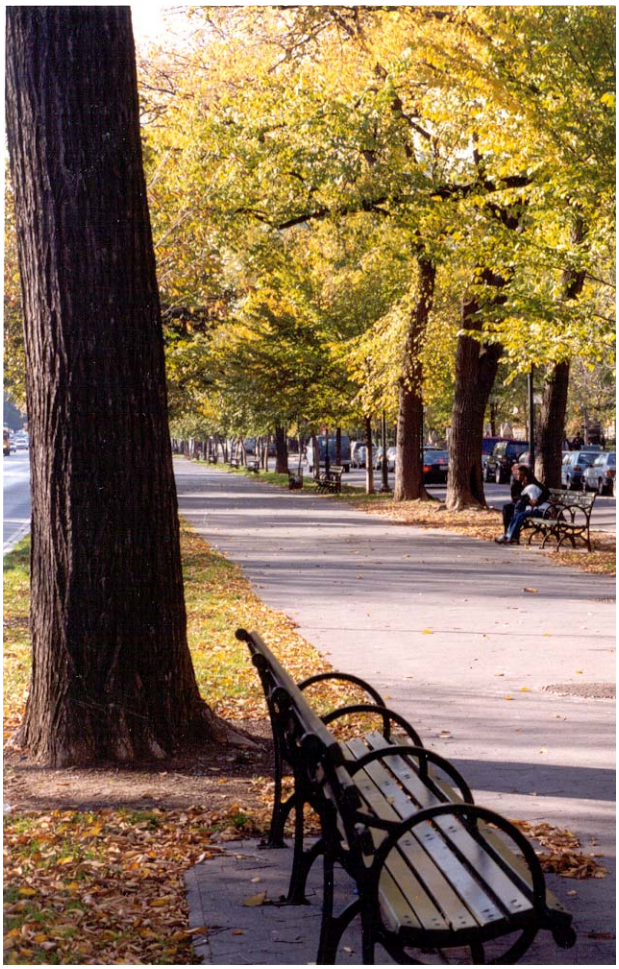
Borough of Brooklyn



Abstract

An assessment of trees in Brooklyn, New York, reveal that this borough has approximately 610,000 trees with canopies that cover 11.4 percent of the area. The most common trees are estimated to be tree of heaven, white mulberry, black locust, Norway maple and black cherry. These trees currently store approximately 172,000 metric tons of carbon with an estimated value of $3.5 million. In addition, these trees remove about 2,500 tC per year ($51,000/yr) and about 254 metric tons of air pollution per year ($1.3 million/yr). The replacement or compensatory value of Brooklyn's trees is estimated at $679 million. Potential damage from an Asian longhorn beetle infestation is $390 million (51 percent of the population). Management strategies are suggested for maximizing air quality and carbon benefits from urban trees.

The Authors

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Executive Summary

This report describes the urban forest structure of Brooklyn, New York, as well as the effects of this resource (i.e., all trees and other vegetation) on the local environment. Proper management of urban forests can improve a city's environment and, consequently, the health and well-being of its residents. In turn, these improvements can result in substantial economic benefits. The following summarizes the findings of this report.

Tree cover: 11.4% by Community District:

201: 3.0%	202: 7.8%	203: 19.6%	204: 15.6%	205: 8.4%
206: 9.5%	207: 17.4%	208: 11.0%	209: 13.8%	210: 17.1%
211: 7.4%	212: 11.2%	213: 9.1%	214: 17.8%	215: 12.0%
216: 8.0%	217: 11.9%	218: 10.2%	255: 50.9%	256: 6.3%

Other cover types:

Building:	34.5%
Impervious ground cover (cement; tar):	32.8%
Grass and soil:	20.8%

Number of trees: 610,000 by land-use type:

Open space:	239,600	(21.4% tree cover)
Residential (1-2 family):	147,300	(17.0% tree cover)
Vacant:	106,800	(2.8% tree cover)
Multifamily residential:	73,300	(9.2% tree cover)
Public facility:	28,200	(8.7% tree cover)
Commercial/industrial:	15,000	(1.9% tree cover)

Most common trees:

Tree of heaven:	125,100	(20.5% of tree population)
White mulberry:	46,800	(7.7% of tree population)
Black locust:	39,700	(6.5% of tree population)
Norway maple:	38,000	(6.2% of tree population)
Black cherry:	35,700	(5.9% of tree population)

Tree size: (trunk diameter at 1.37 m)

0.0-7.6 cm (< 3"):	24.1%	30.6-45.7 cm (12-18"):	11.9%
7.7-15.2 cm (3- 6"):	20.3%	45.8-61.0 cm (18-24"):	9.0%
15.3-30.5 cm (6-12"):	28.2%	61.1-76.2 cm (24-30"):	2.5%
		76.3 + cm (>30"):	4.0%

Tree condition:

Excellent:	42.4%	Poor / critical:	3.5%
Good:	39.0%	Dead:	5.2%
Fair:	9.9%		

Trees and carbon dioxide:

Through their growth process, trees remove carbon dioxide from the atmosphere. Each year, a growing tree sequesters some carbon; over the years, the tree can store a large amount of carbon in its tissue. When the tree dies, most of the stored carbon is released back to the atmosphere through decomposition.

Carbon storage:

172,400 metric tons (equivalent to the amount carbon emitted from Brooklyn's population in about 5 days based on average per capita carbon emissions), with an estimated value $3.5 million.

Gross annual carbon sequestration:

5,120 metric tons (carbon sequestration from living trees), with an estimated value of $104,000/yr.

Net annual carbon sequestration:

2,510 metric tons (estimated net carbon effect after accounting for decomposition emission of carbon from dead trees), with an estimated value of $51,000.

Individual tree carbon effects:

A large tree (> 83.8 cm in diameter) stores approximately 2.6 metric tons of carbon, 530 times more carbon than stored in a small tree (< 7.6 cm in diameter). A large, healthy tree sequesters about 48 kg of carbon per year, 47 times more than a small tree.

Effect of trees and shrubs on air pollution:

Trees and shrubs affect air quality by: a) altering air temperatures; b) directly removing air pollutants; c) emitting volatile organic compounds (VOC) that contribute to ozone and carbon monoxide formation; and d) altering building energy use and, consequently, pollution emissions from power plants. Computer estimates of tree and shrub effects on air quality focused on pollution removal and VOC emissions in 1994. Values were based on externality values that estimate the societal cost of pollutant emissions/formation.

Air pollution removal:

Total amount:	254 metric tons	($1,309,000)
Ozone:	76 metric tons	($ 512,000)
Particulate matter:	68 metric tons	($ 305,000)
Nitrogen dioxide:	63 metric tons	($ 422,000)
Sulfur dioxide:	33 metric tons	($ 55,000)
Carbon monoxide:	15 metric tons	($ 14,000)

Trees accounted for 81.9% of the total pollution removal estimate.

Average air quality improvement (during in-leaf season due to pollution removal; ozone, nitrogen dioxide, and sulfur dioxide effects are for daytime hours):

	Average effect	Peak effect (forested area)
Ozone:	0.26%	14.2%
Particulate matter:	0.25%	10.5%
Nitrogen dioxide:	0.17%	6.8%
Sulfur dioxide:	0.26%	14.7%
Carbon monoxide:	0.001%	0.05%

Effect of individual trees on pollution removal:

A large tree removes about 2.0 kg of pollution per year, 65 times more pollution than a small tree.

Total VOC emissions:

trees = 88.8 metric tons; 4.4 g $m^{-2} yr^{-1}$ of tree cover
shrubs = 7.8 metric tons; 1.4 g $m^{-2} yr^{-1}$ of shrub cover

Brooklyn Urban Forest Ozone Index Score:

77.0 (of 100.0).

A score of 100 represents a forest composition where all species have the maximum effect on reducing ozone (lowest possible VOC emissions); a score of 0 represents a composition with minimum effect on reducing ozone (highest possible VOC emissions). If the management objective is to reduce ozone, higher index scores will reduce VOC emissions and consequent ozone formation. However, high scores (e.g., 100) may not be feasible in many urban forests as species diversity would be minimized.

Best genera in Brooklyn for reducing ozone (index values > 99):

Betula spp.[1]	*Catalpa* spp.[3]	*Celtis* spp.[1]
Cercis spp.[1]	*Crataegus* spp.[3]	*Eleagnus* spp.[4]
Fraxinus spp.[1]	*Gleditsia* spp.[2]	*Hydrangea* spp.[3]
Ilex spp.[1]	*Liriodendron* spp.[1]	*Morus* spp.[1]
Paulownia spp.[3]	*Prunus* spp.[1]	*Pyrus* spp.[1]
Rhus spp.[1]	*Sophora* spp.[2]	*Tilia* spp.[3]
Tsuga spp.[1]	*Viburnum* spp.[1]	*Ulmus* spp.[1]

[1]Emissions estimates based on measured genera values from the literature (most reliable estimate of emissions).

[2]Emissions estimates based on median of genera values within family.

[3]Emissions estimates based on median family values within order.

[4]Emissions estimates based on median order values within superorder (least reliable estimate of emissions).

Total compensatory value of trees in Brooklyn:

The estimated compensatory value of Brooklyn's urban forest is $679 million. This value is based on the Council of Tree and Landscape Appraiser's formula for estimating individual-tree values. This value is not the ecological or societal value of the forest but an estimate of tree replacement costs and/or compensation due to tree owner's for tree loss.

Management to maximize air quality and carbon benefits:

The following management options can help Brooklyn's urban forest improve air quality and increase carbon sequestration and net carbon benefits:

- Increase the number of healthy trees (increases pollution removal and carbon sequestration).
- Sustain existing tree cover (maintains current carbon storage and pollution removal levels).
- Maximize use of low VOC-emitting trees (reduces ozone and carbon monoxide formation).
- Sustain large, healthy trees (large trees have greatest per tree effects).
- Use long-lived trees (forestalls carbon emissions from decomposition).
- Use low maintenance, urban-adapted trees (reduces pollutant emissions from maintenance activities).
- Reduce the use of fossil fuels in maintaining vegetation (reduces pollutant emissions).
- Plant trees in energy-conserving locations (reduces pollutant emissions from power plants).
- Plant trees to shade parked cars (reduces vehicular VOC emissions).
- Supply ample water to vegetation (enhances pollution removal and temperature reduction).

- Plant trees in polluted areas or heavily populated areas (maximizes tree effects).
- Do not plant species that are sensitive to pollutants (increases tree health).
- Use evergreen species to reduce particulate matter (provides year-round removal of particles).
- Use wood for long-term products (forestalls carbon emissions from decomposition).
- Use tree materials for energy production (reduces pollutant emissions from power plants).

Other findings:

- If the Asian longhorn beetle becomes established throughout Brooklyn, the potential damage is a loss of 308,000 trees (51% of the total population) with an estimated compensatory value loss of $390 million.

- Land uses that offer the highest proportion and amount of grass/herbaceous and soil for increasing tree cover are open space (60%; 2,700 hectares) and vacant lands (70%; 1,200 hectares)

Introduction

Urban trees and shrubs can affect air quality and, consequently, contribute to the health and well-being of a city's inhabitants. Measuring the urban forest is an important first step toward understanding the dynamics of urban forests and a prerequisite for planning, designing, and managing city vegetation on both a local and regional scale.

The purpose of this report was to assess the urban forest in Brooklyn, New York, to include its structure (e.g., species composition, stem diameter distribution, tree condition, etc.) and impact on air quality and atmospheric carbon dioxide (CO_2). The potential impact of the Asian long-horned beetle on Brooklyn's urban forest was also evaluated.

The forest resources of Brooklyn (182.7 km^2; 2,465,326 residents in 2000) were quantified using the Urban Forest Effects (UFORE) model that was designed to aid in improving urban-forest management and design (Nowak and Crane 2000). Data collection, model methods and results (estimates of pollution removal, subsequent improvement in air quality, and chemical emissions by trees in Brooklyn) are discussed, and management options to improving air quality and carbon storage in Brooklyn are explored.

The major air pollutants analyzed in this report are carbon monoxide (CO), nitrogen dioxide (NO_2), tropospheric (ground-level) ozone (O_3), particulate matter less than 10 microns (PM10) and sulfur dioxide (SO_2).

Effects of Urban Forests on Air Quality

Urban forests can affect air pollution by: 1) directly removing the pollutant, 2) emitting atmospheric chemicals directly from vegetation or indirectly through vegetation maintenance practices, 3) altering urban microclimates (e.g., reducing air temperature), and 4) altering building energy use and consequently emissions from power plants (Nowak 1995).

Although some gaseous air pollution is removed by the plant surface, trees remove gaseous pollutants primarily by uptake through leaf stomata (Smith 1990). Once inside the leaf, gases diffuse into intercellular spaces and may be absorbed by water films to form acids or react with the inner surfaces of leaves. Trees also remove pollution by intercepting airborne particles. Some particles can be absorbed into the tree (e.g., Ziegler 1973; Rolfe 1974), though most intercepted particles are retained on the plant surface. Often, vegetation is a temporary retention site for atmospheric particles as the intercepted particles may be resuspended to the atmosphere, washed off by rain, or dropped to the ground with leaf and twig fall (Smith 1990). Factors that affect pollution removal by trees include the amount of healthy leaf-surface area, concentrations of local pollutants, and local meteorology.

Some trees emit volatile organic compounds (VOC) such as isoprene and monoterpenes into the atmosphere. These compounds, natural chemicals that make up essential oils, resins, and other plant products may be useful to the tree in attracting pollinators or repelling predators (Kramer and Kozlowski 1979). Isoprene is believed to provide thermal protection to plants by helping prevent irreversible leaf damage at high temperatures (Sharkey and Singsaas 1995). VOC emissions vary with tree species, air temperature, and other environmental factors (e.g., Tingey et al. 1991; Guenther et al. 1995; Guenther 1997).

VOC can contribute to the formation of O_3 and CO (e.g., Brasseur and Chatfield 1991). However, in atmospheres with low concentrations of nitrogen oxide (e.g., certain rural environments), VOC may remove O_3 (e.g., Crutzen et al. 1985; Jacob and Wofsy 1988). Some VOC are carcenogenic (e.g., benzene) but those emitted by vegetation are nontoxic. Because VOC emissions are temperature dependent and trees generally lower air temperatures, it is believed that increased tree cover lowers overall VOC emissions and, consequently, reduces O_3 levels in urban areas. A computer simulation of O_3 conditions in Atlanta, GA (June 4, 1984), revealed that a 20-percent loss in the area's forest could lead to a 14-percent increase in O_3 concentrations. Although there were fewer trees to emit VOC, an increase in Atlanta's air temperatures due to the urban heat island, which occurred concomitantly with the tree loss, increased VOC emissions from the remaining trees and anthropogenic sources, and altered O_3 photochemistry such that O_3 increased (Cardelino and Chameides 1990).

A simulation of California's South Coast Air Basin suggested that the impact on air quality from increased urban tree cover may be locally positive or negative. The basin-wide net effect of increased urban vegetation is a decrease in O_3 where the additional trees are low VOC emitters (Taha 1996), e.g., *Fraxinus* spp., *Gleditsia* spp., *Malus* spp., *Prunus* spp., *Pyrus* spp., and *Sorbus* spp. High VOC emitters include *Liquidambar* spp., *Eucalyptus* spp., *Quercus* spp., *Platanus* spp., *Populus* spp., *Rhamnus* spp., and *Salix* spp. (Benjamin et al. 1996).

Modeling the effects of increased urban tree cover on O_3 concentrations from Washington, DC to central Massachusetts showed that urban trees generally reduce O_3 in cities, though average concentrations tend to increase slightly in the overall modeling domain. Interactions of the effects of trees on the physical and chemical environment demonstrate that trees can cause changes in pollution removal rates and meteorology, particularly air temperatures, wind fields, and boundary-layer heights (i.e., the height of the layer of atmosphere that, because of turbulence, interacts with the Earth's

surface on a time scale of several hours or less), all of which affect O_3 concentrations (Nowak et al. 2000). In this study, changes in urban tree species had no detectable effect on O_3 concentrations.

Trees in parking lots also can affect the microclimates around parked vehicles, particularly through tree shade. In turn, these microclimates can affect evaporative emissions from these vehicles. In Sacramento County, CA, increasing tree cover in parking lots from 8 to 50 percent could reduce VOC evaporative emissions from light duty vehicles by 2 percent and nitrogen oxide start emissions by less than 1 percent (Scott et al. 1999).

Effects of Urban Forests on Greenhouse Gases

Increasing levels of atmospheric CO_2 and other greenhouse gases, i.e., methane (CH_4), chlorofluorocarbons, nitrous oxide (N_2O), and tropospheric O_3) are thought by many scientists to be contributing to an increase in atmospheric temperatures by the trapping of certain wavelengths of heat in the atmosphere. However, some chemicals may be reducing atmospheric temperatures (e.g., SO_2, particulate matter, stratospheric O_3) (Graedel and Crutzen 1989; Hamburg et al. 1997). Globally averaged air temperature at the Earth's surface has increased between 0.3° and 0.6°C since the late 1800s. A current estimate of the expected rise in average surface air temperature globally is 1° to 3.5°C by 2100 (Hamburg et al. 1997).

Urban trees can affect global climate change by affecting the urban atmosphere and various chemical emissions (Nowak 2000). Because of its proximity to numerous emissions sources, urban vegetation can have increased impacts on global climate change both directly (e.g., removing greenhouse gases) and indirectly (e.g., altering nearby emissions). Greenhouse gases most effected by urban forests and urban forest management are CO_2, tropospheric O_3, and SO_2. Urban trees affect greenhouse gases in the same ways that they affect air pollutants. This report includes estimates of current carbon (C) storage levels and annual C sequestration rates for Brooklyn's urban forest.

Asian Longhorn Beetle

Another important environmental issue in Brooklyn is the introduction of an Asian longhorn beetle (ALB), *Anoplophora glabripennis* Motschulsky. This pest, which attacks healthy trees, was first detected in the Greenpoint section of Brooklyn in August 1996 (Haack et al. 1997).

Larvae of the ALB feed in more than 24 species in the Orient and Palearctic (Yang et al. 1995). In its native China, where it is the most important destructive forest pest, ALB prefers *Populus* spp. (Li and Wu 1993). In the United States, *Acer* spp. are preferred by this insect. Other hardwood species also are attacked, and host switching, even in the presence of preferred hosts, appears to be characteristic of the ALB. Both old and young (down to 1/2 inch in diameter) trees are attacked. ALB bores into the main trunk, branches, and tree roots.

Adult emergence begins in May and peaks in early July. In New York, adults emerge in August and September, especially during the heat of the day (Kucera 1996). Adults can fly up to 1,000 m to locate new host material (Thier 1997). Dispersal can be accelerated by human activity (e.g., shipping infested packing material or movement of infested firewood). Because larvae bore deep into wood, they are difficult to kill with biological or chemical pesticides. Infested trees are killed within several years of initial attack. As of June 23, 2000, ALB attacks caused the removal of nearly 5,000 in the New York City area (USDA For. Serv. 2000).

Although quarantines and eradication programs have been established in New York to prevent further spread of the ALB, this insect has a high potential for introduction to other urban areas through movement of infested wood materials, particularly pallets and crating imported from China. Such introductions would result in the loss of additional urban trees and increase the possibility of personal injury, property damage, and liability where beetle damage weakens stems and branches.

Methods

The UFORE model uses standard field, air pollution, and meteorological data to quantify urban forest structure and numerous forest-related effects in various U.S. cities (Nowak and Crane 2000). Currently, there are four model components:

UFORE-A: Anatomy of the Urban Forest — quantifies urban forest structure (e.g., species composition, tree density, tree health, leaf area, leaf and tree biomass) based on field data.

UFORE-B: Biogenic Volatile Organic Compound (VOC) Emissions — quantifies: 1) hourly urban forest VOC emissions (isoprene, monoterpenes, and other VOC emissions that contribute to O_3 formation) based on field and meteorological data, and 2) O_3 and CO formation based on VOC emissions.

UFORE-C: Carbon Storage and Sequestration — calculates total stored C, and gross and net C sequestered annually by the urban forest based on field data.

UFORE-D: Dry Deposition of Air Pollution — quantifies the hourly amount of pollution removed by the urban forest and associated percent improvement in air quality throughout a year. Pollution removal is calculated for O_3, SO_2, NO_2, CO, and PM10 based on field, pollution concentration, and meteorological data.

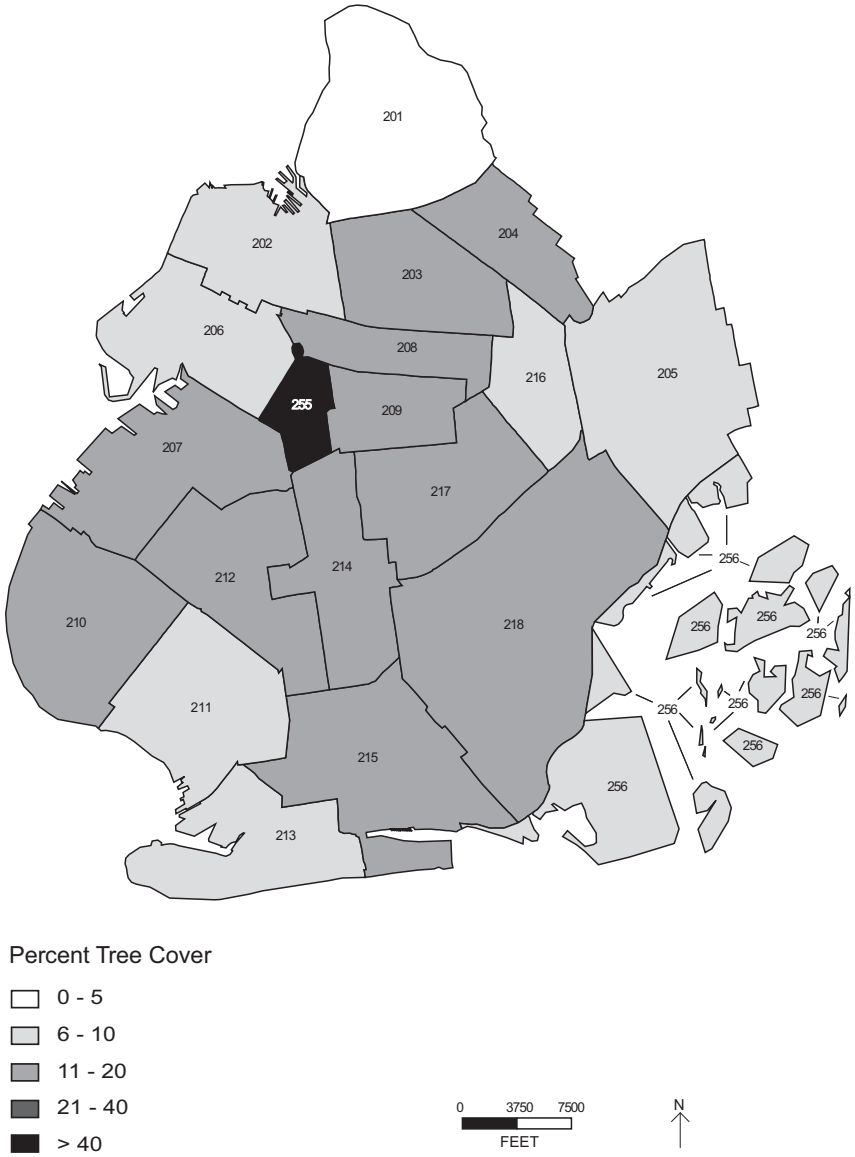

Figure 1.—Percent tree cover in Brooklyn's 18 Community Districts (201-218) plus Prospect Park (255) and south shore/island area (256).

UFORE-A

Urban forest structure is the spatial arrangement and characteristics of vegetation in relation to other objects, e.g., buildings, within urban areas (e.g., Nowak 1994a). Aerial photography was used to determine tree-cover characteristics of Brooklyn (Nowak et al. 1996). Field data were collected to measure the attributes of individual tree and other vegetation.

Photo Interpretation

Random dot-grid analyses were conducted from 1994, aerial photos of Brooklyn (1:12,000 scale, leaf-off, black and white). Separate photo analyses were conducted for each of Brooklyn's 18 community districts plus Prospect Park and the south shore/island areas that are not part of a district (Fig. 1). For each dot analyzed, cover type (tree-shrub, grass-soil, building, other ground impervious surface, and water) and land-use were recorded. The following land-use designations were used on the basis of a 1995 land-use map provided by the New York Department of City Planning:

- 1- to 2-family residence — low-density residences.
- multifamily residence or mixed residence and commercial — multifamily buildings (three or more dwelling units) or in mixed residential and commercial buildings.

- commercial/industrial — commercial and industrial buildings and areas (factories, offices, shopping areas, parking garages).
- public facility or institution — schools, hospitals, nursing homes, museums, performance centers, houses of worship, police stations, firehouses, courts, detention centers.
- open space or outdoor recreation — public and private parks, playgrounds, nature preserves, cemeteries, amusement areas, beaches, stadiums, golf courses.
- vacant land.

Mean and standard error of percent tree cover (and other cover types) were calculated for each land-use type and community district (Lindgren and McElrath 1969). Average tree cover in Brooklyn was calculated by weighting the average cover in a community district by the district's area (Abeles Schwartz Assoc. and Neighborhood Open Space Coalition 1988).

Field Data Collection

During the summer of 1997, 202 field plots (0.04 ha each) were distributed among the land-use types in proportion to the estimated amount of tree cover. The plots were located randomly within each land-use type (67 plots in 1- to 2-family residence, 16 in multifamily residence or mixed residence and commercial, 10 in commercial/industrial, 14 in public facility or institution, 68 in open space or outdoor recreation, and 27 in vacant land). On each plot, the following general plot data were estimated/recorded:

- Percent tree cover.
- Land use: 1- or 2-family residential; multifamily residential (including mixed residence and commercial); commercial/industrial; public facility/institutional; open space/outdoor recreation; and vacant (New York Dep. of City Plann. 1995).
- Percent of plot within the land use.
- Ground cover: percent of ground covered by following cover types: buildings, cement, tar-blacktop/asphalt, other impervious, soil, rock, duff/mulch, herbaceous (exclusive of grass and shrubs), maintained grass, wild/unmaintained grass, water, and shrubs.

For building areas, the following information was recorded: dominant building material, building height, roofing material, and building length intersecting plot.

For each shrub mass, the following information was recorded: genus, height, percent of shrub mass volume occupied by leaves, and percent of total shrub area in the plot occupied by the shrub mass.

For each tree with the center of its stem in the plot and minimum diameter at breast height (d.b.h.) of 2.54 cm, the following information was measured/recorded:

- species (Appendix A).
- number of stems.
- d.b.h. (if more than one stem, average d.b.h. was recorded).
- tree height.
- height to base of live crown.
- crown width (average of two perpendicular measurements).
- tree condition (based on percent of branch dieback in crown):
  Excellent (< 1)
  Good (1-10)
  Fair (11-25)
  Poor (26-50)
  Critical (51-75)
  Dying (76-99)
  Dead (100 — no leaves)
- Distance from the building:
  Within 1 tree height of building.
  1 to 2 tree heights of building.
  2 to 3 tree heights of building.
- Direction from building (for trees located within 3 tree heights of a building): north, northeast, northwest, east, west, south, southeast, southwest.
- Street tree: Y if a street tree, N if not.

Leaf Area and Leaf Biomass

Leaf area and leaf biomass of individual trees were calculated using regression equations for deciduous urban species (Nowak 1996). If shading coefficients (percent light intensity intercepted by foliated tree crowns) used in the regression did not exist for an individual species, genus or hardwood averages were used. For deciduous trees that were too large to be used directly in the regression equation, average leaf-area index (LAI: m^2 leaf area per m^2 projected ground area of canopy) was calculated by the regression equation for the maximum tree size based on the appropriate height-width ratio and shading coefficient class of the tree. This LAI was applied to the ground area (m^2) occupied by the tree to calculate leaf area (m^2). For deciduous trees with height-to-width ratios that were too large or too small to be used directly in the regression equations, tree height or width was scaled downward to allow the crown to the reach maximum (2) or minimum (0.5) height-to-width ratio. Leaf area was calculated using the regression equation with the maximum or minimum ratio; leaf area was then scaled back proportionally to reach the original crown volume.

For conifer trees (excluding pines), average LAI per height-to-width ratio class for deciduous trees with a shading coefficient of 0.91 were applied to the tree's ground area to calculate leaf area. The 0.91 shading coefficient class is believed to be the best class to

represent conifers as conifer forests typically have about 1.5 times higher LAI than deciduous forests (Barbour et al. 1980), the average shading coefficient for deciduous trees is 0.83 (Nowak 1996); 1.5 times the 0.83 class LAI is equivalent to the 0.91 class LAI. Because pines have lower LAI than other conifers and LAI that are comparable to hardwoods (e.g., Jarvis and Leverenz 1983; Leverenz and Hinckley 1990), the average shading coefficient (0.83) was used to estimate pine leaf area.

If tree leaf biomass could not be calculated directly from regression equations (due to tree parameters being out of equation range), leaf biomass was calculated by converting leaf-area estimates using species-specific measurements of g leaf dry weight/m^2 of leaf area.[1] Shrub leaf biomass was calculated as the product of the crown volume occupied by leaves (m^3) and measured leaf biomass factors (g m^{-3}) for individual species (e.g., Winer et al. 1983; Nowak 1991). Shrub leaf area was calculated by converting leaf biomass to leaf area based on measured species conversion ratios ($m^2 g^{-1}$).[1] Due to limitations in estimating shrub leaf area by the crown-volume approach, shrub leaf area was not allowed to exceed a LAI of 18 (one shrub in Brooklyn sample reached maximum shrub LAI). If there were no leaf biomass to area or leaf biomass to crown-volume conversion factors for an individual species, genus or hardwood/conifer averages were used.[1]

Average tree condition was calculated by assigning each condition class a numeric condition rating. A condition rating of 1 indicates no dieback (excellent); a condition rating of 0 indicates a dead tree (100-percent dieback). Each code between excellent and dead was given a rating between 1 and 0 based on the midvalue of the class (e.g., fair = 11-25 percent dieback was given a rating of 0.82 or 82-percent healthy crown). Estimates of leaf area and leaf biomass were adjusted downward based on crown leaf dieback (tree condition).

To adjust for overlapping tree crowns, estimates of tree leaf area and leaf biomass (derived from open-grown tree equations) were scaled back proportional to the amount of crown competition on the plot. A plot competition factor (CF) was calculated as:

$$CF = GA / TA \quad \textbf{(1)}$$

where GA = projected crown area (m^2) of individual trees in the plot and TA = % tree cover × plot size (m^2). Leaf area (LA_n) of individual trees was calculated as:

$$LA_n = LA_0 \cdot LAI_n / LAI_0 \quad \textbf{(2)}$$

where LA_0 = leaf area based on open-grown equations; LAI_0 = LAI of plot based on open-grown equations; and LAI_n = LAI adjusted for plot competition. LAI_n varied with CF. For CF ≤ 1 (open-grown trees): $LAI_n = LAI_0$. For CF > 1 and CF < 2 (mixed open-grown and closed-canopy conditions):

$$LAI_n = LAI_{op} + LAI_{cl} \quad \textbf{(3)}$$

where:

$$LAI_{op} = LAI_0 \cdot (1 - ((GA - TA)/TA)) \quad \textbf{(4)}$$

$$LAI_{cl} = [\ln((1 - \bar{x}_s)^{CF})/-k] \cdot (GA - TA)/TA \quad \textbf{(5)}$$

where $\bar{x}_s$ is average shading coefficient in the plot; LAI_{op} is leaf area for open-grown trees; LAI_{cl} is leaf area in closed canopies, which is based on estimating LAI from light intensity using the Beer-Lambert Law:

$$LAI = \ln(I / I_O)/-k \quad \textbf{(6)}$$

where I = light intensity beneath canopy; I_o = light intensity above canopy; and k = light extinction coefficient (Smith et al. 1991). The plot light extinction coefficient was:

$$k = (\%CON \cdot 0.52) + (\%HRD \cdot 0.65) \quad \textbf{(7)}$$

where %CON is the percent of plot crown area occupied by conifers and %HRD is the percent of plot crown area occupied by hardwoods. The light extinction coefficients for conifers (0.52) and hardwoods (0.65) were from Jarvis and Leverenz (1983).
For CF ≥ 2 (closed canopies):

$$LAI_n = \ln((1 - \bar{x}_s)^{CF})/-k \quad \textbf{(8)}$$

Species Diversity

Species diversity indices (Shannon-Wiener's index) and species richness, i.e., number of species (Barbour et al. 1980), were calculated for living trees for the entire city. The proportion of the tree population that originated from different parts of the country and world was calculated based on the native range of each species (e.g., Hough 1907; Grimm 1962; Platt 1968; Little 1971, 1976, 1977, 1978; Viereck and Little 1975; Preston 1976; Clark 1979; Burns and Honkala 1990a,b; Gleason and Cronquist 1991).

Compensatory Value

The value of the trees in Brooklyn was based on the compensatory value of trees as determined by the Council of Tree and Landscape Appraisers (1992). Compensatory value, which is based on the replacement cost of a similar tree, is used for monetary settlement for damage or death of plants through litigation, insurance claims of direct payment, and loss of property value for income tax deduction. Other values can be ascribed to

[1]Nowak, D.J.; Klinger, L.; Karlik, J.; Winer, A; Harley, P. and Abdollahi, K. Tree leaf area—leaf biomass conversion factors. Unpublished data on file at Northeastern Research Station, Syracuse, NY.

trees based on such factors as environmental functions provided (e.g., air pollution reduction), but compensatory valuation is the most direct method of estimating the structural value of the urban forest.

Compensatory value is based on four tree/site characteristics: trunk area (cross-sectional area at height of 1.37 m), species, condition, and location. Trunk area and species are used to determine the basic value, which is then multiplied by condition and location ratings (0-1) to determine the final tree compensatory value.

For transplantable trees, average replacement cost and transplantable size were obtained from International Society of Arboriculture (ISA) publications (ACRT 1997) to determine the basic replacement price (dollars/cm^2 of cross-sectional area) for the tree. As no data for New York State were available, the basic price ($3.48 cm^{-2}) was based on data averaged for New Jersey and Pennsylvania. The basic replacement price was multiplied by trunk area and species factor (0-1) to determine a tree's basic value. The minimum basic value for a tree prior to species adjustment was set at $150. Local species factors also were obtained from ISA publications. If no species data were available for the state, data from the nearest state were used.

For trees larger than transplantable size the basic value (BV) was:

$$BV = RC + (BP \cdot [TA_A - TA_R] \cdot SF) \qquad (9)$$

where RC (replacement cost) is the cost of a tree at the largest transplantable size, BP (basic price) is the local average cost per unit trunk area (dollars/cm^2), TA_A is trunk area of the tree being appraised, TA_R is trunk area of the largest transplantable tree and SF is the local species factor.

For trees larger than 76.2 cm in trunk diameter, trunk area was adjusted downward based on the premise that a large mature tree would not increase in value as rapidly as its truck area. The following adjusted trunk-area formula was determined based on the perceived increase in tree size, expected longevity, anticipated maintenance, and structural safety (Counc. of Tree and Landscape Appraisers 1992):

$$ATA = -0.335d^2 + 176d - 7020 \qquad (10)$$

where ATA = adjusted trunk area and d = trunk diameter in cm.

Basic value was multiplied by condition and location factors (0-1) to determine the tree's compensatory value. Condition factors were based on percent crown dieback: excellent (< 1) = 1.0; good (1-10) = 0.95; fair (11-25) = 0.82; poor (26-50) = 0.62; critical (51-75) = 0.37; dying (76-99) = 0.13; dead (100) = 0.0.

Available data required using location factors based on land use type (Int. Soc. of Arboric. 1988): golf course = 0.8; commercial/industrial, cemetery and institutional = 0.75; parks and residential = 0.6; transportation and forest = 0.5; agriculture = 0.4; vacant = 0.2; wetland = 0.1.

As an example of compensatory value calculations, if a tree that is 40.6 cm in diameter (1,295 cm^2 trunk area) has a species rating of 0.5, a condition rating of 0.82, a location rating of 0.4, a basic price of $7 per cm^2, and a replacement cost of $1,300 for a 12.7-cm-diameter tree (127 cm^2 trunk area), the compensatory value would equal:

$$[1{,}300 + (7 \cdot (1{,}295 - 127) \cdot 0.5)] \cdot 0.82 \cdot 0.4 = \$1{,}767$$

Data for individual trees were used to determine the total compensatory value of trees in Brooklyn.

Insect Effects

The proportion of leaf area and live tree population, and estimated compensatory value in various susceptibility classes to gypsy moth feeding and ALB infestation (Liebhold et al. 1995; Nowak et al. 2001) were calculated to reveal potential urban forest damage associated with a gypsy moth or ALB outbreak in Brooklyn (e.g., Onstad et al. 1997; Nowak et al. 2001).

Land Use

Land use determined in the field was cross-referenced with land use classified by the land-use map to determine the map's accuracy. Data in this report are given by land-use classes as defined by the map. However, what is identified as one use on the map may contain samples from other use types. Possible reasons for this discrepancy are map error or changes in land use in the field since the map was produced.

The proportion of species population, leaf area, and leaf biomass in each d.b.h. class are calculated, as are the proportion of species population by condition class and by d.b.h. and condition class. Field data were input into the UFORE-A module to calculate totals, averages, and standard errors by species, land use, and city totals for urban forest structure. The standard errors for leaf area and leaf biomass report sampling error rather than error of estimation. The reported sampling errors underestimate the actual standard errors. Lack of information regarding errors in the allometric equations and adjustment factors make it impossible to fully account for estimation errors.

UFORE-B

VOC can contribute to the formation of O_3 and CO (e.g., Brasseur and Chatfield 1991). The amount of VOC emissions depends on tree species, leaf biomass, air

temperature, and other environmental factors. UFORE-B estimates the hourly emission of isoprene (C_5H_8), monoterpenes (C_{10} terpenoids), and other volatile organic compounds (OVOC) by species for each land use and for the entire city. Species leaf biomass (from UFORE-A) is multiplied by genus-specific emission factors (Appendix A) to produce emission levels standardized to 30°C and photosynthetically active radiation (PAR) flux of 1,000 µmol m^{-2} s^{-1}. If genus-specific information is not available, median emission values for the family, order, or superorder are used (order and superorder values were used on 18.9 percent of the total leaf biomass). Standardized emissions are converted to actual emissions based on light and temperature correction factors (Geron et al. 1994) and local meteorological data.

VOC emission (E) (in µgC $tree^{-1}$ hr^{-1} at temperature T (K) and PAR flux L (µmol m^{-2} s^{-1})) for isoprene, monoterpenes, and OVOC is estimated as:

$$E = B_E \cdot B \cdot \gamma \qquad \textbf{(11)}$$

where B_E is the base genus emission rate (Appendix A) in µgC (g leaf dry weight)$^{-1}$ hr^{-1} at 30°C and PAR flux of 1,000 µmol m^{-2} s^{-1}; B is species leaf dry weight biomass (g) (from UFORE-A); and:

$$\gamma = [\alpha \cdot c_{L1} L / (1 + \alpha^2 \cdot L^2)^{\frac{1}{2}}] \cdot [\exp[c_{T1}(T - T_S)/R \cdot T_S \cdot T]/ (0.961 + \exp[c_{T2}(T - T_M)/R \cdot T_S \cdot T])] \qquad \textbf{(12)}$$

for isoprene where L is PAR flux; a = 0.0027; c_{L1} = 1.066; R is the ideal gas constant (8.314 K^{-1} mol^{-1}), T(K) is leaf temperature, which is assumed to be air temperature, T_S is standard temperature (303 K), and T_M = 314K, C_{T1} = 95,000 J mol^{-1}, and C_{T2} = 230,000 J mol^{-1} (Geron et al. 1994; Guenther et al. 1995; Guenther 1997). As PAR strongly controls the isoprene emission rate, PAR is estimated at 30 canopy levels as a function of above-canopy PAR using the sunfleck canopy environment model (A. Guenther, Nat. Cent. for Atmos. Res., pers. commun., 1998) with the LAI from UFORE-A.
For monoterpenes and OVOC:

$$\gamma = \exp[B(T - T_S)] \qquad \textbf{(13)}$$

where T_S = 303 K, and B = 0.09.

Hourly inputs of air temperature are from measured National Climatic Data Center (NCDC) meteorological data. Total solar radiation is calculated based on the National Renewable Energy Laboratory Meteorological/ Statistical Solar Radiation Model (METSTAT) with inputs from the NCDC data set (Maxwell 1994). PAR is calculated as 46 percent of total solar radiation input (Monteith and Unsworth 1990).

Because tree transpiration cools air and leaf temperatures and thus reduces biogenic VOC emissions, tree and shrub VOC emissions were reduced based on model results of the effect of increased urban tree cover on O_3 in the Northeastern United States (Nowak et al. 2000). For the modeling scenario analyzed (July 13-15, 1995), increased tree cover reduced air temperatures by 0.3° to 1.0°C, resulting in hourly reductions in biogenic VOC emissions of 3.3 to 11.4 percent. These hourly reductions in VOC emissions were applied to the tree and shrub emissions during the in-leaf season (Julian date 80-293) to account for tree effects on air temperature and its consequent impact on VOC emissions.

To estimate the amount of O_3 produced by the VOC emissions, the O_3 incremental reactivity scales (g O_3 produced/g VOC emitted) for isoprene, monoterpenes, and OVOC were used (Carter 1994, 1998). The average incremental reactivity values used for Brooklyn (VOC/ NO_x ratio of 9.6) (Nat. Res. Counc. 1991) were based on scaling estimates of existing values to represent the VOC/NO_x conditions in Brooklyn (Table 1).

There is a relatively high degree of uncertainty in applying the incremental reactivity rates, particularly in winter. However, vegetation has relatively low emission rates during this period, so the effect of trees on O_3 formation is minimal. As O_3 is formed during daylight hours, incremental reactivity values were multiplied by daytime VOC emissions to calculate overall O_3 formation due to tree VOC emissions.

As CO formation can contribute to O_3 formation, CO formation due to tree emissions also were subsequently converted to O_3 formation (Table 1). Zimmerman et al. (1978) found that 60 percent of VOC emissions have been converted to CO, though recent evidence suggests that this conversion potential is closer to 10 percent (S. Madronovich, Nat. Cent. for Atmos. Res., pers. commun., 1997). UFORE-B uses an average VOC to CO conversion factor of 10 percent. Estimates of CO formation are calculated as:

$$COFP = 0.1 \cdot E \cdot R \qquad \textbf{(14)}$$

where COFP is CO formation potential (g), E is the VOC emission (gC), and R is the atomic weight ratio of CO/C (2.33). CO emissions were then converted to O_3 formation based on incremental reactivity scales (Table 1).

Incremental reactivity scales and CO formation estimates are a reasonable yet simplified approach to estimate the multiple, complex chemical reactions that form O_3 and CO. They are used in the model to give a rough approximation of the amount of pollution formed due to biogenic VOC emissions and atmospheric conditions in the city. However, due to the high degree of uncertainty in the approaches of estimating VOC emissions and consequently pollution formation, no estimates of the amount of pollution formed by various species are given. Rather, estimates of the net effect of trees on O_3 (pollution formation minus

pollution removal) are used to create a relative species index of trees species effects on these pollutants. Although the estimation of pollution formation has a high degree of uncertainty, all species use the same approach; thus, index values can be used to compare the relative impact of the species on O_3.

The individual species/genera O_3 index values range from 100, which represents species with the lowest possible pollution formation potential (i.e., no emission of isoprene or monoterpene), to zero, which is represented by a species (e.g., *Liquidambar* sp.) with the highest pollution formation potential (highest standardized total VOC emissions) (Appendix A).

An air-quality species index score was created for Brooklyn by weighting the individual species/genera index values by the amount of leaf biomass in the species/genera. A total score of 100 represents a forest composition where all species have the maximum effect on reducing O_3 (lowest possible VOC emissions and O_3 formation); a score of zero represents a composition with minimum effect on reducing O_3 (highest possible VOC emissions and O_3 formation). If the management objective is to reduce O_3, higher index scores will reduce VOC emissions and consequent O_3 formation. However, high scores (i.e., 100) may not be feasible in many urban forests as species diversity may be minimized.

UFORE-C

Increasing levels of atmospheric CO_2 and other greenhouse gases (e.g., methane, chlorofluorocarbons, nitrous oxide) are thought to contribute to an increase in atmospheric temperatures by the trapping of certain wavelengths of radiation in the atmosphere (U.S. Nat. Res. Council 1983). Through growth processes, trees remove atmospheric CO_2 and store C within their biomass.

Biomass for each measured tree was calculated using allometric equations from the literature (Table 2). If more than one equation exists for an individual species, the mean of the biomass equation results was used. For diameter ranges where there was no valid species-specific allometric equation, the average of results from equations of the same genus was used. Similarly, if no genus equations were found, biomass was computed separately for each hardwood and conifer equation, and the group average was used. For large trees (> 94 cm d.b.h. for hardwoods and > 122 cm d.b.h. for softwoods), volumetrically based equations were used to estimate biomass (Hahn 1984) based on the assumption that merchantable height was 80 percent of total tree height.

Biomass equations differ in the portion of tree biomass that is calculated, whether fresh or oven-dry weight is estimated, and in the diameter ranges used to devise the equations (Table 2). Equations that predict above-ground biomass were converted to whole-tree biomass based on a root-to-shoot ratio of 0.26 (Cairns et al. 1997).

Equations that compute fresh-weight biomass were multiplied by species- or genus-specific conversion factors to yield dry-weight biomass. These conversion factors, derived from average moisture contents of species given in the literature, averaged 0.48 for conifers and 0.56 for hardwoods (USDA 1955; Young and Carpenter 1967; King and Schnell 1972; Wartluft 1977; Stanek and State 1978; Wartluft 1978; Monteith 1979; Clark et al. 1980; Ker 1980; Phillips 1981; Husch et al. 1982; Schlaegel 1984a,b,c,d; Smith 1985).

As deciduous trees drop their leaves annually, only C stored in wood biomass was calculated. For all biomass equations that included leaves, leaf biomass was removed from the estimate of total tree biomass based on equation comparisons of leaf biomass as a percent of total biomass by d.b.h. class. For evergreen trees, leaf biomass as calculated by UFORE-A was added to the estimate of total wood biomass to yield total tree biomass.

Because the use of multiple equations creates disjointed tree biomass estimates between equation predictions at various tree diameters, the equation results for individual species were combined together to produce one predictive equation for a wide range of diameters for various individual species. If there was no equation for an individual species, the average of results from equations of the same genus or hardwood/conifer group was used. The process of combining the individual formulas (with limited diameter ranges) into one, more general species formula, produced results that were typically within 2 percent of the original estimates for total carbon storage of the urban forest.

Open-grown, maintained trees tend to have less above-ground biomass than predicted by forest-derived biomass equations for trees of the same d.b.h. (Nowak 1994b). To adjust for this difference, biomass results for urban trees were multiplied by 0.8. No adjustment was made for trees in more natural stand conditions (e.g., on vacant lands or in forest preserves).

Total tree and shrub dry-weight biomass was converted to total stored C by multiplying by 0.5 (e.g., For. Prod. Lab. 1952; Chow and Rolfe 1989). To estimate monetary value associated with urban tree carbon storage and sequestration, C values were multiplied by $20.3/tC based on the estimated marginal social costs of CO_2 emissions (Fankhauser 1994). Standard errors given for C report sampling error rather than error of estimation. Estimation error is unknown and likely larger than the reported sampling error. Estimation error also includes the uncertainty of using biomass equations and conversion factors, which may be large, as well as measurement error, which is typically small.

Urban Tree Growth and Carbon Sequestration

Average diameter growth from the appropriate land-use and diameter class was added to the existing tree diameter (year *x*) to estimate tree diameter in year *x+1*. For trees in forest stands, average d.b.h. growth was estimated as 0.38 cm/yr (Smith and Shifley 1984); for trees on land uses with a park-like structure (e.g., parks, cemeteries, golf courses), average d.b.h. growth was 0.61 cm/yr (deVries 1987); for more open-grown trees, d.b.h. class specific growth rates were based on Nowak (1994b).

Average height growth was calculated based on formulas from Fleming (1988) and the specific d.b.h. growth factor used for the tree. Growth rates were adjusted based on tree condition. For trees in fair to excellent condition, growth rates were multiplied by 1 (no adjustment), poor trees' growth rates were multiplied by 0.76, critical trees by 0.42, and dying trees by 0.15 (dead trees' growth rates = 0). Adjustment factors were based on percent crown dieback and the assumption that less than 25-percent crown dieback had a limited effect on d.b.h. growth rates. The difference in estimates of C storage between year *x* and year *x+1* is the gross amount of C sequestered annually.

Tree death leads to the eventual release of stored C. In estimating the net amount of C sequestered by the urban forest, C emissions due to decomposition after tree death must be considered. To calculate the potential release of carbon due to tree death, estimates of annual mortality rates by condition class were derived from a study of street-tree mortality (Nowak 1986). Annual mortality was estimated as 1.92 percent for trees 0 to 3 inches in the good-excellent class; 1.46 percent for trees more than 3 inches in the good-excellent class; 3.32 percent for trees in fair condition; 8.86 percent for poor condition; 13.08 percent for critical condition; 50 percent dying trees, and 100 percent for dead trees.

Because population estimates of C are based on individual-tree estimates, decomposition emissions also must be based on individual trees. Thus, rather than allowing a certain percentage of a population of trees to die and decompose, the model estimates that x percent of a tree will die and decompose. These individual estimates are aggregated upward to yield estimates of decomposition for the total population.

Two types of decomposition rates were used: 1) rapid release for trees that are projected to be removed, and 2) delayed release for standing dead trees and tree roots of removed trees. Trees that are removed from urban areas usually are not developed into wood products for long-term C storage (i.e., removed trees are often burned or mulched). Therefore, they will most likely release their carbon relatively soon after removal.

Dead trees that are not removed within a year have an increased probability of being measured in the tree sample, and decomposition rates must reflect this difference. All trees on vacant, transportation, and agriculture land uses and 50 percent of the trees in parks were assumed to be left standing as these trees are likely within forest stands and/or away from intensively maintained sites. These trees were assumed to decompose over a period of 20 years.[2] Trees on all other land uses were assumed to be removed within 1 year of tree death. For removed trees, above-ground biomass was mulched with a decomposition rate of three years;[3] below-ground biomass was assumed to decompose in 20 years.

Estimates of C emissions due to decomposition were based on the probability of the tree dying within the next year and the probability of the tree being removed using the formula:

$$Emission = C \cdot M_c \cdot \sum p_i((D_{remove}) + (D_{s\tan d})) \quad \textbf{(15)}$$

$$D_{remove} = (p_{ab} / y_i)(1/d_m) + ((1 - p_{ab}) / y_i)(1/d_r) \quad \textbf{(16)}$$

$$D_{s\tan d} = ((y_i - 1) / y_i)(1/d_r) \quad \textbf{(17)}$$

where Emission = individual tree contribution to carbon emissions; C = carbon storage in the next year; M_c = probability of mortality based on condition class; i = decomposition class (based on number of years left standing before removal); p_i = proportion of the land use tree population in decomposition class i; p_{ab} = proportion of tree biomass above ground; y_i = number of years left standing before removal ($y_i \rightarrow \infty$ for dead trees that will never be removed (natural decomposition)); d_m = decomposition rates for mulched above-ground biomass (3 years); and d_r = decomposition rate for standing trees and tree roots (20 years). The amount of carbon sequestered due to tree growth was reduced by the amount lost due to tree mortality to estimate the net carbon sequestration rate.

UFORE-D

UFORE-D was used to estimate dry deposition of air pollution (i.e., pollution removal during nonprecipitation periods) to trees and shrubs in Brooklyn (Nowak et al. 1998). This module calculates the hourly dry deposition of O_3, SO_2, NO_2, CO, and PM10 to tree canopies throughout the year based on

[2]There are few data on tree decomposition rates. Using decomposition rates of 10 to 50 years had little effect on the overall net decomposition.

[3]Although no mulch decomposition studies could be found, studies on decomposition reveal that 37-56 percent of carbon in tree roots and 48-67 percent of carbon in twigs is released within the first three years (Scheu and Schauermann 1994).

tree-cover data, hourly NCDC weather data, and U.S. Environmental Protection Agency (EPA) pollution-concentration monitoring data. For Brooklyn, the pollution removal by trees and shrubs was estimated for 1994.

In UFORE-D, the pollutant flux (F; in g m^{-2} s^{-1}) is calculated as the product of the deposition velocity (V_d; in m s^{-1}) and the pollutant concentration (C; in g m^{-3}):

$$F = V_d \cdot C \quad \textbf{(18)}$$

Deposition velocity is calculated as the inverse of the sum of the aerodynamic (R_a), quasi-laminar boundary layer (R_b) and canopy (R_c) resistances (Baldocchi et al. 1987):

$$V_d = (R_a + R_b + R_c)^{-1} \quad \textbf{(19)}$$

Hourly meteorological data from LaGuardia Airport were used in estimating R_a and R_b. The aerodynamic resistance is calculated as (Killus et al. 1984):

$$R_a = u(z) \cdot u_*^{-2} \quad \textbf{(20)}$$

where u(z) is the mean windspeed at height z (m s^{-1}) and u_* is the friction velocity (m s^{-1}).

$$u_* = (k \cdot u(z-d))\left[\ln((z-d)\cdot z_o^{-1}) - \psi_M((z-d)\cdot L^{-1}) + \psi_M(z_o \cdot L^{-1})\right]^{-1} \quad \textbf{(21)}$$

where k = von Karman constant, d = displacement height (m), z_o = roughness length (m), y_M = stability function for momentum, and L = Monin-Obuhkov stability length. L was estimated by classifying hourly local meteorological data into stability classes using Turner classes (Panofsky and Dutton 1984) and then estimating 1/L as a function of stability class and z_o (Zannetti 1990). When L < 0 (unstable) (van Ulden and Holtslag 1985):

$$\psi_M = 2\ln[0.5(1+X)] + \ln[0.5(1+X^2)] - 2\tan^{-1}(X) + 0.5\pi \quad \textbf{(22)}$$

where X = $(1 - 28\ z\ L^{-1})^{0.25}$ (Dyer and Bradley 1982). When L > 0 (stable conditions):

$$u_* = C_{DN} \cdot u\{0.5 + 0.5[1 - (2u_o / C_{DN}^{\frac{1}{2}} \cdot u))^2]^{\frac{1}{2}}\} \quad \textbf{(23)}$$

where C_{DN} = k $(\ln (z/z_o))^{-1}$; u_o^2 = $(4.7\ z\ g\ \theta_*)\ T^{-1}$; g = 9.81 m s^{-2}; θ_* = 0.09 $(1 - 0.5\ N^2)$; T = air temperature (K°); and N = fraction of opaque cloud cover (Venkatram 1980; EPA 1995). Under stable conditions, u_* was calculated by scaling actual windspeed with a calculated minimum windspeed based on methods given in EPA (1995).

The quasi-laminar boundary-layer resistance was estimated as (Pederson et al. 1995):

$$R_b = 2(Sc)^{\frac{2}{3}}(\mathrm{Pr})^{-\frac{2}{3}}(k \cdot u_*)^{-1} \quad \textbf{(24)}$$

where k = von Karman constant, Sc = Schmidt number, and Pr is the Prandtl number.

In-leaf, hourly tree canopy resistances for O_3, SO_2, and NO_2 were calculated based on a modified hybrid of big-leaf and multilayer canopy deposition models (Baldocchi et al. 1987; Baldocchi 1988). Canopy resistance (R_c) has three components: stomatal resistance (r_s), mesophyll resistance (r_m), and cuticular resistance (r_t), such that:

$$1/R_c = 1/(r_s + r_m) + 1/r_t \quad \textbf{(25)}$$

Mesophyll resistance was set to zero s m^{-1} for SO_2 (Wesely 1989) and 10 s m^{-1} for O_3 (Hosker and Lindberg 1982). Mesophyll resistance was set to 100 s m^{-1} for NO_2 to account for the difference between transport of water and NO_2 in the leaf interior, and to bring the computed deposition velocities in the range typically exhibited for NO_2 (Lovett 1994). Base cuticular resistances were set at 8,000 m s^{-1} for SO_2, 10,000 m s^{-1} for O_3, and 20,000 m s^{-1} for NO_2 to account for the typical variation in r_t exhibited among the pollutants (Lovett 1994).

Hourly inputs to calculate canopy resistance are photosynthetic active radiation (PAR; µE m^{-2} s^{-1}), air temperature (K°), windspeed (m s^{-1}), u_* (m s^{-1}), CO_2 concentration (set to 360 ppm), and absolute humidity (kg m^{-3}). Air temperature, windspeed, u_*, and absolute humidity are measured directly or calculated from measured hourly NCDC meteorological data. Total solar radiation is calculated based on the METSTAT model with inputs from the NCDC data set (Maxwell 1994). PAR is calculated as 46 percent of total solar radiation input (Monteith and Unsworth 1990).

As CO and particulate matter removal by vegetation are not directly related to transpiration, R_c for CO was set to a constant for the in-leaf season (50,000 s m^{-1}) and leaf-off season (1,000,000 s m^{-1}) based on data from Bidwell and Fraser (1972). For particles, the median deposition velocity from the literature (Lovett 1994) was 0.0128 m s^{-1} for the in-leaf season. Base particle V_d was set to 0.064 based on a LAI of 6 and a 50-percent resuspension rate of particles back to the atmosphere (Zinke 1967). The base V_d was adjusted according to actual LAI and in-leaf vs. leaf-off season parameters.

The model uses tree and shrub LAI and percent tree and shrub leaf area that is evergreen from UFORE-A calculations. Local leaf-on and leaf-off dates are input into the model so that deciduous-tree transpiration and related pollution deposition are limited to the in-leaf period, and seasonal variation in removal can be illustrated for each pollutant. Particle collection and gaseous deposition on deciduous trees in winter assumed a surface-area index for bark of 1.7 (m^2 of bark per m^2 of ground surface covered by the tree crown) (Whittaker and Woodwell 1967). To limit deposition estimates to periods of dry deposition, deposition

velocities were set to zero during periods of precipitation.

Hourly pollution concentrations (ppm) for gaseous pollutants in Brooklyn were obtained from the EPA (2-SO_2 monitors; 2-CO; 1-O_3; 1-NO_2). Hourly ppm values were converted to μg m^{-3} based on measured atmospheric temperature and pressure (Seinfeld 1986). Average daily concentrations of PM10 (μg m^{-3}) also were obtained from the EPA (3 monitors). Missing hourly meteorological or pollution-concentration data are estimated using the monthly average for the specific hour. In some locations, an entire month of pollution-concentration data may be missing and are estimated based on interpolations from existing data. For example, O_3 concentrations may not be measured during winter months and existing O_3 concentration data are extrapolated to missing months based on the average national O_3 concentration monthly pattern.

Average hourly pollutant flux (g m^{-2} of tree canopy coverage) among the pollutant monitor sites was multiplied by Brooklyn's tree-canopy coverage (m^2) to estimate total hourly pollutant removal by trees across the city. Bounds of total tree removal of O_3, NO_2, SO_2, and PM10 were estimated using the typical range of published in-leaf dry deposition velocities (Lovett 1994).

The monetary value of pollution removal by trees is estimated using the median externality values for the United States for each pollutant. These values, in dollars per metric ton (t) are: NO_2 = \$6,752 t^{-1}, PM10 = \$4,508 t^{-1}, SO_2 = \$1,653 t^{-1}, and CO = \$959 t^{-1} (Murray et al. 1994). Externality values for O_3 were set to equal the value for NO_2.

To approximate boundary-layer heights in the study area, mixing-height and meteorological measurements from Atlantic City, NJ, and LaGuardia Airport were used. Daily morning and afternoon mixing heights were interpolated to produce hourly values using the EPA's PCRAMMIT program (EPA 1995). Minimum boundary-layer heights were set to 150 m during the night and 250 m during the day based on estimated minimum boundary-layer heights in cities. Hourly mixing heights (m) were used in conjunction with pollution concentrations (μg m^{-3}) to calculate the amount of pollution within the mixing layer (μg m^{-2}). This extrapolation from ground-layer concentration to total pollution within the boundary layer assumes a well-mixed boundary layer, which is common in the daytime (unstable conditions) (e.g., Colbeck and Harrison 1985). The amount of pollution in the air was contrasted with the amount removed by trees on an hourly basis to calculate the relative effect of trees in reducing local pollution concentrations:

$$E = R(R + A)^{-1} \quad \textbf{(26)}$$

where E = relative reduction effect (%); R = amount removed by trees (kg); A = amount of pollution in the atmosphere (kg).

The ability of individual trees to remove pollutants was estimated for each diameter class using the formula (Nowak 1994c):

$$I_x = R_t \cdot (LA_x / LA_t) / N_x \quad \textbf{(27)}$$

where I_x = pollution removal by individual trees in diameter class *x* (kg/tree); R_t = total pollution removed for all diameter classes (kg); LA_x = total leaf area in diameter class *x* (m^2); LA_t = total leaf area of all diameter classes (m^2); and N_x = number of trees in diameter class *x*. This formula yields an estimate of pollution removal by individual trees based on leaf surface area (the major surface for pollutant removal).

Results

Urban Forest Structure

Trees in Brooklyn cover 2,083 ha (11.4 percent of the borough). Percent tree cover is highest in Prospect Park (50.9 percent) and lowest in Community District 201 (3.0 percent) (Table 3, Fig. 1). Brooklyn's cover is dominated by buildings (34.5 percent), followed by other impervious ground surfaces (e.g., tar, cement) (32.8 percent), grass (20.8 percent), trees, and water (0.5 percent). The land-use distribution in Brooklyn is: open space, 24 percent; 1-2 family residential, 22 percent; multifamily residential, 19 percent; commercial/industrial, 17 percent; public facility, 9 percent; and vacant, 9 percent. Tree cover is highest within open space land uses (21.4 percent), followed by 1-2 family residential (17.0 percent), multifamily residential (9.2 percent), public facility (8.7 percent), vacant (2.8 percent), and commercial/industrial areas (1.9 percent) (Table 4). Land uses with the greatest percent and actual potential space for planting trees (grass/soil area) are vacant (69.7 percent, 1,200 ha) and open space (60.1 percent, 2,700 ha).

Percent total greenspace was highest in the South Shore area (Community District 256) (84.2 percent), followed by Prospect Park (District 255) (74.5 percent), and District 218 (42.5 percent). Percent total greenspace filled with trees (canopy greenspace) was highest in Prospect Park (68.3 percent), followed by Districts 209 (65.2 percent), 214 (63.5 percent), and 203 (62.5 percent). Percent total greenspace in Brooklyn was 32.3 percent with 35.4 percent of the greenspace filled with tree canopies (Table 3).

Land uses with highest percent total greenspace are open space (81.5 percent) and vacant (72.5 percent). Percent of greenspace occupied by tree canopies was 52.3 percent for 1-2 family residential, 43.7 percent for

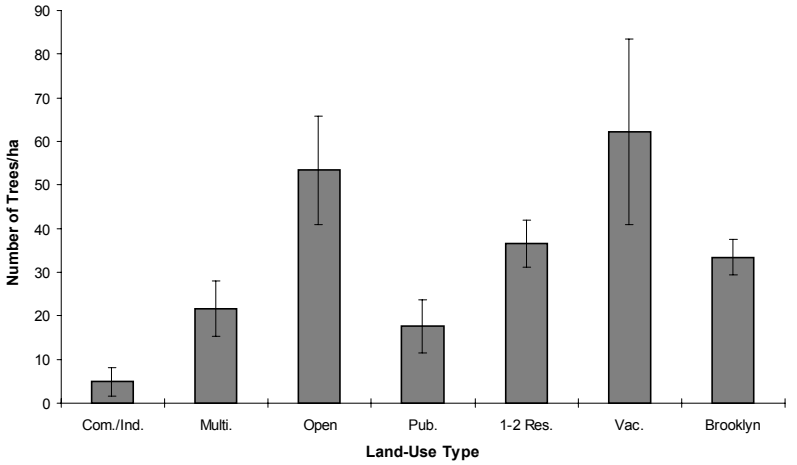

Figure 2.—Number of trees/ha in Brooklyn by land use. Error bars represent ± one standard error of the mean.

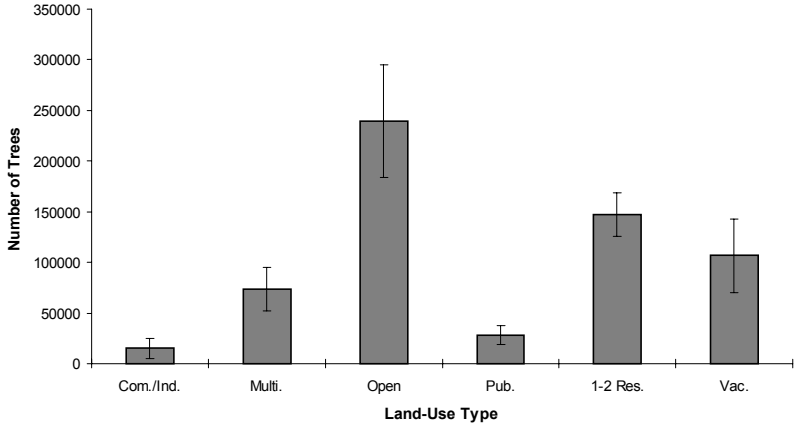

Figure 3.—Number of trees in Brooklyn by land use. Error bars represent ± one standard error of the mean.

public facilities, and 43.2 percent for multifamily residential (Table 4).

There are approximately 610,000 trees in Brooklyn. Most of these trees are on open space (240,000) and 1-2 family residential (147,000) (Tables 5-6, Figs. 2-3, Appendix B). The most common tree species in Brooklyn are tree of heaven (20.5 percent of tree population), white mulberry (7.7 percent), black locust (6.5 percent), Norway maple (6.2 percent), and black cherry (5.9 percent) (Table 5, Appendix B). Tree of heaven is the most common species on all land uses except public facility, where it ranks fourth (Table 6, Appendix B). The most dominant trees in Brooklyn in terms of leaf area are London planetree (13.7 percent of total tree leaf area), tree of heaven (11.2 percent), Norway maple (11.1 percent), white mulberry (9.1 percent), and black locust (4.9 percent) (Appendix B). Most of the Brooklyn's leaf area is located in open space and residential lands, and on trees of moderate size (Figs. 4-6). The tree LAI for Brooklyn was 4.2; 3.8 percent of the leaf area is evergreen. The shrub LAI was 2.4 with 19.0 percent in evergreens. Leaf area and leaf biomass distributions for trees and shrubs by species, land use, and d.b.h. class are given in Figures 4 and 5, and Appendix B.

Average tree density in Brooklyn is 33.3/ha. Tree density is highest on vacant land (62.2/ha) and lowest on commercial/industrial land (4.9/ha) (Appendix B). There are about 52,000 street trees in Brooklyn (Appendix B), though the UFORE methodology is not specifically designed to sample street-tree populations. Brooklyn's urban forest comprises mostly small-diameter trees; 61.6 percent of the trees are less than 23 cm d.b.h. (Table 7, Fig. 7, Appendix B). Diameter distributions for individual species also are given in Appendix B. Most of the small trees (< 7.6 cm d.b.h.) in Brooklyn are tree of heaven (27.7 percent) (Appendix B).

Most of the trees in Brooklyn are in excellent (42.4 percent) or good condition (39.0 percent), with 5.2 percent classified as dead (Table 8, Appendix B). Species in the worst condition were Russian olive, eastern cottonwood, and tree of heaven (Appendix B). Most trees in Brooklyn are exotic to North America; only 26.2 percent are native to New York State (Table 9, Fig. 8, Appendix B).

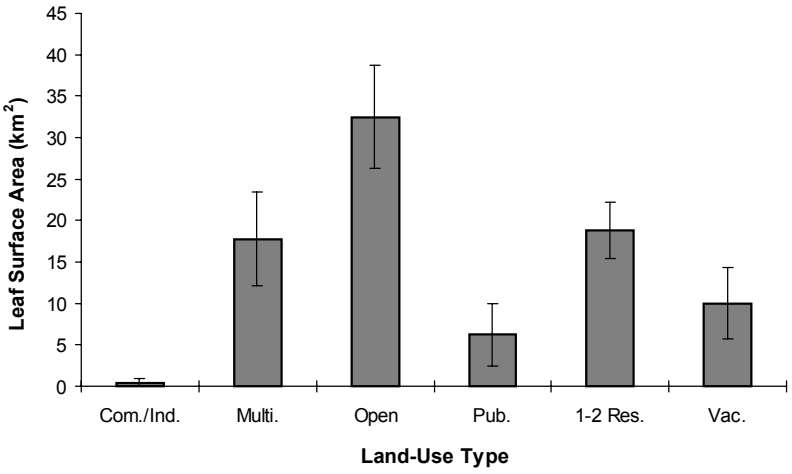

Figure 4.—Leaf surface in Brooklyn by land use. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

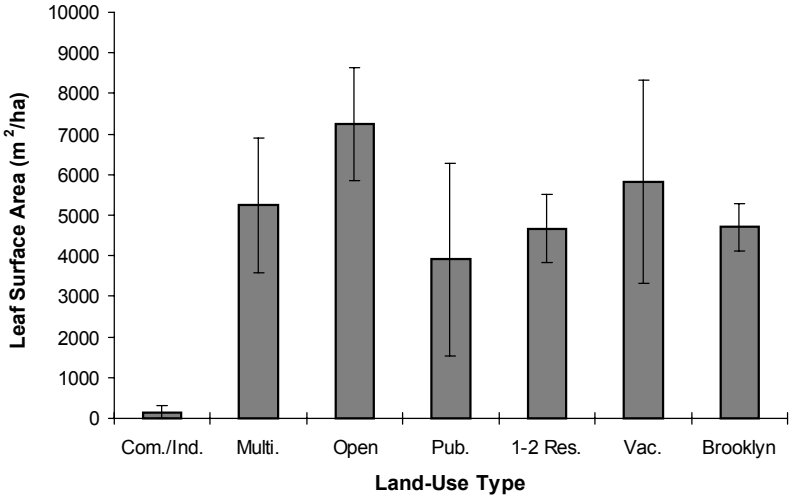

Figure 5.—Leaf surface area/ha estimated in Brooklyn by land use. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

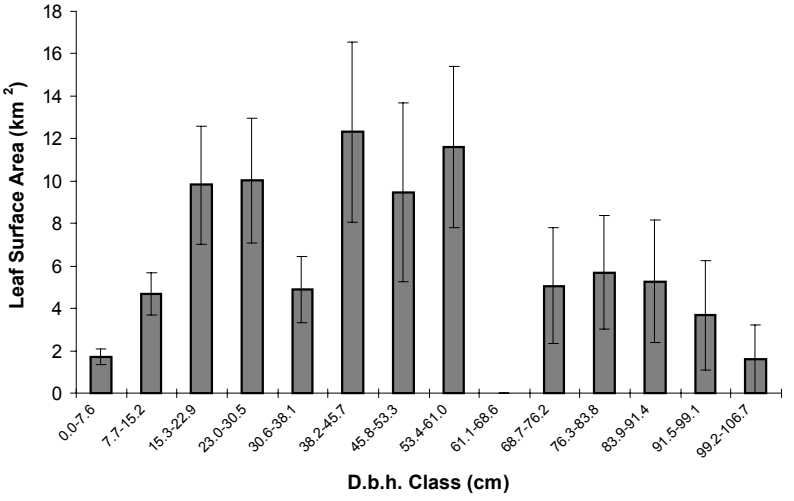

Figure 6.—Leaf surface area within 7.6-cm d.b.h. classes in Brooklyn. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

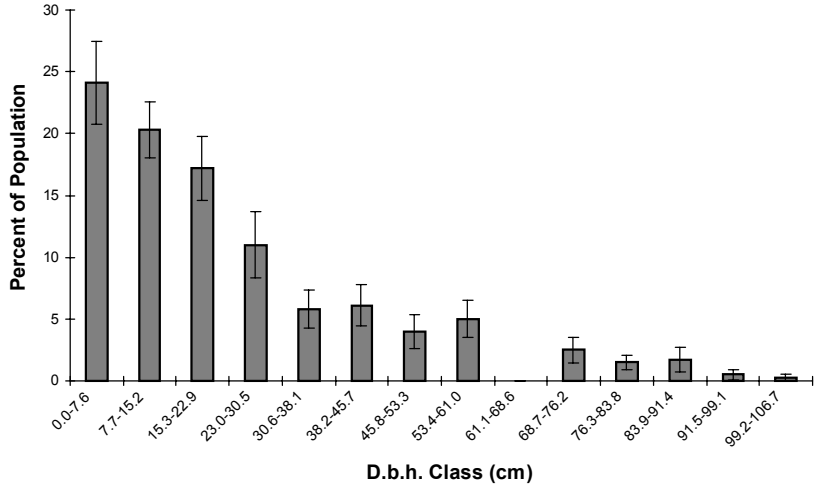

Figure 7.—Percent of tree population within 7.6-cm d.b.h. classes in Brooklyn. Error bars represent ± one standard error of the mean.

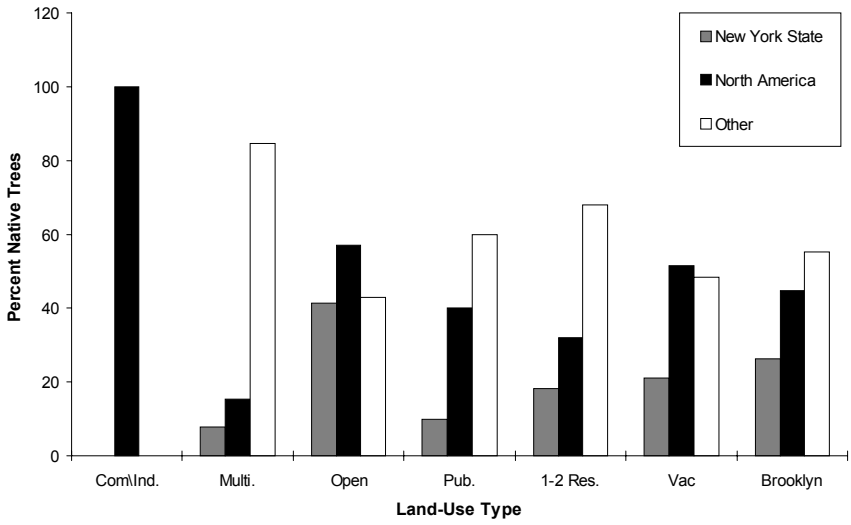

Figure 8.—Percent of live trees in Brooklyn that are native to different geographical areas, by land use. Species native to New York State are included in North America category; the other category includes species exotic to North America (including hybrids and species of unknown origin).

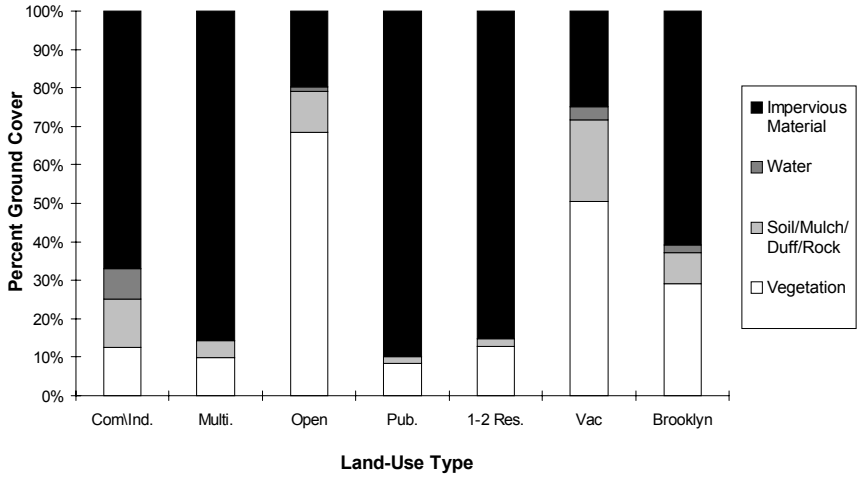

Figure 9.—Percent ground cover in Brooklyn by land use.

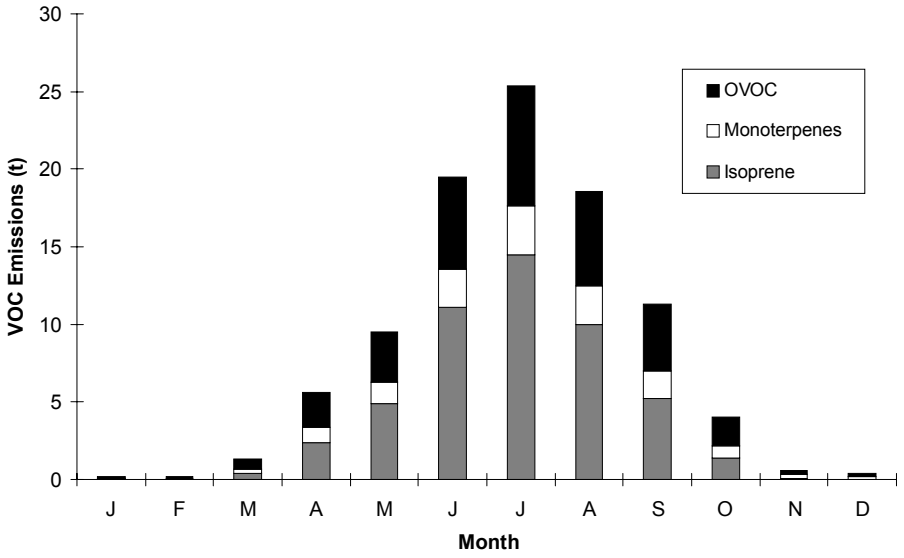

Figure 10.—Monthly biogenic VOC emissions for trees and shrubs in Brooklyn, 1994.

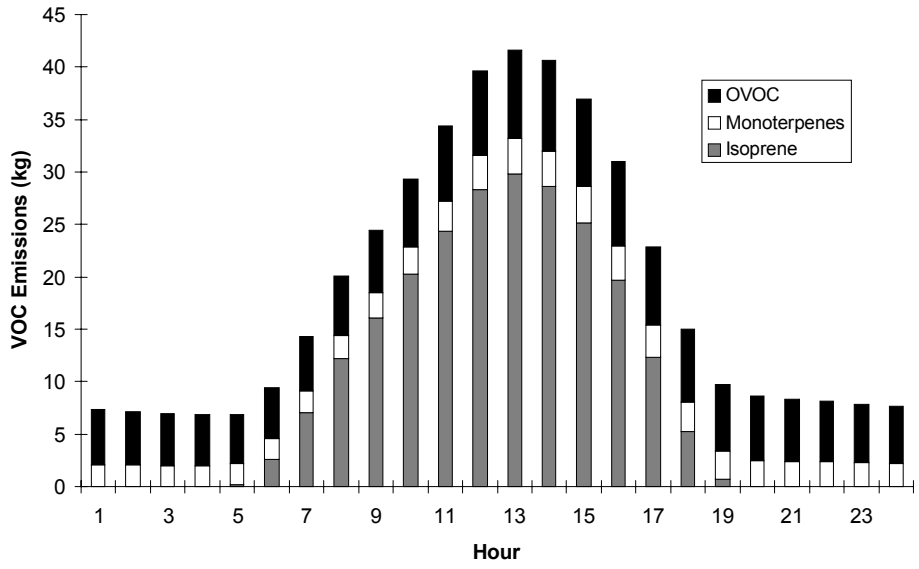

Figure 11.—Hourly biogenic VOC emissions for trees and shrubs during the in-leaf season in Brooklyn, 1994.

Total tree compensatory value in Brooklyn is $679 million, with most of that value associated with open space and 1-2 family residential areas (Table 10, Appendix B).

The most dominant ground-surface covers sampled in the field in Brooklyn are building (31.3 percent), cement (14.9 percent), tar (14.1 percent) and grass (13.6 percent) (Table 11, Fig. 9, Appendix B). Impervious surfaces cover more than 60 percent of the ground. Species richness from the field sample is 57 species with a diversity value of 3.36 (Appendix B). About 16 percent of the total tree leaf area (compensatory value of $168 million) is from species that are considered susceptible to gypsy moth defoliation (Appendix B). Approximately 65 percent of the total tree leaf area (compensatory value of $390 million) is from species that are known hosts of the ALB (Appendix B). Classification of predicted land use from the land-use map versus actual land use classified in the field plot are given in Appendix B.

Biogenic VOC Emissions and Species Ozone Index Values

In 1994, trees and shrubs in Brooklyn emitted 96.6 t of VOC (49.9 t of isoprene, 13.9 t of monoterpenes, and 32.8 t of OVOC) (Table 12). Of the total VOC emissions, 8 percent are from shrubs. Tree emissions averaged 4.4 g VOC/m^2 canopy cover, while shrub emissions averaged 1.4 g/m^2. The emission of these chemicals varied throughout the year with emissions highest in July (Fig. 10). Emissions also vary throughout the day; the highest emissions occurred around 2 p.m. (Fig. 11).

The total VOC emission factor standardized per m^2 of tree canopy cover at 30°C and 1,000 µmol m^{-2} s^{-1} is 3.4

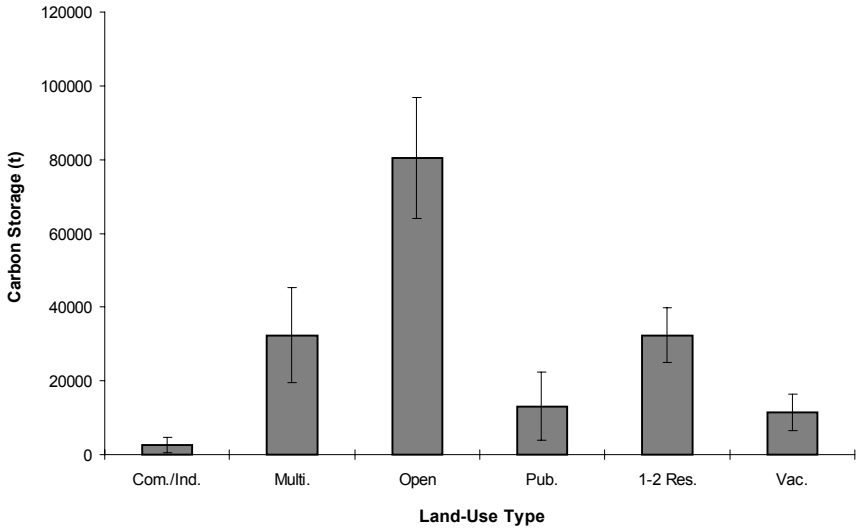

Figure 12.—Carbon storage in Brooklyn by land use. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

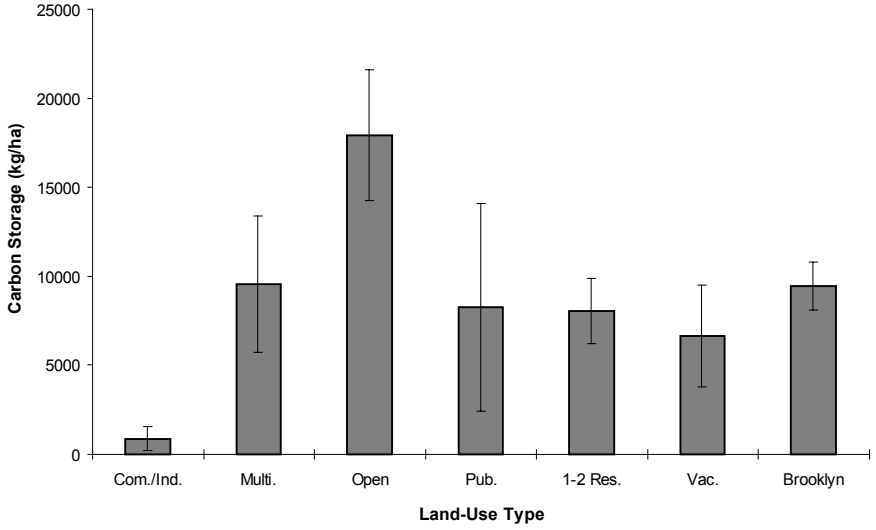

Figure 13.—Carbon storage/ha in Brooklyn by land use. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

mg C m^{-2} hr^{-1} and is comparable to the regional forest VOC emissions (Kinnee et al. 1997). The land use with highest VOC emissions was open space, followed by 1-2 family residential, multifamily residential, vacant, public facility, and commercial/industrial (Table 12). Forty-two percent of Brooklyn's VOC emissions were from the *Platanus* and *Quercus* genera (Table 13).

The tree genera in Brooklyn with the highest individual O_3 index scores were *Catalpa* spp., *Crataegus* spp., *Paulownia* spp., *Pyrus* spp., *Rhus* spp., and *Tilia* spp. Of the species with index values greater than 95, *Acer* spp., *Ailanthus* spp., *Morus* spp., *Prunus* spp., *Sophora* spp., *Tilia* spp., and *Ulmus* spp. were the most dominant, accounting for 57.5 percent of Brooklyn's total leaf biomass (Table 14).

Brooklyn's urban-forest, air-quality species index score was 77 of a possible 100 (100 represents a forest composition where all species have the maximum effect on reducing O_3).

Storage and Sequestration of CO_2

Trees in Brooklyn store about 172,400 t of C (Table 15) with an estimated value of $3.5 million. This storage is equivalent to the amount emitted from Brooklyn's population in about 5 days based on average per-capita C emissions (U.S. Dep. Energy 1997). Brooklyn's trees sequester an estimated 5,100 t of C annually (Table 15). However, based on estimated mortality and tree removals (given Brooklyn's tree-condition distribution), net sequestration is around 2,500 t of C (Table 15). Brooklyn land uses that contain the most C in trees are

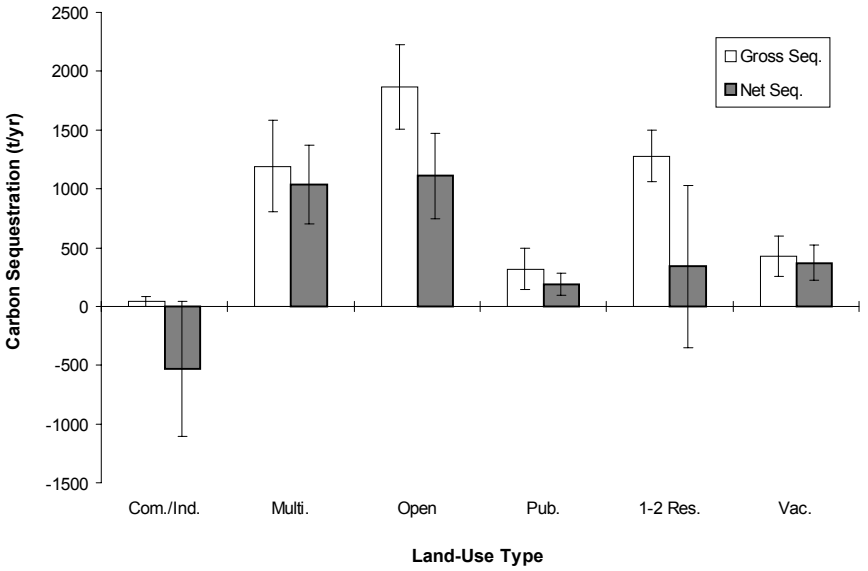

Figure 14.—Annual gross and net carbon sequestration in Brooklyn by land use. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

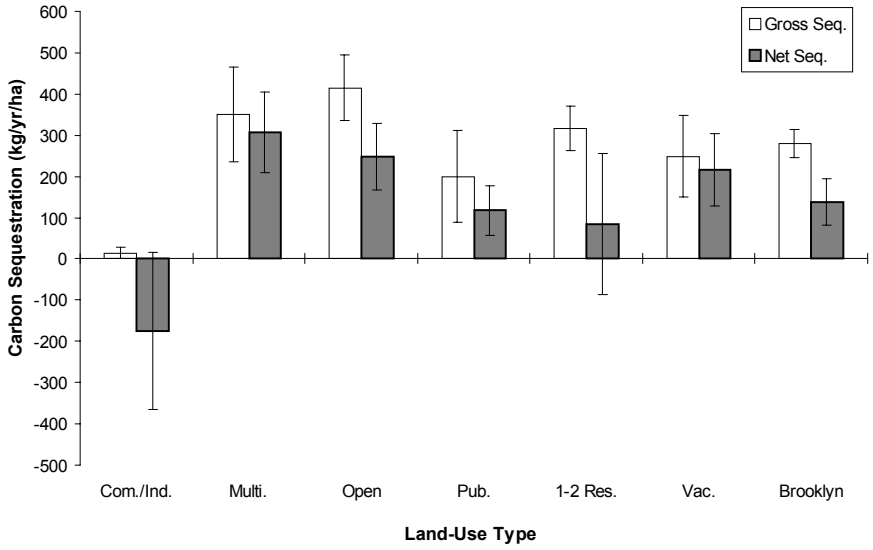

Figure 15.—Annual gross and net carbon sequestration per hectare in Brooklyn by land use. Error bars represent ± one standard error of the mean. Standard errors likely are conservative as they report sampling error rather than error of estimation.

open space (47 percent of total C stored by trees in the borough), 1-2 family residential (19 percent), and multifamily residential (19 percent). Estimated gross and net annual sequestration was greatest on open space lands (Table 15, Figs. 12-15, Appendix B).

Tree species that currently store the most C in Brooklyn are tree of heaven (21.1 percent of the total C stored), London planetree (11.1 percent), Norway maple (8.4 percent), and northern red oak (7.6 percent) (Appendix B). Gross C sequestration was greatest for tree of heaven (18.7 percent of total gross sequestration), London planetree (10.5 percent), Norway maple (9.7 percent), and white mulberry (6.7 percent) (Appendix B). Net sequestration was estimated as negative (C emissions) for tree of heaven, Russian olive, and unidentified dead trees (Appendix B).

Individual tree C storage and sequestration were greatest for the largest d.b.h. class (83.8+ cm), with large trees storing and sequestering 530 and 47 times more C, respectively, than small trees (0 to 7.6 cm) (Table 16).

Air Pollution Removal

In 1994, trees and shrubs in Brooklyn removed an estimated 254 t of air pollution at an estimated value to society of $1.31 million (Table 17). Pollution removal was greatest for O_3, followed by PM10, NO_2, SO_2, and CO. Trees accounted for 81.9 percent of total pollution removal. Pollution removal per m^2 of canopy cover was greater for trees (10.2 g m^{-2}) than shrubs (8.2 g m^{-2}) due to greater LAI (Table 17). Standardized pollution removal rates differ among cities due to the amount of

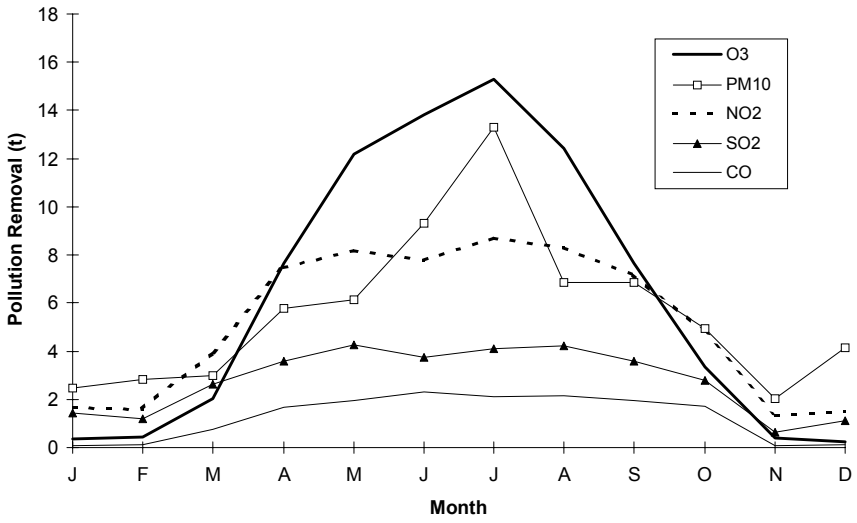

Figure 16.—Monthly pollutant removal (dry deposition) by trees and shrubs in Brooklyn, 1994.

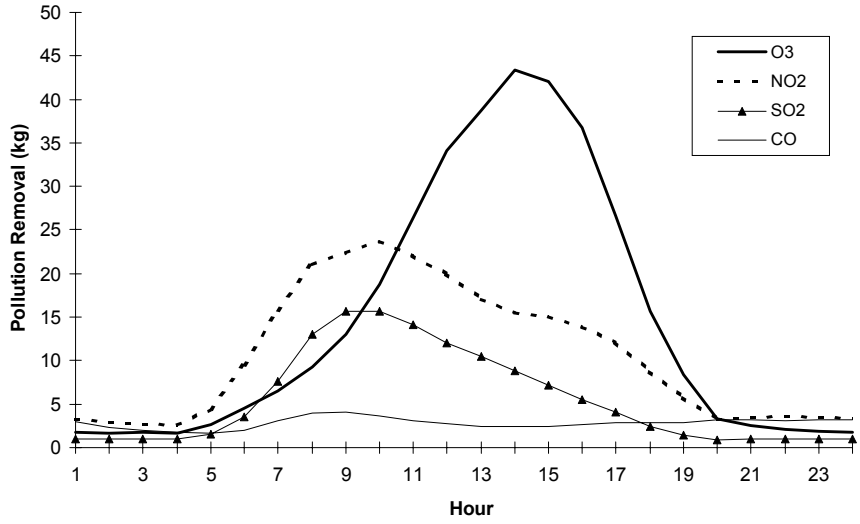

Figure 17.—Hourly pollution removal (dry deposition) by trees and shrubs during the in-leaf season in Brooklyn, 1994.

air pollution, length of in-leaf season, LAI, precipitation, and other meteorological factors.

Hourly air-quality improvement in Brooklyn due to pollution removal by trees during daytime of the in-leaf season averaged 0.26 percent for O_3 and SO_2, 0.25 percent for PM10, 0.17 percent for NO_2, and 0.001 percent for CO. Air pollution removal by trees at night is minimal due to stomatal closure. Air quality improves with increased tree cover and decreased boundary-layer heights. In urban areas with 100-percent tree cover (i.e., contiguous forest stands), short-term improvements in air quality (1 hour) from pollution removal by trees were as high as 14.7 percent for SO_2, 14.2 percent for O_3, 10.5 percent for PM10, 6.8 percent for NO_2, and 0.05 percent for CO.

Total removal and percent air quality improvement show diurnal and seasonal patterns based on vegetation and meteorological conditions, and atmospheric pollution concentration. Most pollution is removed during July and during the daytime (Figs. 16-17). Individual large trees removed up to 65 times more pollution than small trees; large trees remove up to 1.95 kg yr^{-1} versus 0.03 kg yr^{-1} for small trees (Table 16).

The modeled deposition velocities for each pollutant and their daily patterns correspond well with measured deposition velocities for trees (e.g., Lovett 1994). Average V_d (cm s^{-1}) for daytime of in-leaf season with an LAI of 4.2 were: O_3 = 0.53; SO_2 = 0.51; PM10 = 0.49 (50% resuspension included); NO_2 = 0.33; CO = 0.002. Maximum hourly V_d (cm s^{-1}) during the in-leaf season were: SO_2 = 1.23; O_3 = 1.17; PM10 = 0.49 (50-percent resuspension included); NO_2 = 0.51; CO = 0.002.

All model results were cross-checked and verified against test data sets and published field measurements.

Discussion

Brooklyn's urban forest resource covers 11 percent of the borough and comprises 610,000 trees. Sustaining this resource will preserve a compensatory or structural value of $679 million. Currently, it is dominated (in leaf area) by London planetree, tree of heaven, and Norway maple. These three species account for 36 percent of Brooklyn's tree leaf area, 31 percent of the trees, and 41 percent of the total tree biomass.

With respect to land uses, London planetree is common in residential areas and public facilities. Its population comprises mostly larger trees (> 30 cm d.b.h.). There were fewer small trees (< 7 percent < 23 cm d.b.h.), indicating that Brooklyn's urban forest composition likely will shift from this species unless additional trees are established. Even then, the dominance of London planetree should diminish when these large trees begin to decline. Currently, all London planetree in Brooklyn are in good or excellent condition.

Tree of heaven is the most common tree for all land uses except public facility, where it ranks fourth. This exotic pioneer species is common in many U.S. cities. Because many trees are in the smaller diameter classes, the tree of heaven population likely will be sustained. However, more than 20 percent of its population were dead. Many of these trees are likely pioneers on relatively unmaintained sites, so the relatively high mortality of this species may be an artifact of the dead trees being allowed to remain standing longer than other species. Also, the high mortality likely indicates poor long-term survival. In other areas of New York City, tree of heaven has been transitory (Sisinni and Emmerich 1995).

Norway maple is another invasive, exotic species that is common to Brooklyn. This species is common in residential and open space areas, and contains a mix of small and large trees, indicating that it is being sustained through replanting efforts or natural regeneration. Of the Norway maple population in Brooklyn, nearly 90 percent were in good or excellent condition. This species may not be appropriate around natural forest areas as it commonly escapes to compete with native species (Nowak and Rowntree 1990).

The overall diameter structure of Brooklyn's urban forest indicates that forest cover should be sustained as nearly 45 percent of the trees are less than 15.2 cm in diameter. Most trees are exotic not only to New York State but also to North America. The potential benefits (e.g., relatively easy establishment and survival) and potential costs (e.g., invasion into unwanted areas) must be weighed when considering these exotic species for urban forests.

Enhancing Brooklyn's Urban Forest Cover

Brooklyn's urban forest can be increased through proper planning and management. The borough's tree cover and density are the lowest of seven U.S. cities that have been analyzed (Table 18). Cultural or environmental factors that limit tree cover in cities include impervious surfaces, intensive site use that limits regeneration due to trampling or soil compaction, and mowing and herbicide use.

Approximately two-thirds of Brooklyn is covered by impervious surfaces. Planting is possible on nonbuilding impervious surfaces (e.g. roads, parking lots, and sidewalks) where land use activities such as vehicle traffic do not prohibit tree establishment. Tree cover can be established even on some building surfaces with proper design and engineering (e.g., rooftop gardens). Although relatively expensive to establish vegetation on, these areas can be used to increase canopy cover.

On commercial/industrial lands, more than half of the ground area is nonbuilding impervious surfaces, which also cover 40 percent of public facility, 35 percent of multifamily residential, and 25 percent of 1-2 family residential. For these uses, nonbuilding impervious surfaces offer a relatively large amount of space upon which tree cover could be established and sustained.

Open spaces and vacant lands offer the greatest potential for increased tree cover with 60- and 70-percent (2,700 and 1,200 ha) grass/soil cover, respectively. These uses may be the most cost-effective for increasing tree cover because of the relatively large amount of grass/bare soil. However, use activities may prevent planting in these areas.

Apart from planting trees in urban areas, managers can limit cultural practices (e.g., mowing) to increase canopy cover in Brooklyn. The borough is within an Appalachian oak forest type (Kuchler 1966), so trees should regenerate naturally in many areas of the borough. Allowing trees to regenerate is a relatively low-cost option to increasing tree cover, though this type of management limits species selection and some control over the site. Limiting mowing in areas where it is not essential can increase tree cover depending on the species that becomes established.

Potential Impact of Asian Longhorn Beetle

As of June 23, 2000, more than 4,700 trees were removed in New York State due to infestation by the ALB (USDA For. Serv. 2000). Quarantines and eradication programs have been established to prevent the spread of this pest. Still, should ALB become established in Brooklyn, an estimated 308,000 trees will be infested (51 percent of the borough's trees and 65 percent of its leaf area), with a potential value loss of $390 million.

Urban Forest Management in Brooklyn

Effect on Global Climate Change

Brooklyn's urban forest and its management can affect global climate change by affecting the urban atmosphere and chemical emissions. Carbon storage in Brooklyn is estimated at 172,400 t (9.4 t/ha). This storage level is lower than that of Oakland (11 t/ha) and Chicago (14.1 t/ha) (Table 19). Carbon storage in Brooklyn is equivalent to the amount of C emitted by the borough's population in about 5 days based on average per-capita emission rates. Total C storage by trees in Chicago, which took years to sequester, is equivalent to emissions from the city's residential sector during a 5-month period (Nowak 1994b).

The estimated gross sequestration rate is 5,120 t in Brooklyn (0.3 t/ha/yr) and 40,100 t (0.7 t/ha/yr) in Chicago (Table 19). Factors that lead to increased carbon storage and gross sequestration per hectare include increased tree density and an increased proportion of large trees. Trees in poorer condition also have lower gross sequestration rates. The gross sequestration rates for Brooklyn and Chicago compare with 2.6 t/ha/yr for a 25-year old loblolly pine plantation with genetically improved stock on a high yield site, and 1.0 t/ha/yr for a 25-year old natural regeneration spruce-fir forest on an average site (Birdsey 1996).

Net annual sequestration (gross sequestration minus estimated C emissions due to mortality [decomposition]) is an estimated 14,400 t for Chicago (Nowak 1994b) versus 2,500 t for Brooklyn. Again, these differences are due to the same factors that affect C storage.

Urban forests affect the emission or formation of greenhouse gases through the emission of trace gases by plants and the emission of gases due to tree maintenance activities (e.g., from vehicles, chain saws, backhoes). VOC contribute to the formation of O_3 and CO (e.g., Brasseur and Chatfield 1991) and eventually CO_2. However, because the C used to form the VOC originates from CO_2 and the cycle of CO_2 to VOC to CO_2 is relatively quick, VOC emissions should not be considered as contributing to increasing CO_2 concentrations (Nowak 2000).

For the most part, the net C sequestered from a forest is that sequestered by the first generation of trees. Future generations of trees sequester the C lost through decomposition of previous generations (Nowak 2000), though some C can be retained for long periods in the soil. Thus, net C storage in a given area will cycle through time as the population grows and declines. When forest growth (C accumulation) is greater than decomposition, net C storage increases. Long-term storage from forests can be increased when wood is used in long-term products (lumber) or where it is prevented from decaying, e.g., landfills (Nowak 2000).

When considering the net effect of tree growth on atmospheric CO_2, managers also must consider that nearly all of the C sequestered eventually will be converted to CO_2 when the trees decompose. As a result, the benefits of C sequestration will be relatively short-lived if the forest structure is not sustained. Note that if this structure is sustained through maintenance techniques that include the use of fossil fuels, benefits will be eroded by the resulting emissions of CO_2. The continual use of fossil fuels in tree maintenance will eventually result in urban forests that are net C emitters unless the maintenance emissions can be offset by reduced decomposition through long-term storage and/or building energy conservation derived from trees, and its consequent reduction of emissions from power plants.

Because urban tree management often requires large amounts of energy, primarily from fossil fuels, managers should consider the types of equipment that are used to plant, maintain, and remove vegetation. Vehicles and equipment such as chain saws, backhoes, leaf blowers, chippers, and shredders emit CO_2 (about 0.7 kg/l of gasoline) (Graham et al. 1992) as well as VOC, CO, nitrogen and sulfur oxides, and particulate matter (EPA 1991).

Thus, when evaluating the overall net change in global climate change and air quality due to urban trees, managers and planners must be aware that the greater the use of fossil fuels in establishing and maintaining a certain vegetation structure, the longer trees must live and function to offset the pollutant emissions from maintenance and management activities.

As mentioned previously, planting trees in energy-conserving locations around buildings (e.g., Heisler 1986) can reduce building energy use and, consequently, chemical emissions from power plants. However, planting trees in improper locations can increase energy use. The power plant C emissions avoided due to a tree's energy conservation effect could be four times the direct C storage over the life of the tree (Nowak 1993). Because urban trees also reduce C emissions through energy conservation and reduced air temperatures they have a greater potential to reduce greenhouse gases than nonurban trees (Nowak 2000).

To further reduce CO_2 concentrations in Brooklyn, urban forest managers should focus on: a) sustaining existing tree cover (to avoid the loss of existing C), b) increasing tree cover (to facilitate additional C storage), and c) increasing tree health and sequestration by replacing dead and dying trees with young, healthy trees, particularly for land use that are net CO_2 emitters (commercial/industrial). Management plans also should include: a) strategically planting new trees around buildings to enhance energy conservation, b) using wood for energy or long-term products, and c) reducing the use of fossil fuels in maintaining urban forest structure.

Effect on Air Quality

Urban forests can improve air quality in cities by removing pollutants, lowering air temperatures, and reducing building energy use and emissions from parked vehicles. However, VOC emissions from vegetation can lead to the formation of O_3 and CO (Brasseur and Chatfield 1991), and reduced windspeeds due to trees can lead to reduced pollution dispersion and higher ground-level concentrations of pollutants (Nowak et al. 2000).

Integrative modeling studies (i.e., Cardelino and Chameides 1990; Taha 1996; Nowak et al. 2000) show that increased tree cover can reduce pollutant concentrations in cities, particularly where low VOC-emitting species are used. Within the Washington, DC-New York City corridor, the composition of urban tree species had no detectable effect (< 1 ppb) on O_3 concentrations (Nowak et al. 2000). This lack of effect most likely was due to the area being mostly NO_x limited and that changes in VOC emissions due to urban tree species were insignificant compared with existing anthropogenic and natural VOC emissions. Taha (1996) found that species composition could affect O_3 concentrations in the South Coast Air Basin of the Los Angeles area.

In Brooklyn, 18 percent of the tree and shrub leaf biomass was from genera with the highest base VOC emissions (> 70 µgC/g leaf wt/hr standardized to 30°C and 1,000 µmol/m^2/s; Appendix A). Changing species composition from high-emitting genera (*Platanus, Quercus, Robinia, Populus, Salix,* and *Liquidambar*) would increase the overall index score (77.0) and could aid in reducing O_3 levels in the Brooklyn area. Low index scores do not necessarily mean that the urban forest has net formation of pollution, only that the potential maximum effect of trees on improving O_3 levels has not been reached. Attaining a high index score (e.g., 100) may not be feasible in many urban forests as species diversity could be minimized.

Additional research is needed on the effects of individual species on pollution, particularly O_3. While the overall impact of species differences on O_3 in Brooklyn likely is minimal, using low VOC-emitting species will assure maximum effects on reducing O_3. In choosing appropriate species for Brooklyn, numerous other factors need to be considered, including lifespan, maintenance needs, individual-species differences in transpirational cooling, and human preference for various species. Planting species that require high maintenance or have short lifespans could increase emissions of air pollutants from maintenance and removal activities required for these species.

Healthy trees are effective in reducing numerous air pollutants. In 1994, trees in Brooklyn removed about 208 t of air pollution at an estimated value of $1.1 million. This removal rate is among the lowest of urban forests analyzed (Table 20), but likely is due to Brooklyn's relatively low tree cover and size (area). However, standardized pollution removal by Brooklyn's trees (10.2 g/m^2 canopy cover/yr) was comparable to that of Chicago (8.9 g/m^2/yr), Atlanta (10.6 g/m^2/yr), and Baltimore (12.2 g/m^2/yr) (Nowak 1994c; Nowak and Crane 2000). Difference in standardized removal rates among cities are due to differences in pollution concentration, meteorology, length of growing season, and leaf area of the forest (Nowak et al. 1998).

Air quality improvement from pollution removal by Brooklyn's trees averaged around 0.2 to 0.25 percent during the growing season (< 0.1 ppb for O_3 under average conditions). However peak improvement could reach 14 to 15 percent in heavily forested areas (about 5 ppb for O_3). If completely forested, pollution removal by trees in the borough could lead to a maximum reduction of about 17 ppb, or an average reduction of about 3 ppb, under high O_3 concentrations (e.g., 120 ppb).

These estimates of air quality improvement due to pollution removal likely underestimate the total effect of the forest on reducing ground-level pollutants because they do not account for the effect of the forest canopy in preventing concentrations of upper air pollution from reaching ground-level air space. Measured differences in O_3 concentration between above- and below-forest canopies in California's San Bernardino Mountains have exceeded 50 ppb (40-percent improvement) (Bytnerowicz et al. 1999). Under normal daytime conditions, atmospheric turbulence mixes the atmosphere such that pollutant concentrations are relatively consistent with height (e.g., Colbeck and Harrison 1985). Forest canopies can limit the mixing of upper air with ground-level air, leading to significant below-canopy air quality improvements. However, where there are numerous pollutant sources below the canopy (e.g., automobiles), the forest canopy could have the inverse effect by minimizing the dispersion of the pollutants away at ground level.

To increase air pollution removal by Brooklyn's urban forest, managers should increase tree canopy cover as well as the leaf area within canopied areas (e.g., by adding shrubs below trees). In areas with high levels of ground-based emissions (e.g., highways), canopy cover may be best located along the highway (not overhead) to allow pollutants to disperse upward while increasing removal immediately adjacent to the sources. Additional canopy cover in residential areas (or other areas where people concentrate) where pollution concentrations are high could improve human health.

In assessing the effects of trees in cities, managers also must consider current air quality conditions. If the city has clean air, the effects of pollution formation from VOC emissions will be minimized as the incremental

impact of additional pollutants in clean air is relatively small in human and environmental impacts. Conversely, if the city's air quality is poor, the change in pollution concentrations due to vegetation, either positive or negative, will have a relatively greater effect on human health and environmental quality. A change in a pollutant's concentration of 1 ppm when concentrations are low is less significant than a change of 1 ppm when concentrations are near the National Ambient Air Quality Standard level, i.e., at these levels, pollution will have a greater impact on humans and the environment.

Because Brooklyn is considered to be in nonattainment for the air quality standards of O_3 and CO (as of January 2001) (U.S. EPA 2001), the borough's species composition and overall vegetation structure could help improve human health and environmental quality, particularly with respect to these nonattainment pollutants.

Tree Species and Size Effects

In addition to choosing tree species that are well adapted to the site to reduce maintenance needs and increase longevity, species characteristics can influence chemical removal and emissions, urban microclimate, and building energy conservation. To enhance transpirational cooling, and thereby reduce air temperatures and temperature-dependent VOC emissions, trees with relatively high leaf surface areas and transpiration rates should be selected. Besides location around buildings, tree size, transpiration, and leaf and branching density also can influence building energy use (Heisler 1986; McPherson 1994).

Large trees (with a healthy leaf surface area) will increase C sequestration and pollution removal rates. Large, healthy trees greater than 83.8 cm in diameter sequester about 47 times more C and remove 65 times more air pollution annually than small, healthy trees (< 8 cm in diameter). Also, large trees store about 530 times more C than small trees. Tree species with relatively long lifespans will have the greatest overall positive effect on CO_2 as carbon emissions because tree planting and removal will occur less frequently.

VOC emission rates also vary by species. Nine genera have the highest standardized isoprene emission rate (Geron et al. 1994; C.D. Geron, EPA, pers. commun., 1999) and thus the greatest relative effect among genera on increasing O_3: beefwood (*Casuarina* spp.), *Eucalyptus* spp., sweetgum (*Liquidambar* spp.), black gum (*Nyssa* spp.), sycamore (*Platanus* spp.), poplar (*Populus* spp.), oak (*Quercus* spp.), black locust (*Robinia* spp.), and willow (*Salix* spp.). However, due to the high degree of uncertainty in atmospheric modeling and the complexities and variations of modeling conditions in individual cities, it is not clear whether these genera contribute to an overall net formation of O_3 in cities. In Brooklyn, it is likely that species composition has minimal impact on ozone concentrations (Nowak et al. 2000). Common genera in Brooklyn with the greatest relative effect on lowering O_3 are mulberry (*Morus* spp.), cherry (*Prunus* spp.), linden (*Tilia* spp.), and honeylocust (*Gleditsia* sp.).

As stated earlier, improper design and management can lead to detrimental effects and increased costs (Dwyer et al. 1992; Nowak and Dwyer 2000). Managers should consider current and potential urban forest structure and functions, vegetation management potential and consequences, and the needs of local residents when developing vegetation management strategies.

Summary of Management Options

The following options can help Brooklyn's urban forest improve air quality and increase both C sequestration and net C benefits:

- Increase the number of healthy trees (increases pollution removal and C sequestration).
- Sustain existing tree cover (maintains current C storage and levels of pollution removal).
- Maximize the use of low VOC-emitting trees (reduces O_3 and CO formation).
- Sustain large, healthy trees (large trees have greatest per-tree effects).
- Plant long-lived species and use wood for long-term products (forestalls C emissions from decomposition).
- Use low-maintenance, urban-adapted trees (reduces pollution emissions from maintenance activities).
- Minimize the use of fossil fuels in maintaining vegetation (reduces pollution emissions).
- Plant trees in energy-conserving locations and use tree materials for energy production (reduces pollution emissions from power plants).
- Plant trees to shade parked cars (reduces vehicular VOC emissions).
- Provide trees and shrubs with ample water (increases pollution removal and reduces air temperatures).
- Plant trees in polluted and/or heavily populated areas (maximizes tree effects).
- Avoid pollution-sensitive species (increases tree health).
- Plant evergreen trees to reduce levels of particulate matter (provides year-round removal of particles).

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Table 1.—Estimated grams of O_3 formed per gram of VOC emitted, by VOC class, Brooklyn, NY[a]

VOC class	g O_3 formed/ g VOC emitted[b]	Range (g O_3/g VOC)
Isoprene	3.5	2.2 - 11.5
Monoterpenes[c]	1.3	1.0 - 4.1
OVOCs[d]	1.12	0.65 - 3.2
CO	0.038	0.03 - 0.07

[a]Three incremental reactivity scales were used (Carter 1994, 1998): a) maximum incremental reactivity, which represents conditions with a VOC/NO_x ratio of about 4 (maximum potential O_3-forming effect), b) maximum O_3 incremental reactivity scale (VOC/NO_x ratio of about 8), and c) equal benefit incremental reactivity (VOC/NO_x ratio of about 15; minimum potential O_3-forming effect).

[b]Based on VOC/NO_x ratio of 9.6, which was adjusted from original value of about 8 (Carter 1994, 1998). Original values were 3.85 for isoprene, 1.4 for monoterpenes, 1.26 for OVOCs, and 0.04 for CO.

[c]Based on weighted emissions (Guenther et al. 1998; weighted emission factors in parentheses) of α-Pinene (1), ß-Pinene (0.75), Sabinene (0.3), 3-Carene (0.5), and Limonene (0.2) for O_3/VOC estimate and upper limit of range; and α-Pinene and ß-Pinene for lower limit of range. Chemical species of monoterpenes are based on Winer et al. (1992).

[d]OVOC are based on weighted emissions (Guenther et al. 1998; weighted emission factors in parentheses) of reactive VOC: ethene (0.1), propene (0.1), butene (0.03), acetalehyde (0.03), formaldehyde (0.03), acetic acid (0.01), and formic acid (0.01); and less reactive VOCs: methanol (1), ethanol (0.1), acetone (0.1), and ethane (0.01). Reactive and less reactive VOC are 25- and 75-percent of the total OVOC emissions, respectively.

Table 2.—Attributes of equations used to calculate tree biomass

Species	Tree part[a]	Type of weight	Volume[b]	D.b.h. range	Height range	Reference
				cm	m	
Abies balsamea	Above	Dry	No	3 - 51	na	Tritton and Hornbeck 1982
Abies balsamea	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Acer macrophyllum	Ab-lf	Dry	Yes	13 - 84	9 - 27	Pillsbury and Kirkley 1984
Acer rubrum	Above	Dry	No	3 - 66	na	Tritton and Hornbeck 1982
Acer saccharinum	Above	Dry	No	5 - 46	9 - 27	Alemdag 1984
Acer saccharum	Above	Dry	No	3 - 66	na	Tritton and Hornbeck 1982
Betula alleghaniensis	Above	Dry	No	3 - 66	na	Tritton and Hornbeck 1982
Betula alleghaniensis	Above	Dry	No	5 - 71	5 - 26	Alemdag 1984
Betula lenta	Above	Dry	No	5 - 51	na	Tritton and Hornbeck 1982
Betula papyrifera	Above	Dry	No	3 - 51	na	Tritton and Hornbeck 1982
Betula papyrifera	Ab-lf	Dry	Yes	all[c]	na	Hahn 1984
Carya spp.	Whole	Fresh	No	5 - 71	na	Wenger 1984
Carya spp.	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Castanopsis chrysophylla	Ab-lf	Dry	Yes	13 - 79	6 - 30	Pillsbury and Kirkley 1984
Celtis laevigata	Ab-lf	Dry	No	5 - 56	3 - 28	Schlaegel 1984b
Celtis occidentalis	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Cornus spp.	Ab-lf	Dry	No	3 - 13	5 - 13	Phillips 1981
Fagus grandifolia	Above	Dry	No	3 - 66	na	Tritton and Hornbeck 1982
Fraxinus americana	Above	Dry	No	3 - 51	na	Tritton and Hornbeck 1982
Fraxinus americana	Above	Fresh	No	13 - 61	14 - 30	Myers et al 1980
Fraxinus nigra	Above	Dry	No	5 - 33	7 - 20	Alemdag 1984
Fraxinus pennsylvanica	Ab-lf	Dry	No	3 - 79	4 - 34	Schlaegel 1984c
Juglans cinerea	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Juglans nigra	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Juniperus virginiana	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Liquidambar styraciflua	Ab-lf	Dry	No	3 - 84	4 - 39	Schlaegel 1984a
Liriodendron tulipifera	Ab-lf	Fresh	No	15 - 71	na	Wenger 1984
Liriodendron tulipifera	Above	Dry	No	3 - 51	na	Tritton and Hornbeck 1982
Nyssa sylvatica	Ab-lf	Fresh	No	3 - 25	6 - 24	Clark et al 1986
Nyssa sylvatica	Ab-lf	Fresh	No	28 - 51	15 - 30	Clark et al 1986
Ostrya virginiana	Whole	Dry	No	5 - 18	na	Perala and Alban 1993
Ostrya virginiana	Above	Dry	No	5 - 48	6 - 12	Alemdag 1984
Picea spp.	Above	Dry	No	3 - 66	na	Tritton and Hornbeck 1982
Picea abies	Above	Dry	No	13 - 41	na	Jokela et al 1986
Picea glauca	Above	Fresh	No	15 - 41	9 - 22	Steinhilb et al 1984
Picea glauca	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Picea glauca	Whole	Fresh	No	3 - 66	na	Wenger 1984
Picea mariana	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Pinus banksiana	Whole	Dry	No	5 - 41	na	Perala and Alban 1993
Pinus contorta	Whole	Dry	No	10 - 33	na	Stanek and State 1978
Pinus contorta	Above	Fresh	No	3 - 38	na	Wenger 1984
Pinus echinata	Wh-lf	Fresh	No	15 - 51	na	Wenger 1984
Pinus elliottii	Wh-lf	Fresh	No	15 - 53	na	Wenger 1984
Pinus palustris	Wh-lf	Fresh	No	15 - 48	na	Wenger 1984
Pinus ponderosa	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Pinus resinosa	Above	Dry	No	3 - 51	na	Tritton and Hornbeck 1982
Picea rubens	Whole	Fresh	No	3 - 66	na	Wenger 1984
Pinus strobus	Above	Dry	No	3 - 66	na	Tritton and Hornbeck 1982
Populus spp.	Whole	Fresh	No	3 - 51	na	Wenger 1984
Populus balsamifera	Above	Dry	No	8 - 53	6 - 27	Alemdag 1984
Populus deltoides	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Populus grandidentata	Whole	Dry	No	3 - 46	na	Perala and Alban 1993
Populus tremuloides	Above	Dry	No	5 - 43	7 - 27	Alemdag 1984

Continued

Table 2.—Continued

Species	Tree part[a]	Type of weight	Volume[b]	D.b.h. range	Height range	Reference
				cm	m	
Populus tremuloides	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Prunus pensylvanica	Above	Dry	No	3 - 23	na	Tritton and Hornbeck 1982
Prunus serotina	Above	Dry	No	5 - 51	na	Tritton and Hornbeck 1982
Pseudotsuga menziesii	Whole	Dry	No	3 - 122	na	Wenger 1984
Quercus agrifolia	Ab-lf	Dry	Yes	13 - 76	6 - 30	Pillsbury and Kirkley 1984
Quercus alba	Above	Dry	No	5 - 51	na	Tritton and Hornbeck 1982
Quercus alba	Above	Dry	No	5 - 76	5 - 22	Alemdag 1984
Quercus alba	Above	Fresh	No	15 - 61	11 - 28	Myers et al 1980
Quercus chrysolepis	Ab-lf	Dry	Yes	13 - 76	6 - 30	Pillsbury and Kirkley 1984
Quercus coccinea	Ab-lf	Dry	No	13 - 51	15 - 29	Clark et al 1986
Quercus douglasii	Ab-lf	Dry	Yes	13 - 69	6 - 24	Pillsbury and Kirkley 1984
Quercus lyrata	Ab-lf	Dry	No	3 - 86	3 - 30	Schlaegel 1984d
Quercus macrocarpa	Whole	Dry	No	5 - 25	na	Perala and Alban 1993
Quercus phellos	Ab-lf	Dry	No	5 - 94	6 - 38	Schlaegel 1981
Quercus prinus	Above	Dry	No	5 - 51	na	Tritton and Hornbeck 1982
Quercus rubra	Above	Dry	No	5 - 51	na	Tritton and Hornbeck 1982
Quercus rubra	Ab-lf	Fresh	No	15 - 64	na	Wenger 1984
Quercus rubra	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Quercus velutina	Above	Fresh	No	5 - 41	na	Wenger 1984
Quercus velutina	Whole	Dry	No	30 - 89	na	Stanek and State 1978
Quercus wislizenii	Ab-lf	Dry	Yes	13 - 76	6 - 27	Pillsbury and Kirkley 1984
Salix babylonica	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Thuja occidentalis	Above	Dry	No	3 - 30	na	Ker 1980
Thuja occidentalis	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984
Thuja plicata	Whole	Dry	No	3 - 122	na	Wenger 1984
Tilia americana	Above	Dry	No	5 - 56	4 - 26	Alemdag 1984
Tsuga canadensis	Whole	Fresh	No	3 - 51	na	Wenger 1984
Tsuga heterophylla	Whole	Dry	No	3 - 91	na	Wenger 1984
Ulmus americana	Whole	Dry	No	5 - 30	na	Perala and Alban 1993
Ulmus americana	Above	Dry	No	5 - 56	7 - 23	Alemdag 1984
Ulmus americana	Ab-lf	Fresh	Yes	all[c]	na	Hahn 1984

[a]Above = above-ground biomass; Ab-lf = above-ground biomass without leaves; Whole = whole-tree biomass.

[b]Volumetric formula.

[c]Hahn's (1984) volumetric formulas were used to calculate biomass for deciduous trees greater than 94 cm d.b.h. and biomass of coniferous trees greater than 122 cm d.b.h.

Table 3.—Mean and standard error (SE) of percent tree/shrub, grass/soil, building, ground impervious (e.g., tar, cement) and water cover by Brooklyn Community District based on sampling of aerial photographs. Total greenspace (TGS) is percent of area filled with vegetation or covered by soil (i.e., not occupied by impervious surfaces or water); canopy greenspace (CGS) is proportion of total greenspace occupied by tree canopies

District	Tree/shrub		Grass/soil		Building		Impervious		Water		TGS	CGS
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE		
201	3.0	1.0	10.6	1.8	44.4	2.9	40.1	2.8	2.0	0.8	13.6	22.0
202	7.8	2.0	11.2	2.4	40.2	3.7	40.8	3.7	0.0	0.0	19.0	41.2
203	19.6	3.0	11.7	2.4	40.2	3.7	28.5	3.4	0.0	0.0	31.3	62.5
204	15.6	3.1	13.3	2.9	40.7	4.2	30.4	4.0	0.0	0.0	28.9	53.8
205	8.4	1.5	25.9	2.4	33.7	2.5	31.4	2.5	0.6	0.4	34.3	24.4
206	9.5	2.1	15.8	2.6	38.9	3.5	34.7	3.5	1.1	0.7	25.3	37.5
207	17.4	2.5	16.5	2.5	32.6	3.1	33.5	3.2	0.0	0.0	33.9	51.3
208	11.0	3.1	15.0	3.6	43.0	5.0	31.0	4.6	0.0	0.0	26.0	42.3
209	13.8	3.3	7.3	2.6	45.0	4.8	33.9	4.5	0.0	0.0	21.1	65.2
210	17.1	2.5	15.8	2.4	32.9	3.2	34.2	3.2	0.0	0.0	32.9	52.1
211	7.4	1.8	10.1	2.0	41.5	3.3	41.0	3.3	0.0	0.0	17.5	42.1
212	11.2	2.1	11.6	2.1	46.4	3.3	30.9	3.0	0.0	0.0	22.7	49.1
213	9.1	2.0	25.8	3.1	20.2	2.9	44.4	3.5	0.5	0.5	34.8	26.1
214	17.8	2.8	10.3	2.2	44.3	3.7	27.6	3.3	0.0	0.0	28.1	63.5
215	12.0	1.9	13.4	2.0	41.9	2.9	32.6	2.7	0.0	0.0	25.4	47.3
216	8.0	2.7	11.5	3.0	35.4	4.5	45.1	4.7	0.0	0.0	19.5	40.9
217	11.9	2.3	13.9	2.4	44.1	3.5	30.2	3.2	0.0	0.0	25.7	46.2
218	10.2	1.3	32.3	2.0	26.2	1.9	30.6	2.0	0.8	0.4	42.5	24.0
Prospect Park	50.9	6.7	23.6	5.7	5.5	3.1	9.1	4.1	10.9	4.5	74.5	68.3
Shore area	6.3	1.4	77.9	2.4	1.0	0.6	14.9	2.0	0.0	0.0	84.2	7.5
Total	11.4	0.5	20.8	0.6	34.5	0.7	32.8	0.7	0.5	0.1	32.3	35.4

Table 4.—Mean and standard error (SE) of percent tree/shrub, grass/soil, building, ground impervious (e.g., tar, cement) and water cover by land use, Brooklyn, NY, based on sampling of aerial photographs

Land use	Tree		Grass/soil		Building		Impervious		Water		TGS[a]	CGS[a]
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE		
Open space	21.4	1.5	60.1	1.8	1.9	0.5	15.3	1.3	1.4	0.4	81.5	26.3
Residential	17.0	1.2	15.5	1.1	42.8	1.5	24.8	1.3	0.0	0.0	32.5	52.3
Multifamily	9.2	0.8	12.1	0.9	43.9	1.4	34.8	1.4	0.0	0.0	21.3	43.2
Public facility	8.7	1.7	11.2	1.9	39.9	2.9	40.2	2.9	0.0	0.0	19.9	43.7
Vacant	2.8	1.4	69.7	3.9	2.1	1.2	25.4	3.7	0.0	0.0	72.5	3.9
Comm./Indust.	1.9	0.5	4.7	0.7	41.3	1.6	50.8	1.7	1.2	0.4	6.6	28.8

[a]TGS = total greenspace; CGS = canopy greenspace (see Table 3).

Table 5.—Species composition of and estimated number of trees (including dead trees) in Brooklyn's urban forest

Species	Number of trees	SE	Percent of population
Tree of heaven	125,100	28,600	20.5
White mulberry	46,800	21,400	7.7
Black locust	39,700	20,100	6.5
Norway maple	38,000	10,300	6.2
Black cherry	35,700	18,600	5.9
London planetree	25,900	9,400	4.3
Sycamore maple	25,000	10,800	4.1
Honeylocust	20,100	8,900	3.3
American basswood	14,300	8,200	2.3
Cherry	14,200	5,700	2.3
Kwanzan cherry	11,200	6,300	1.8
Eastern white pine	10,900	5,200	1.8
Japanese pagoda tree	10,900	7,700	1.8
Hawthorn	10,700	7,800	1.8
Flowering dogwood	10,600	3,900	1.7
Pin oak	9,800	5,100	1.6
American elm	9,700	6,200	1.6
Silver maple	7,900	3,500	1.3
Littleleaf linden	7,900	4,200	1.3
Blue spruce	7,500	3,300	1.2
Japanese maple	7,400	3,200	1.2
Callery pear	6,700	5,400	1.1
Eastern redbud	6,500	5,100	1.1
Northern red oak	6,500	3,200	1.1
Eastern cottonwood	6,300	3,800	1.0
Apple	6,100	3,000	1.0
Crabapple	6,000	3,600	1.0
Horsechestnut	5,200	5,200	0.9
Red maple	4,900	4,900	0.8
Hydrangea	4,900	4,900	0.8
Black willow	4,900	4,900	0.8
European white birch	4,700	2,700	0.8
Siberian elm	4,700	4,700	0.8
Royal paulownia	4,500	3,400	0.7
Eastern hemlock	4,500	3,300	0.7
Russian olive	3,300	2,300	0.5
Eastern redcedar	3,300	3,300	0.5
Nannyberry	3,300	3,300	0.5
Northern hackberry	3,100	3,100	0.5
Norway spruce	3,100	2,200	0.5
Boxelder	1,600	1,600	0.3
Atlas cedar	1,600	1,600	0.3
White ash	1,600	1,600	0.3
Witch-hazel	1,600	1,600	0.3
American holly	1,600	1,600	0.3
Sweetgum	1,600	1,600	0.3
Tuliptree	1,600	1,600	0.3
Smooth sumac	1,600	1,600	0.3
Slippery elm	1,600	1,600	0.3
Gray birch	1,600	1,600	0.3
Northern catalpa	1,500	1,500	0.2
Ginkgo	1,500	1,500	0.2
Sourwood	1,500	1,500	0.2
White spruce	1,500	1,500	0.2
Higan cherry	1,500	1,500	0.2
Common pear	1,500	1,500	0.2
Pussy willow	1,500	1,500	0.2
Unknown dead trees	1,500	1,500	0.2
Total	610,000	74,600	100.0

Table 6.—Five most common tree species by land use, estimated number of trees (including dead trees) and percent of total tree population (standard errors given on pages 54-55)

Land use	Species	Number of trees	Percent of population
Commercial/industrial	Tree of heaven	7,500	50.0
	Hawthorn	7,500	50.0
	Total (top 5 species)	15,000	100.0
	Total (all species)	15,000	100.0
Multifamily residential	Tree of heaven	20,900	28.6
	Norway maple	10,500	14.3
	Horsechestnut[a]	5,200	7.1
	Honeylocust	5,200	7.1
	White mulberry	5,200	7.1
	Total (top 5 species)	47,100	64.3
	Total (all species)	73,300	100.0
Open space	Tree of heaven	34,200	14.3
	Black cherry	32,600	13.6
	White mulberry	27,700	11.6
	Black locust	13,000	5.4
	Sycamore maple	11,400	4.8
	Total (top 5 species)	119,000	49.7
	Total (all species)	239,600	100.0
Public facility	Honeylocust	8,400	30.0
	London planetree	8,400	30.0
	Japanese pagoda tree	5,600	20.0
	Tree of heaven	2,800	10.0
	American elm	2,800	10.0
	Total (top 5 species)	28,200	100.0
	Total (all species)	28,200	100.0
Residential (1-2 family)	Tree of heaven	28,300	19.2
	Norway maple	19,300	13.1
	Sycamore maple	8,900	6.1
	Flowering dogwood	8,900	6.1
	Japanese maple[b]	7,400	5.1
	Total (top 5 species)	72,900	49.5
	Total (all species)	147,300	100.0
Vacant land	Tree of heaven	31,400	29.4
	Black locust	26,700	25.0
	White mulberry	9,400	8.8
	American basswood	6,300	5.9
	Sycamore maple[c]	4,700	4.4
	Total (top 5 species)	78,500	73.5
	Total (all species)	106,800	100.0

[a]London planetree, kwanzan cherry, callery pear, Japanese pagoda tree, and American elm tied for third most common species (7.1 percent).

[b]London planetree tied for fifth most common species (5.1 percent).

[c]Eastern white pine and Siberian elm tied for fifth most common species (4.4 percent).

Table 7. — Percent of tree population (including dead trees) by diameter and land-use classes (standard errors on pages 78-82)

Land use	D.b.h. class (cm)													
	0.0-7.6	7.7-15.2	15.3-22.9	23.0-30.5	30.6-38.1	38.2-45.7	45.8-53.3	53.4-61.0	61.1-68.6	68.7-76.2	76.3-83.8	83.9-91.4	91.5-99.1	> 99.1
Commercial/industrial	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multifamily residential	28.6	0.0	7.1	7.1	7.1	21.4	14.3	7.1	0.0	0.0	0.0	7.1	0.0	0.0
Open space	23.8	25.2	12.9	17.0	0.7	2.7	2.7	6.1	0.0	2.7	2.0	2.0	1.4	0.7
Public facility	20.0	20.0	10.0	10.0	0.0	10.0	0.0	10.0	0.0	20.0	0.0	0.0	0.0	0.0
Residential(1-2 family)	28.3	23.2	14.1	6.1	9.1	6.1	4.0	4.0	0.0	2.0	3.0	0.0	0.0	0.0
Vacant land	20.6	22.1	35.3	8.8	7.4	2.9	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
Total	24.1	20.3	17.2	11.0	5.8	6.1	4.0	5.0	0.0	2.5	1.5	1.7	0.5	0.3

Table 8.—Tree condition by land use (standard errors given on pages 95-97); Mean condition based on rating of excellent (1.0), good (0.95), fair (0.82), poor (0.62), critical (0.37), dying (0.13), and dead (0.0)

Land use	Condition class (%)							Mean condition
	Excellent	Good	Fair	Poor	Critical	Dying	Dead	
Commercial/industrial	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.50
Multifamily residential	21.4	64.3	7.1	0.0	0.0	0.0	7.1	0.88
Open space	42.9	42.2	8.2	1.4	2.0	0.0	3.4	0.91
Public facility	30.0	50.0	10.0	10.0	0.0	0.0	0.0	0.92
Residential (1-2 family)	52.5	32.3	4.0	2.0	4.0	0.0	5.1	0.89
Vacant land	44.1	26.5	25.0	1.5	0.0	0.0	2.9	0.91
Total	42.4	39.0	9.9	1.7	1.8	0.0	5.2	0.90

Table 9.—Percent of live tree population native to New York State, native to North America, and exotic to North America. Trees of unknown origin (e.g., hybrids) are not classified (see page 106)

Land use	Native to New York	Native to North America	Exotic to North America
Commercial/industrial	0.0	100.0	0.0
Multifamily residential	7.7	15.4	76.9
Open space	41.5	57.0	41.5
Public facility	10.0	40.0	30.0
Residential (1-2 family)	18.1	32.0	62.7
Vacant land	21.2	51.5	47.0
Total	26.2	44.8	50.8

Table 10.—Total compensatory tree value in Brooklyn by land use, in dollars

Land use	Compensatory value
Open space	334,187,000
Residential (1-2 family)	146,383,000
Multifamily residential	101,115,000
Public facility	62,131,000
Vacant land	27,663,000
Commercial/industrial	7,897,000
Total	679,375,000

Table 11.—Distribution of ground surface cover type by land use (as estimated from field plots), in percent (standard errors on page 106)

Land use	Cement	Tar	Bare soil	Rock	Other imperv.[a]	Duff/ mulch	Herbs	Grass	Wild grass	Water	Shrub	Building	Tree
Commercial/industrial	16.5	21.6	0.3	12.0	1.2	0.2	1.2	10.2	0.0	8.0	1.2	27.6	0.6
Multifamily residential	20.7	9.0	1.4	2.9	0.0	0.1	1.9	6.8	0.3	0.0	0.8	56.0	13.0
Open space	2.4	16.0	6.1	1.6	0.3	3.1	14.6	33.1	12.4	1.1	8.4	1.1	18.0
Public facility	29.5	16.1	0.8	1.0	0.1	0.0	0.3	7.1	0.4	0.0	0.6	44.1	8.7
Residential (1-2 family)	21.9	9.7	0.8	0.8	1.2	0.5	3.5	4.8	1.7	0.0	2.7	52.3	10.4
Vacant land	3.1	13.9	13.8	6.4	0.9	0.9	30.8	8.8	10.4	3.5	0.6	7.1	12.5
Total	14.9	14.1	3.4	3.8	0.6	1.0	7.8	13.6	4.5	1.9	3.1	31.3	11.2

[a]Impervious material other than cement, tar, or rock.

Table 12.—Total annual emissions (kg) of isoprene, monoterpene, OVOC, and VOC by land use for trees and shrubs in Brooklyn (1994)

Land use	Isoprene	Monoterpene	OVOC	Total VOC
Open space	26,780	5,070	13,920	45,780
Residential (1-2 family)	7,170	4,270	7,210	18,650
Multifamily residential	2,990	2,850	6,030	11,870
Vacant land	7,290	1,230	2,800	11,330
Public facility	5,290	280	2,150	7,720
Commercial/industrial	330	190	710	1,240
Total	49,860	13,900	32,820	96,590

Table 13.—Total annual emissions (kg) of isoprene, monoterpene, and total VOC for tree and shrub genera in Brooklyn (1994)

Genera	Isoprene	Monoterpene	Total VOC
Platanus	18,056	129	20,450
Quercus	17,337	249	19,760
Robinia	8,268	117	9,409
Acer	45	3,608	7,597
Ailanthus	38	2,975	6,266
Picea	1,795	2,189	5,260
Morus	29	292	2,872
Cedrus	14	1,238	2,605
Populus	2,184	16	2,474
Salix	1,853	13	2,085
Prunus	24	110	2,051
Aesculus	11	888	1,871
Sophora	18	178	1,749
Juniperus	15	385	1,521
Tilia	0	0	1,452
Ulmus	15	77	1,448
Taxus	8	498	1,086
Gleditsia	9	94	920
Myrica	0	213	585
Thuja	5	132	522
Pyrus	0	0	515
Rosa	0	0	451
Pinus	2	248	393
Rubus	0	0	385
Ilex	4	39	380
Rhus	0	0	366
Ligustrum	0	0	250
Unknown deciduous shrubs	3	12	216
Fraxinus	2	8	146
Betula	1	14	133
Euonymus	2	11	111
Liquidambar	72	16	97
Cornus	1	44	93
Ginkgo	0	53	85

Continued

Table 13.—continued

Genera	Isoprene	Monoterpene	Total VOC
Catalpa	0	0	80
Crataegus	0	0	78
Hibiscus	0	0	77
Rhododendron	1	4	75
Celtis	1	7	70
Celastrus	1	6	54
Hydrangea	0	0	54
Iva	1	3	54
Ficus	38	1	49
Buxus	1	5	46
Elaeagnus	0	4	41
Vitis	0	0	40
Cercis	0	2	39
Tsuga	0	4	37
Unknown evergreen shrubs	0	17	37
Forsythia	0	1	25
Viburnum	0	0	24
Paulownia	0	0	20
Hamamelis	6	5	13
Aralia	0	1	13
Philadelphus	0	0	11
Pieris	0	1	9
Liriodendron	0	1	8
Wisteria	0	1	7
Unknown Vine	0	0	6
Toxicodendron	0	0	6
Parthenocissus	0	0	6
Oxydendrum	0	1	5
Berberis	3	0	3
Total	49,861	13,904	96,590

Table 14.—Species O_3 index values for tree genera in Brooklyn (total index value for Brooklyn is 77.0)

Genera	Percent of total city leaf biomass	O_3 index value
Catalpa	0.30	100.0
Crataegus	0.29	100.0
Hydrangea	0.08	100.0
Paulownia	0.07	100.0
Pyrus	1.90	100.0
Rhus	0.03	100.0
Tilia	5.41	100.0
Viburnum	0.04	100.0
Cercis	0.14	99.7
Fraxinus	0.49	99.7
Prunus	5.68	99.7
Ulmus	5.05	99.7
Betula	0.44	99.5
Celtis	0.23	99.5
Elaeagnus	0.14	99.5
Gleditsia	3.05	99.5
Ilex	0.56	99.5
Liriodendron	0.03	99.5
Morus	9.47	99.5
Sophora	5.46	99.5
Tsuga	0.10	99.5
Juniperus	0.17	98.9
Oxydendrum	0.01	98.9
Acer	14.66	97.2
Aesculus	3.62	97.2
Ailanthus	11.74	97.2
Cedrus	4.20	97.2
Cornus	0.18	97.2
Ginkgo	0.12	95.0
Pinus	0.44	94.9
Picea	3.91	76.0
Hamamelis	0.01	71.0
Platanus	8.44	4.8
Populus	1.02	4.8
Salix	0.69	4.8
Quercus	8.11	4.6
Robinia	3.70	4.6
Liquidambar	0.03	0.0

Table 15.—Total C storage (t) and gross and net C sequestration (t/yr) by land use (standard errors on page 56-58)

Land use	Storage	Sequestration	
		Gross	Net
Open space	80,410	1,860	1,110
Residential (1-2 family)	32,400	1,280	340
Multifamily residential	32,370	1,190	1,040
Public facility	13,140	320	190
Vacant land	11,400	430	370
Commercial/industrial	2,690	40	-530
Total	172,410	5,120	2,510

Table 16.—Average C stored, gross C sequestered annually, air pollution removed, and associated air pollution removal value for individual trees by d.b.h. class

D.b.h. class (cm)	C stored	C sequestered	Pollution removed	Pollution removal value
	kg	*kg/yr*	*kg/yr*	*dollars*
0.00 - 7.62	4.8	1.0	0.03	0.16
7.63 - 15.24	24.2	2.8	0.09	0.48
15.25 - 22.86	75.3	4.8	0.23	1.21
22.87 - 30.48	166.0	8.2	0.38	1.97
30.49 - 38.10	262.8	8.0	0.47	2.45
38.11 - 45.72	439.5	15.8	0.81	4.16
45.73 - 53.34	679.5	19.9	1.00	5.18
53.35 - 60.96	900.2	23.0	0.93	4.80
60.97 - 68.58	—	—	—	—
68.59 - 76.20	1,528.6	28.5	0.90	4.67
76.21 - 83.82	1,968.8	40.3	1.48	7.63
83.83 +	2,570.6	47.6	1.95	10.05

Table 17.—Estimated pollution removal in Brooklyn (1994) during nonprecipitation periods (dry deposition), removal value, and removal rate (g/m^2 of cover) for trees and shrubs

Pollutant	Pollution removal	Removal value[a]	Removal rate	
			Trees	Shrubs
	tons	*thousand dollars*	*g/m²*	
O_3[b]	76	512	3.06	2.42
	(20-114)	(134-767)[b]	(0.77-4.38)	(0.73-4.34)
PM10[c]	68	305	2.73	2.12
	(26-106)	(119-476)	(1.07-4.27)	(0.83-3.32)
NO_2	63	422	2.54	1.92
	(30-92)	(203-619)	(1.16-3.54)	(1.13-3.50)
SO_2	33	55	1.32	1.13
	(17-58)	(29-96)	(0.67-2.22)	(0.66-2.22)
CO	15	14	0.58	0.58
Total	254	1,309	10.23	8.17
	(109-384)	(499-1,973)	(4.24-14.98)	(3.93-13.95)

Range of values in parentheses based on typical range of in-leaf dry deposition velocities in the literature (no range determined for CO; Lovett 1994).

[a]Removal value estimated using median externality values in United States for each pollutant: NO_2 = \$6,750 t^{-1}, PM10 = \$4,500 t^{-1}, SO_2 = \$1,650 t^{-1}, CO = \$950 t^{-1} (Murray 1994). Externality values for O_3 were set equal to those for NO_2.

[b]Average national O_3 trend data were used to estimate missing data for January and February.
[c]Assumes 50-percent resuspension of particles.

Table 18.—Estimated number of trees and tree density (trees/ha) for cities analyzed with the UFORE model (Nowak and Crane 2000); tree cover estimates based on satellite imagery or aerial photography; data for Oakland (Nowak 1991) and Chicago (Nowak 1994b) were not analyzed with UFORE.

City	Number of trees		Mean number of trees/ha		Mean tree cover	
					Percent	
Atlanta	9,420,000	(749,000)[a]	276	(22)[a]	32.9	na[b]
Chicago	4,130,000	(634,000)	68	(10)	11.0	(0.2)[a]
Baltimore	2,600,000	(406,000)	109	(17)	18.9	na
Philadelphia	2,110,000	(211,000)	62	(6)	21.6	(0.4)
Oakland	1,590,000	(51,000)	120	(4)	21.0	(0.2)
Boston	1,180,000	(109,000)	83	(8)	21.2	(0.4)
Brooklyn	610,000	(75,000)	33	(4)	11.4	(0.5)

[a]Standard errors in parentheses.

[b]na = not analyzed; base data for Atlanta from "American Forests;" base data for Baltimore from Grove (1996).

Table 19.—Estimated C storage (above and below ground) and gross and net annual C sequestration by trees in Brooklyn, Chicago, and Oakland (Nowak 1993, 1994)

City	C storage		Gross C sequestration		Net C sequestration	
	t	t/ha	t/yr	t/ha/yr	t/yr	t/ha/yr
Chicago	854,800	14.1	40,100[a]	0.7	14,400	0.2
Brooklyn	172,400	9.4	5,100	0.3	2,500	0.1
Oakland	145,800	11.0	na[b]	na	na	na

[a]Tree growth and sequestration are relatively high as growth rates in this estimate were not effected by tree condition (i.e., all trees accumulated C based on average healthy tree growth rates).

[b]na - not analyzed.

Table 20.—Estimated pollution removal by trees and shrubs during nonprecipitation periods (dry deposition) for Atlanta, Chicago, Baltimore, and Brooklyn

Pollutant	Atlanta[a]	Chicago[b]	Baltimore[c]	Brooklyn[d]
O_3	514[e] (101-604)[g]	191	180 (42-221)	76[f] (20-114)
PM10[h]	406 (157-706)	212	137 (53-239)	68 (26-106)
NO_2	145 (72-165)	89	115 (48-134)	63 (30-92)
SO_2	95 (42-137)	84	55 (26-85)	33 (17-58)
CO	35	15	13	15
Total	1,196 (407-1,648)	591	499 (181-692)	254 (109-384)

[a]341 km^2, 32.9-percent tree cover; assumed LAI of 6; 1994 pollution and meteorological data (Nowak and Crane 2000).

[b]603 km^2, 11.0-percent tree cover; measured LAI of 6; 1991 pollution and meteorological data (Nowak 1994c).

[c]209 km^2, 18.9-percent tree cover; assumed LAI of 6; 1994 pollution and meteorological data (Nowak and Crane 2000).

[d]Removal by trees and shrubs; 182 km^2, 11.2-percent tree cover, 3.1-percent shrub cover; measured tree LAI = 4.2; measured shrub LAI = 2.4; 1994 pollution and meteorological data.

[e]Average national O_3 monthly trend data used to estimate missing data for January, February, and December.

[f]Average national O_3 monthly trend data used to estimate missing data for January and February.

[g]Expected range of values (no range determined for CO or Chicago).

[h]Assumes 50-percent resuspension of particles.

APPENDIX A

Common and Scientific Names for Trees and Shrubs in Brooklyn

Common name	Scientific name
American basswood	*Tilia americana*
American bittersweet	*Celastrus scandens*
American elm	*Ulmus americana*
American holly	*Ilex opaca*
Apple	*Pyrus malus*
Atlas cedar	*Cedrus atlantica*
Azalea	*Rhododendron azalea*
Barberry	*Berberis* spp.
Bayberry	*Myrica pennsylvanica*
Black cherry	*Prunus serotina*
Black locust	*Robinia pseudoacacia*
Black willow	*Salix nigra*
Blue spruce	*Picea pungens*
Boxelder	*Acer negundo*
Boxwood	*Buxus* spp.
Bramble	*Rubus* spp.
Callery pear	*Pyrus calleryana*
Cherry	*Prunus* spp.
Common fig	*Ficus carica*
Common pear	*Pyrus communis*
Crabapple	*Pyrus* spp.
Devils-walkingstick	*Aralia spinosa*
Eastern cottonwood	*Populus deltoides*
Eastern hemlock	*Tsuga canadensis*
Eastern redbud	*Cercis canadensis*
Eastern redcedar	*Juniperus virginiana*
Eastern white pine	*Pinus strobus*
Euonymus	*Euonymus* spp.
European white birch	*Betula pendula*
Flowering dogwood	*Cornus florida*
Forsythia	*Forsythia* spp.
Ginkgo	*Ginkgo biloba*
Grape	*Vitis* spp.
Gray birch	*Betula populifolia*
Green ash	*Fraxinus pennsylvanica*
Hawthorn	*Crataegus* spp.
Hibiscus	*Hibiscus* spp.
Higan cherry	*Prunus subhirtella*
Holly	*Ilex* spp.
Honeylocust	*Gleditsia triacanthos*
Horsechestnut	*Aesculus hippocastanum*
Hydrangea	*Hydrangea* spp.
Japanese knotweed	*Polygonum cuspidatum*
Japanese maple	*Acer palmatum*

Continued

Common name	Scientific name
Japanese pagoda tree	*Sophora japonica*
Juniper	*Juniperus* spp.
Kwanzan cherry	*Prunus serrulata*
Littleleaf linden	*Tilia cordata*
London planetree	*Platanus acerifolia*
Marsh elder	*Iva frutescens*
Mock-orange	*Philadelphus* spp.
Multiflora rose	*Rosa multiflora*
Nannyberry	*Viburnum lentago*
Northern catalpa	*Catalpa speciosa*
Northern hackberry	*Celtis occidentalis*
Northern red oak	*Quercus rubra*
Northern white-cedar	*Thuja occidentalis*
Norway maple	*Acer platanoides*
Norway spruce	*Picea abies*
Peachleaf willow	*Salix amygdaloides*
Pieris	*Pieris* spp.
Pin oak	*Quercus palustris*
Poison ivy	*Toxicodendron radicans*
Privet	*Ligustrum* spp.
Pussy willow	*Salix discolor*
Red maple	*Acer rubrum*
Rhododendron	*Rhododendron* spp.
Rose	*Rosa* spp.
Rose-of-sharon	*Hibiscus syriacus*
Royal paulownia	*Paulownia tomentosa*
Russian olive	*Elaeagnus angustifolia*
Shining sumac	*Rhus copallina*
Siberian elm	*Ulmus pumila*
Silver maple	*Acer saccharinum*
Slippery elm	*Ulmus rubra*
Smooth sumac	*Rhus glabra*
Sourwood	*Oxydendrum arboreum*
Sweet mountain pine	*Pinus mugo*
Sweetgum	*Liquidambar styraciflua*
Sycamore maple	*Acer pseudoplatanus*
Tree of heaven	*Ailanthus altissima*
Tuliptree	*Liriodendron tulipifera*
Viburnum	*Viburnum* spp.
Virginia creeper	*Parthenocissus quinquefolia*
White ash	*Fraxinus americana*
White mulberry	*Morus alba*
White spruce	*Picea glauca*
Wisteria	*Wisteria* spp.
Witch-hazel	*Hamamelis* spp.
Yew	*Taxus* spp.

Estimated Biogenic VOC Emission Rates for Common U.S. Trees and Shrubs

Genus[a]	Common name	Isoprene		Monoterpenes	
		Emission rate	Reliability[b]	Emission rate	Reliability[b]
Eucalyptus	Eucalyptus	70.0	Genus	3.0	Genus
Liquidambar	Sweetgum	70.0	Genus	3.0	Genus
Nyssa	Black gum	70.0	Genus	0.6	Genus
Quercus	Oak	70.0	Genus	0.2	Genus
Robinia	Black locust	70.0	Genus	0.2	Genus
Casuarina	Beefwood	70.0	Genus	0.1	Genus
Platanus	Sycamore	70.0	Genus	0.1	Genus
Populus	Poplar	70.0	Genus	0.1	Genus
Salix	Willow	70.0	Genus	0.1	Genus
Cupaniopsis	Carrotwood	44.9	Genus	0.0	Genus
Koelreuteria	Goldenrain tree	44.9	Family	0.0	Family
Cercidiphyllum	Katsura tree	39.4	Order	1.6	Order
Rhamnus	Buckthorn	36.9	Genus	0.0	Genus
Serenoa	Saw palmetto	35.0	Genus	0.1	Genus
Myrtus	Myrtle	30.0	Genus	0.0	Genus
Ficus	Fig	22.9	Genus	0.2	Family
Berberis	Barberry	22.2	Family	0.0	Family
Mahonia	Mahonia	22.2	Family	0.0	Family
Nandina	Heavenly bamboo	22.2	Genus	0.0	Genus
Melaleuca	Melaleuca lilac	22.1	Family	0.0	Family
Syzygium	Jambolan plum	22.1	Family	0.0	Family
Hamamelis	Witch-hazel	17.7	Genus	3.0	Family
Eucommia	Hardy rubbertree	19.7	Superorder	0.8	Superorder
Picea	Spruce	14.0	Genus	3.0	Genus
Callistemon	Bottlebrush	14.1	Genus	0.0	Genus
Sabal	Cabbage palmetto	14.0	Genus	0.1	Genus
Phoenix	Date palm	13.9	Genus	0.0	Genus
Maclura	Osage-orange	11.5	Family	0.2	Family
Eugenia	Eugenia	10.2	Genus	0.0	Genus
Pistacia	Pistache	0.0	Genus	7.9	Genus
Cotinus	Smoketree	0.0	Family	3.4	Family
Schinus	California peppertree	0.0	Genus	3.4	Genus
Abies	Fir	0.1	Genus	3.0	Genus
Acacia	Acacia	0.1	Genus	3.0	Genus
Cryptomeria	Japanese cedar	0.1	Family	3.0	Family
Juglans	Walnut	0.1	Genus	3.0	Genus
Magnolia	Magnolia	0.1	Genus	3.0	Genus
Metasequoia	Dawn redwood	0.1	Family	3.0	Family
Pinus	Pine	0.1	Genus	3.0	Genus
Sequoia	Coast redwood	0.1	Family	3.0	Family
Sequoiadendron	Giant sequoia	0.1	Family	3.0	Family
Taxodium	Baldcypress	0.1	Genus	3.0	Genus
Ginkgo	Ginkgo	0.0	Genus	2.7	Genus

Continued

Genus[a]	Common name	Isoprene		Monoterpenes	
		Emission rate	Reliability[b]	Emission rate	Reliability[b]
Larix	Larch	0.1	Family	2.3	Family
Ceanothus	Ceanothus	0.0	Genus	2.1	Genus
Acer	Maple	0.1	Genus	1.6	Genus
Aesculus	Buckeye	0.1	Order	1.6	Order
Ailanthus	Tree of heaven	0.1	Order	1.6	Order
Asimina	Pawpaw	0.1	Order	1.6	Order
Carpinus	Hornbeam	0.1	Genus	1.6	Genus
Carya	Hickory	0.1	Genus	1.6	Genus
Cedrus	Cedar	0.1	Genus	1.6	Genus
Citrus	Citrus	0.1	Genus	1.6	Genus
Cornus	Dogwood	0.1	Genus	1.6	Genus
Pseudotsuga	Douglas-fir	0.1	Genus	1.6	Genus
Araucaria	Bunya bunya	0.1	Order	1.5	Order
Taxus	Yew	0.1	Superorder	1.5	Superorder
Alnus	Alder	0.1	Family	0.9	Family
Corylus	Hazelnut	0.1	Family	0.9	Family
Myrica	Bayberry	0.0	Genus	1.0	Genus
Ostrya	Hophornbeam	0.1	Family	0.9	Family
Cupressus	Cypress	0.0	Genus	0.8	Genus
Calocedrus	Incense cedar	0.1	Family	0.6	Family
Cupressocyparis	Leyland cypress	0.1	Family	0.6	Family
Fagus	Beech	0.1	Genus	0.6	Genus
Juniperus	Juniper	0.1	Genus	0.6	Genus
Oxydendrum	Sourwood	0.1	Genus	0.6	Genus
Persea	Red bay	0.1	Genus	0.6	Genus
Thuja	Cedar	0.1	Genus	0.6	Genus
Castanea	Chestnut	0.1	Family	0.4	Family
Lithocarpus	Tanbark oak	0.0	Genus	0.4	Family
Aralia	Devil-walkingstick	0.1	Superorder	0.2	Superorder
Betula	Birch	0.1	Genus	0.2	Genus
Buxus	Boxwood	0.1	Superorder	0.2	Superorder
Celastrus	Bittersweet	0.1	Order	0.2	Order
Celtis	Hackberry	0.1	Genus	0.2	Genus
Cercidium	Paloverde	0.1	Family	0.2	Family
Chamaecyparis	False cypress	0.1	Genus	0.2	Genus
Cladrastis	Yellowwood	0.1	Family	0.2	Family
Delonix	Royal poinciana	0.1	Family	0.2	Family
Elaeagnus	Russian olive	0.1	Superorder	0.2	Superorder
Euonymus	Euonymus	0.1	Order	0.2	Order
Gleditsia	Honeylocust	0.1	Family	0.2	Family
Grevillea	Grevillea	0.1	Superorder	0.2	Superorder
Gymnocladus	Kentucky coffeetree	0.1	Family	0.2	Family
Ilex	Holly	0.1	Genus	0.2	Genus
Laburnum	Golden-chain tree	0.1	Family	0.2	Family
Liriodendron	Tuliptree	0.1	Genus	0.2	Genus

Continued

Genus[a]	Common name	Isoprene		Monoterpenes	
		Emission rate	Reliability[b]	Emission rate	Reliability[b]
Morus	Mulberry	0.1	Genus	0.2	Genus
Olea	Olive	0.0	Genus	0.3	Genus
Sophora	Japanese pagoda tree	0.1	Family	0.2	Family
Tsuga	Hemlock	0.1	Genus	0.2	Genus
Wisteria	Wistaria	0.1	Family	0.2	Family
Zelkova	Japanese zelkova	0.1	Family	0.2	Family
Arbutus	Madrona	0.1	Family	0.1	Family
Cercis	Eastern redbud	0.1	Genus	0.1	Genus
Diospyros	Persimmon	0.1	Genus	0.1	Genus
Fraxinus	Ash	0.1	Genus	0.1	Genus
Iva	Marshelder	0.1	Hardwood	0.1	Hardwood
Laurus	Laurel	0.1	Family	0.1	Family
Lindera	Spicebush	0.1	Family	0.1	Family
Melia	Chinaberry	0.1	Genus	0.1	Genus
Pieris	Pieris	0.1	Family	0.1	Family
Polygonum	Japanese Knotweed	0.1	Hardwood	0.1	Hardwood
Prunus	Plum/cherry	0.1	Genus	0.1	Genus
Rhododendron	Rhododendron	0.1	Family	0.1	Family
Sassafras	Sassafras	0.1	Genus	0.1	Genus
Ulmus	Elm	0.1	Genus	0.1	Genus
Umbellularia	California laurel	0.1	Family	0.1	Family
Vaccinium	Blueberry	0.1	Genus	0.1	Genus
Adenostoma	Chamise	0.0	Genus	0.1	Genus
Forsythia	Forsythia	0.0	Family	0.1	Family
Syringa	Lilac	0.0	Family	0.1	Family
Vinca	Myrtle/periwinkle	0.0	Order	0.1	Order
Amelanchier	Serviceberry	0.0	Family	0.0	Family
Arctostaphylos	Manzanita	0.0	Genus	0.0	Genus
Camellia	Camellia	0.0	Genus	0.0	Genus
Catalpa	Catalpa	0.0	Family	0.0	Family
Cerocarpus	Mountain mahogany	0.0	Genus	0.0	Genus
Cinnamomum	Camphor	0.0	Genus	0.0	Genus
Cotoneaster	Cotoneaster	0.0	Genus	0.0	Genus
Crataegus	Hawthorn	0.0	Family	0.0	Family
Heteromeles	Christmasberry	0.0	Family	0.0	Family
Hibiscus	Rose-of-sharon	0.0	Genus	0.0	Genus
Hydrangea	Hydrangea	0.0	Order	0.0	Order
Jacaranda	Jacaranda	0.0	Genus	0.0	Genus
Lagerstroemia	Crapemyrtle	0.0	Genus	0.0	Genus
Ligustrum	Privet	0.0	Genus	0.0	Genus
Lonicera	Honeysuckle	0.0	Family	0.0	Family
Malus	Apple	0.0	Family	0.0	Family
Paulownia	Royal paulownia	0.0	Order	0.0	Order
Parthenocissus	Virginia creeper	0.0	Family	0.0	Family
Philadelphus	Mock-orange	0.0	Order	0.0	Order

Continued

Genus[a]	Common name	Isoprene		Monoterpenes	
		Emission rate	Reliability[b]	Emission rate	Reliability[b]
Pittosporum	Tobira	0.0	Genus	0.0	Genus
Podocarpus	Fern pine	0.0	Genus	0.0	Genus
Pyracantha	Pyracantha	0.0	Family	0.0	Family
Pyrus	Pear	0.0	Genus	0.0	Genus
Raphiolepis	India hawthorn	0.0	Genus	0.0	Genus
Rhus	Sumac	0.0	Genus	0.0	Genus
Ribes	Currant	0.0	Order	0.0	Order
Rosa	Rose	0.0	Genus	0.0	Genus
Rubus	Bramble	0.0	Family	0.0	Family
Sambucus	Elder	0.0	Genus	0.0	Genus
Sorbus	Mountain-ash	0.0	Family	0.0	Family
Tecomaria	Cape honeysuckle	0.0	Genus	0.0	Genus
Tilia	Basswood	0.0	Order	0.0	Order
Toxicodendron	Poison ivy	0.0	Genus	0.0	Genus
Viburnum	Viburnum	0.0	Genus	0.0	Genus
Vitis	Grape	0.0	Genus	0.0	Genus

[a]OVOC emission rate for all genera = 1.67. OVOC based on total emissions (Guenther et al. 1998) of reactive VOC (ethene, propene, butene, acetalehyde, formaldehyde, acetic acid, formic acid) and less reactive VOC (methanol, ethanol, acetone, ethane).

[b]Genus: measured genera values from the literature: C.D. Geron, pers. commun. (1999), Geron et al. (1994), Benjamin et al., (1996), Winer et al., (1983), Cronn and Nutmagul (1982), Evans et al., (1982), Rasmussen and Jones (1973); Family: median of genera values within family; Order: median of family values within order; Superorder: median of order values within superorder; Hardwood: median of hardwood values.

Note: Emission rates are in micrograms of C/g of leaf dry weight/hr (standardized to 1,000 µmol m^{-2} s^{-1} of photosynthetically active radiation and 30°C).

Appendix B

Total Estimates for Trees in Brooklyn by Species

Species	Trees (no.)			Carbon storage (t)			Gross carbon sequestration (t/yr)			Net carbon sequestation (t/yr)		Leaf area (km^2)			Leaf biomass (t)			Tree value (dollars)		
	%	Estimate	SE	%	Estimate	SE	%	Estimate	SE	Estimate	SE	%	Estimate	SE	%	Estimate	SE	%	Estimate	SE
Tree of heaven	20.5	125,126	28,584	21.1	36,356.6	14,641.9	18.7	959.5	395.4	-807.2	910.8	11.2	9.58	3.68	11.7	711.9	273.3	6.8	46,360,035	18,256,362
White mulberry	7.7	46,825	21,361	6.5	11,223.5	6,193.8	6.7	343.7	168.6	237.5	130.5	9.1	7.85	3.52	9.5	574.1	257.3	5.3	35,822,537	17,159,321
Black locust	6.5	39,728	20,140	2.3	3,902.9	1,871.6	3.3	169.1	78.8	159.1	74.9	4.9	4.17	2.05	3.7	224.4	110.2	2.2	15,070,286	7,376,863
Norway maple	6.2	37,953	10,294	8.4	14,437.6	4,766.9	9.7	498.1	145.2	395.8	125.9	11.1	9.52	2.95	8.5	513.8	159.1	9.5	64,727,556	18,898,786
Black cherry	5.9	35,740	18,564	3.4	5,935.8	2,965.4	3.8	195.6	94.8	169.5	88.0	3.3	2.84	1.67	3.6	220.1	129.6	2.4	16,101,555	7,952,616
London planetree	4.3	25,948	9,383	11.1	19,210.7	9,092.8	10.5	539.9	206.3	486.4	184.5	13.7	11.73	4.68	8.4	512.0	204.3	13.6	92,067,360	38,477,546
Sycamore maple	4.1	25,045	10,797	1.5	2,636.5	1,388.7	3.3	167.9	89.6	134.0	85.4	3.8	3.24	1.78	3.7	226.2	124.4	2.3	15,393,221	7,956,861
Honeylocust	3.3	20,080	8,925	3.5	5,987.0	3,907.1	4.0	202.8	113.9	179.8	100.8	2.1	1.77	1.00	3.0	184.9	104.6	5.6	37,744,707	21,382,330
American basswood	2.3	14,287	8,242	0.8	1,367.8	1,298.7	0.9	45.8	34.4	44.7	33.5	1.8	1.55	1.31	0.7	45.2	38.3	1.0	6,922,210	4,446,624
Cherry	2.3	14,243	5,653	1.2	2,046.3	1,479.2	1.5	97.3	54.2	81.4	41.5	1.3	1.12	0.54	1.4	86.3	41.7	1.2	8,230,755	4,559,770
Kwanzan cherry	1.8	11,183	6,349	0.3	536.0	366.0	1.2	60.9	34.4	58.6	33.0	0.5	0.47	0.27	0.6	36.3	21.2	0.7	4,842,582	2,786,193
Eastern white pine	1.8	10,945	5,188	0.2	261.6	183.6	0.5	23.1	12.3	22.1	11.6	0.5	0.41	0.24	0.4	26.6	15.2	0.9	6,178,850	3,347,415
Japanese pagoda tree	1.8	10,864	7,686	6.0	10,380.8	9,111.1	4.6	235.8	177.4	110.4	80.7	3.4	2.91	2.46	5.5	331.2	279.0	6.1	41,427,046	34,325,524
Hawthorn	1.8	10,749	7,830	0.4	666.3	614.2	0.9	47.7	42.2	45.1	39.7	0.6	0.49	0.47	0.3	17.7	17.0	1.3	8,914,580	7,950,277
Flowering dogwood	1.7	10,555	3,862	0.1	175.7	116.0	0.6	29.1	14.7	27.7	13.7	0.2	0.19	0.08	0.2	10.9	4.5	0.4	2,465,622	1,258,067
Pin oak	1.6	9,780	5,052	5.3	9,123.3	6,420.6	3.4	176.0	123.4	163.2	114.0	2.8	2.44	1.72	3.6	221.0	155.6	3.7	25,391,697	19,893,269
American elm	1.6	9,678	6,161	1.7	2,988.0	2,873.8	2.3	118.6	108.2	107.1	97.2	4.1	3.52	3.29	4.2	256.3	239.6	2.1	14,005,670	12,488,340
Silver maple	1.3	7,865	3,476	4.0	6,951.3	4,102.4	2.3	116.7	63.3	69.9	50.2	2.8	2.43	1.37	2.1	127.7	71.9	3.5	23,775,374	14,087,258
Littleleaf linden	1.3	7,865	4,180	2.9	5,028.4	3,601.1	2.1	106.0	63.2	94.3	56.0	4.4	3.78	2.32	4.7	283.0	174.0	5.9	39,959,944	26,188,247
Blue spruce	1.2	7,520	3,302	0.2	393.0	202.4	0.7	38.3	17.7	35.1	16.5	0.5	0.40	0.25	1.1	67.3	42.4	0.7	4,894,544	2,332,977
Japanese maple	1.2	7,438	3,223	0.1	106.6	61.8	0.4	18.7	8.6	18.1	8.4	0.3	0.28	0.16	0.3	15.6	8.8	0.3	2,037,589	1,197,779
Callery pear	1.1	6,720	5,439	0.0	54.6	40.1	0.3	14.8	11.0	14.4	10.7	0.1	0.10	0.07	0.1	8.3	5.9	0.2	1,247,006	928,008
Eastern redbud	1.1	6,520	5,130	0.0	29.8	20.9	0.1	5.4	3.8	5.3	3.7	0.2	0.13	0.09	0.1	8.3	6.0	0.1	456,833	360,356
Northern red oak	1.1	6,520	3,185	7.6	13,080.7	8,003.6	4.6	235.3	128.7	186.5	99.2	4.0	3.40	2.00	4.5	270.6	159.3	10.1	68,371,046	39,771,338
Eastern cottonwood	1.0	6,257	3,836	0.7	1,246.8	1,061.6	0.6	30.9	26.1	28.9	25.3	1.0	0.86	0.81	1.0	61.9	58.8	0.2	1,103,561	916,608
Apple	1.0	6,093	3,015	0.8	1,411.1	1,169.3	1.2	61.8	42.2	49.1	31.4	1.1	0.95	0.56	1.4	82.1	48.4	1.1	7,483,799	4,672,775
Crabapple	1.0	5,950	3,596	0.2	312.0	273.9	0.6	29.3	20.8	28.0	19.7	0.3	0.22	0.17	0.3	18.5	14.2	0.4	2,794,353	1,971,762
Horsechestnut	0.9	5,233	5,232	1.5	2,603.9	2,603.6	2.1	109.7	109.7	99.6	99.6	3.7	3.14	3.14	3.6	219.6	219.6	1.7	11,831,652	11,830,521
Red maple	0.8	4,890	4,889	0.0	47.5	47.5	0.1	5.8	5.8	5.8	5.8	0.1	0.05	0.05	0.1	3.3	3.3	0.1	341,081	340,976
Hydrangea	0.8	4,890	4,889	0.0	82.9	82.8	0.2	10.9	10.9	10.5	10.5	0.1	0.07	0.07	0.1	4.9	4.9	0.4	2,506,387	2,505,618
Black willow	0.8	4,890	4,889	0.9	1,497.2	1,496.7	0.7	38.4	38.4	37.4	37.3	0.7	0.57	0.57	0.6	35.0	34.9	0.2	1,325,988	1,325,581
European white birch	0.8	4,748	2,728	0.2	394.2	365.8	0.5	23.9	18.7	22.9	17.8	0.4	0.31	0.28	0.3	18.5	16.5	0.4	2,726,907	2,093,492
Siberian elm	0.8	4,710	4,708	0.2	362.3	362.2	0.3	16.4	16.4	16.0	16.0	0.5	0.39	0.39	0.4	26.6	26.5	0.1	884,014	883,733
Royal paulownia	0.7	4,545	3,363	0.0	22.9	16.2	0.1	5.5	4.3	5.4	4.3	0.1	0.06	0.05	0.1	4.5	3.4	0.0	256,176	213,068
Eastern hemlock	0.7	4,463	3,305	0.0	59.0	42.7	0.2	11.2	7.8	10.9	7.6	0.1	0.07	0.05	0.1	6.0	4.3	0.2	1,452,958	1,031,308
Russian olive	0.5	3,260	2,287	0.1	159.0	111.6	0.1	6.8	6.8	-15.1	22.8	0.1	0.11	0.11	0.1	8.2	8.2	0.2	1,047,988	1,047,667
Eastern redcedar	0.5	3,260	3,259	0.0	10.3	10.3	0.0	1.4	1.4	1.4	1.4	0.0	0.04	0.04	0.21	0.4	10.4	0.1	350,861	350,753
Nannyberry	0.5	3,260	3,259	0.1	145.0	144.9	0.2	8.5	8.5	8.4	8.4	0.0	0.03	0.03	0.0	2.3	2.3	0.1	585,549	585,369
Northern hackberry	0.5	3,140	3,139	0.0	56.2	56.2	0.0	2.1	2.1	2.0	2.0	0.3	0.27	0.27	0.2	14.1	14.1	0.1	483,176	483,022
Norway spruce	0.5	3,118	2,206	1.2	2,034.3	1,872.2	0.8	43.2	35.2	31.8	27.4	1.1	0.99	0.76	2.7	164.2	127.2	2.7	18,156,242	17,023,008
Boxelder	0.3	1,630	1,630	0.0	1.3	1.3	0.0	0.7	0.7	0.7	0.7	0.0	0.03	0.03	0.0	2.8	2.8	0.0	24,450	24,443
Atlas cedar	0.3	1,630	1,630	0.4	703.7	703.5	0.3	15.0	15.0	12.3	12.3	1.3	1.09	1.09	4.2	254.7	254.6	1.5	10,046,884	10,043,802
White ash	0.3	1,630	1,630	1.1	1,850.2	1,849.6	0.9	44.3	44.3	37.2	37.2	0.6	0.53	0.53	0.5	30.0	29.9	1.5	10,154,572	10,151,457
Witch-hazel	0.3	1,630	1,630	0.0	1.7	1.7	0.0	0.8	0.8	0.8	0.8	0.0	0.01	0.01	0.0	0.6	0.6	0.0	73,991	73,968
American holly	0.3	1,630	1,630	0.8	1,315.1	1,314.7	0.7	34.8	34.8	31.8	31.8	0.3	0.26	0.26	0.6	34.2	34.2	0.8	5,370,690	5,369,043
Sweetgum	0.3	1,630	1,630	0.0	13.4	13.4	0.0	1.6	1.6	1.6	1.6	0.1	0.04	0.04	0.0	2.0	2.0	0.1	682,161	681,952
Tuliptree	0.3	1,630	1,630	0.0	0.7	0.7	0.0	0.5	0.5	0.5	0.5	0.0	0.03	0.03	0.0	1.5	1.5	0.0	130,401	130,361

Continued

	Trees (no.)			Carbon storage (t)			Gross carbon sequestration (t/yr)			Net carbon sequestation (t/yr)		Leaf area (km^2)			Leaf biomass (t)			Tree value (dollars)		
Species	%	Estimate	SE	%	Estimate	SE	%	Estimate	SE	Estimate	SE	%	Estimate	SE	%	Estimate	SE	%	Estimate	SE
Smooth sumac	0.3	1,630	1,630	0.0	14.5	14.5	0.0	2.5	2.5	2.5	2.5	0.0	0.03	0.03	0.0	1.8	1.8	0.1	344,058	343,953
Slippery elm	0.3	1,630	1,630	0.8	1,405.7	1,405.3	0.5	23.1	23.1	22.1	22.1	0.6	0.52	0.52	0.4	23.5	23.5	0.2	1,520,681	1,520,215
Gray birch	0.3	1,570	1,569	0.2	361.0	360.9	0.5	23.2	23.2	19.7	19.6	0.2	0.14	0.14	0.1	8.3	8.3	0.2	1,693,777	1,693,237
Northern catalpa	0.2	1,488	1,487	1.3	2,243.2	2,242.5	1.3	64.1	64.1	55.5	55.5	0.3	0.30	0.30	0.3	18.1	18.0	1.1	7,561,486	7,558,944
Ginkgo	0.2	1,488	1,487	0.3	564.8	564.6	0.5	26.7	26.7	24.5	24.5	0.2	0.16	0.16	0.1	7.0	7.0	0.4	2,962,873	2,961,877
Other species	0.2	1,488	1,487	0.2	392.5	392.3	0.0	0.0	0.0	-107.9	107.9	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0	0
Sourwood	0.2	1,488	1,487	0.0	32.3	32.3	0.1	6.6	6.6	6.4	6.4	0.0	0.03	0.03	0.0	0.8	0.8	0.1	777,611	777,349
White spruce	0.2	1,488	1,487	0.0	33.1	33.1	0.1	5.8	5.8	5.6	5.6	0.0	0.03	0.03	0.1	5.4	5.4	0.1	771,736	771,477
Higan cherry	0.2	1,488	1,487	0.0	11.4	11.4	0.1	3.3	3.3	3.2	3.2	0.0	0.03	0.03	0.0	1.9	1.9	0.0	233,448	233,370
Common pear	0.2	1,488	1,487	0.0	19.5	19.5	0.1	5.0	5.0	4.9	4.9	0.1	0.07	0.07	0.1	6.3	6.3	0.1	418,642	418,501
Pussy willow	0.2	1,488	1,487	0.1	117.5	117.5	0.2	12.0	12.0	11.5	11.5	0.1	0.12	0.12	0.1	7.1	7.1	0.1	868,345	868,053

Total Estimates for Trees in Brooklyn by Land Use

Land use	Species	Trees (no.)		Carbon (t)		Gross carbon sequestration (t/yr)		Net carbon sequestation (t/yr)		Leaf area (km^2)		Leaf biomass (t)		Tree value (dollars)		Number of street trees	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Tree of heaven	7,489	7,488	2075.7	2075.5	0.0	0.0	-570.7	570.7	0.00	0.00	0.0	0.0	0	0	0	0
	Hawthorn	7,489	7,488	611.9	611.9	41.8	41.8	39.4	39.4	0.47	0.47	17.0	17.0	7,897,122	7,896,594	0	0
	Total	14,978	9,984	2687.6	2097.63	41.8	41.8	-531.3	576.41	0.47	0.47	17.0	17.0	7,897,122	7,896,594	0	0
Mult. Fam. Res.	Tree of heaven	20,931	16,211	17,097.9	12,798.1	518.8	366.8	443.2	313.7	4.93	3.38	366.0	250.8	24,421,840	16,880,585	0	0
	Norway maple	10,465	7,148	716.5	712.5	59.5	56.2	56.6	53.4	0.59	0.55	31.9	29.8	5,431,647	5,178,309	5,233	5,232
	Horsechestnut	5,233	5,232	2,603.9	2,603.6	109.7	109.7	99.6	99.6	3.14	3.14	219.6	219.6	11,831,652	11,830,521	0	0
	Honeylocust	5,233	5,232	1,947.6	1,947.4	92.4	92.4	84.8	84.8	0.86	0.86	90.0	90.0	11,798,763	11,797,636	0	0
	White mulberry	5,233	5,232	3,736.3	3,735.9	135.4	135.4	100.0	100.0	2.42	2.42	177.2	177.2	13,697,556	13,696,247	0	0
	London planetree	5,233	5,232	1,947.6	1,947.4	71.3	71.3	66.9	66.9	1.90	1.90	82.9	82.9	11,798,763	11,797,636	0	0
	Kwanzan cherry	5,233	5,232	40.0	40.0	11.6	11.6	11.3	11.3	0.07	0.07	5.6	5.6	821,195	821,117	0	0
	Callery pear	5,233	5,232	35.0	35.0	9.8	9.8	9.5	9.5	0.06	0.06	4.8	4.8	828,364	828,285	5,233	5,232
	Japanese pagoda tree	5,233	5,232	1,372.0	1,371.8	75.0	75.0	69.6	69.6	0.51	0.51	58.2	58.2	8,053,558	8,052,788	5,233	5,232
	American elm	5,233	5,232	2,872.3	2,872.0	107.9	107.9	96.9	96.8	3.29	3.29	239.3	239.3	12,431,246	12,430,059	0	0
	Total	73,257	21,445	32,369.0	12,924.7	1,191.4	388.5	1,038.48	334.6	17.77	5.63	1,275.6	420.3	101,114,586	29,770,810	15,698	11,383
Open Space	Tree of heaven	34,230	15,790	8,931.3	6,084.4	170.4	118.5	-293.2	279.8	1.03	0.53	76.8	39.1	7,650,261	5,028,487	0	0
	Black cherry	32,600	18,436	4,459.9	2,603.2	163.9	90.7	138.9	83.9	2.63	1.66	203.8	129.0	14,519,654	7,839,377	0	0
	White mulberry	27,710	19,751	6,778.9	4,925.2	158.8	98.2	89.1	81.2	4.29	2.49	313.9	181.9	17,558,213	10,124,509	0	0
	Black locust	13,040	7,883	2,075.4	1,376.5	81.4	50.1	74.1	46.1	1.71	1.07	92.3	57.4	10,013,151	6,489,507	0	0
	Sycamore maple	11,410	8,089	1,372.4	1,101.6	100.1	80.3	94.6	75.9	1.86	1.38	129.8	96.3	9,909,728	7,252,445	0	0
	Cherry	9,780	5,052	406.8	222.2	24.1	12.6	22.7	12.3	0.31	0.16	24.3	12.4	1,885,937	1,072,925	0	0
	Pin oak	9,780	5,052	9,123.3	6,420.6	176.0	123.4	163.2	114.0	2.44	1.72	221.0	155.6	25,391,697	19,893,269	0	0
	Norway maple	8,150	4,228	2,400.6	1,574.3	79.1	44.1	71.9	39.8	2.05	1.30	110.5	70.3	12,838,198	7,846,576	1,630	1,630
	Eastern redbud	6,520	5,130	29.8	20.9	5.4	3.8	5.3	3.7	0.13	0.09	8.3	6.0	456,833	360,356	0	0
	Northern red oak	6,520	3,185	13,080.7	8,003.6	235.3	128.7	186.5	99.2	3.40	2.00	270.6	159.3	68,371,046	39,771,338	0	0
	American basswood	6,520	5,130	45.7	39.3	7.6	6.3	7.4	6.2	0.16	0.15	4.6	4.3	2,080,434	1,699,144	0	0
	Red maple	4,890	4,889	47.5	47.5	5.8	5.8	5.8	5.8	0.05	0.05	3.3	3.3	341,081	340,976	4,890	4,889
	Silver maple	4,890	2,780	5,659.7	4,001.0	85.8	58.6	64.4	43.6	1.73	1.19	91.2	62.6	19,792,196	13,776,937	0	0
	Hydrangea	4,890	4,889	82.9	82.8	10.9	10.9	10.5	10.5	0.07	0.07	4.9	4.9	2,506,387	2,505,618	0	0
	Black willow	4,890	4,889	1,497.2	1,496.7	38.4	38.4	37.4	37.3	0.57	0.57	35.0	34.9	1,325,988	1,325,581	0	0
	Littleleaf linden	4,890	3,622	4,733.5	3,590.8	86.9	61.4	76.3	53.7	2.71	2.09	203.0	156.7	35,893,723	25,974,976	0	0
	European white birch	3,260	2,287	390.1	365.8	22.0	18.6	21.1	17.7	0.30	0.28	17.8	16.5	2,626,286	2,091,074	0	0
	Hawthorn	3,260	2,287	54.4	53.6	5.9	5.4	5.7	5.2	0.02	0.02	0.7	0.6	1,017,459	922,337	0	0
	Russian olive	3,260	2,287	159.0	111.6	6.8	6.8	-15.1	22.8	0.11	0.11	8.2	8.2	1,047,988	1,047,667	0	0
	Honeylocust	3,260	2,287	3,679.6	3,379.3	76.4	62.9	62.9	50.4	0.62	0.47	64.4	49.2	19,457,530	17,274,911	0	0
	Eastern redcedar	3,260	3,259	10.3	10.3	1.4	1.4	1.4	1.4	0.04	0.04	10.4	10.4	350,861	350,753	0	0
	Eastern white pine	3,260	3,259	41.2	41.2	4.5	4.5	4.4	4.4	0.16	0.16	10.0	10.0	1,764,787	1,764,246	0	0
	London planetree	3,260	3,259	7,603.5	7,601.2	130.9	130.8	113.8	113.8	2.23	2.23	97.6	97.5	28,659,402	28,650,609	3,260	3,25
	Nannyberry	3,260	3,259	145.0	144.9	8.5	8.5	8.4	8.4	0.03	0.03	2.3	2.3	585,549	585,369	0	0
	Boxelder	1,630	1,630	1.3	1.3	0.7	0.7	0.7	0.7	0.03	0.03	2.8	2.8	24,450	24,443	0	0
	Atlas cedar	1,630	1,630	703.7	703.5	15.0	15.0	12.3	12.3	1.09	1.09	254.7	254.6	10,046,884	10,043,802	0	0
	Flowering dogwood	1,630	1,630	0.8	0.8	0.6	0.6	0.6	0.6	0.02	0.02	1.3	1.3	93,722	93,693	0	0
	White ash	1,630	1,630	1,850.2	1,849.6	44.3	44.3	37.2	37.2	0.53	0.53	30.0	29.9	10,154,572	10,151,457	0	0
	Witch-hazel	1,630	1,630	1.7	1.7	0.8	0.8	0.8	0.8	0.01	0.01	0.6	0.6	73,991	73,968	0	0
	American holly	1,630	1,630	1,315.1	1,314.7	34.8	34.8	31.8	31.8	0.26	0.26	34.2	34.2	5,370,690	5,369,043	0	0
	Sweetgum	1,630	1,630	13.4	13.4	1.6	1.6	1.6	1.6	0.04	0.04	2.0	2.0	682,161	681,952	0	0
	Tuliptree	1,630	1,630	0.7	0.7	0.5	0.5	0.5	0.5	0.03	0.03	1.5	1.5	130,401	130,361	0	0
	Apple	1,630	1,630	130.7	130.6	9.0	9.0	7.8	7.8	0.42	0.42	36.3	36.3	1,469,146	1,468,696	0	0
	Norway spruce	1,630	1,630	1,865.1	1,864.5	34.0	34.0	27.0	26.9	0.71	0.71	118.9	118.9	16,988,122	16,982,910	0	0

Continued

Land use	Species	Trees (no.)		Carbon (t)		Gross carbon sequestration (t/yr)		Net carbon sequestation (t/yr)		Leaf area (km^2)		Leaf biomass (t)		Tree value (dollars)		Number of street trees	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Eastern cottonwood	1,630	1,630	197.0	196.9	3.1	3.1	1.8	1.8	0.03	0.03	2.1	2.1	129,291	129,252	0	0
	Smooth sumac	1,630	1,630	14.5	14.5	2.5	2.5	2.5	2.5	0.03	0.03	1.8	1.8	344,058	343,953	0	0
	American elm	1,630	1,630	99.4	99.3	7.3	7.3	7.1	7.1	0.13	0.13	9.2	9.2	1,114,109	1,113,767	0	0
	Slippery elm	1,630	1,630	1,405.7	1405.3	23.1	23.1	22.1	22.1	0.52	0.52	23.5	23.5	1,520,681	1,520,215	0	0
	Total	239,612	55,748	80,407.8	16,468.6	1,863.2	359.6	1,110.8	364.3	32.49	6.21	2523.4	502.8	334,186,666	68,020,874	9,780	7,244
Public Facility	Honeylocust	8,447	6,098	333.9	230.0	30.9	21.6	29.0	20.2	0.25	0.19	26.3	20.0	6,320,058	4,423,681	0	0
	London planetree	8,447	6,098	3,778.1	3359.3	122.1	100.7	112.8	93.0	3.43	3.19	149.6	139.1	21,895,148	17,748,017	2,816	2,815
	Japanese pagoda tree	5,632	5,631	9,008.9	9007.3	160.8	160.8	40.8	40.8	2.40	2.40	273.0	272.9	33,373,488	33,367,562	0	0
	Tree of heaven	2,816	2,815	7.2	7.2	2.2	2.2	2.1	2.1	0.05	0.05	3.6	3.6	81,834	81,819	0	0
	American elm	2,816	2,815	16.3	16.3	3.3	3.3	3.2	3.2	0.11	0.11	7.8	7.8	460,315	460,233	0	0
	Total	28,158	9,627	13,144.3	9,302.2	319.2	178.5	188.0	96.0	6.24	3.79	460.3	292.6	62,130,843	35,735,364	2,816	2,815
1-2 Residential	Tree of heaven	28,263	9,189	4,423.5	2,539.8	148.2	64.4	-463.6	568.1	1.61	0.74	119.9	54.6	8,794,325	3,820,753	0	0
	Norway maple	19,338	6,082	11,320.6	4,442.7	359.5	126.4	267.2	106.9	6.88	2.59	371.3	139.6	46,457,710	16,394,526	11,900	5,411
	Sycamore maple	8,925	6,261	811.9	718.6	33.3	21.6	6.6	23.1	0.25	0.17	17.4	11.7	2,695,452	1,766,224	1,488	1,487
	Flowering dogwood	8,925	3,502	174.8	115.9	28.6	14.7	27.1	13.7	0.17	0.07	9.6	4.3	2,371,900	1,254,573	0	0
	Japanese maple	7,438	3,223	106.6	61.8	18.7	8.6	18.1	8.4	0.28	0.16	15.6	8.8	2,037,589	1,197,779	0	0
	London planetree	7,438	3,223	5,824.3	3,133.9	206.2	100.6	183.7	88.7	3.86	1.74	168.4	76.1	28,734,369	14,301,353	2,975	2,087
	Crabapple	5,950	3,596	312.0	273.9	29.3	20.8	28.0	19.7	0.22	0.17	18.5	14.2	2,794,353	1,971,762	1,488	1,487
	Blue spruce	5,950	2,906	340.5	195.5	30.7	16.0	27.7	14.8	0.34	0.24	58.0	41.4	3,979,662	2,146,231	0	0
	Kwanzan cherry	5,950	3,596	496.0	363.8	49.3	32.4	47.2	31.0	0.40	0.26	30.7	20.4	4,021,387	2,662,449	0	0
	Apple	4,463	2,536	1,280.4	1,162.0	52.8	41.2	41.3	30.5	0.53	0.37	45.7	31.9	6,014,653	4,435,963	0	0
	White mulberry	4,463	2,536	184.2	126.6	25.2	15.1	24.5	14.6	0.31	0.20	22.5	14.6	3,088,053	1,864,160	0	0
	Cherry	4,463	2,536	1,639.5	1,462.4	73.3	52.7	58.7	39.6	0.80	0.52	61.9	39.8	6,344,819	4,431,742	0	0
	Eastern hemlock	4,463	3,305	59.0	42.7	11.2	7.8	10.9	7.6	0.07	0.05	6.0	4.3	1,452,958	1,031,308	0	0
	Silver maple	2,975	2,087	1,291.6	906.4	30.9	24.0	5.5	25.0	0.69	0.67	36.5	35.5	3,983,178	2,940,554	0	0
	Royal paulownia	2,975	2,974	12.0	12.0	4.1	4.1	4.0	4.0	0.04	0.04	3.1	3.0	207,509	207,440	0	0
	Eastern white pine	2,975	2,087	186.4	176.4	12.7	10.4	11.9	9.7	0.17	0.16	11.0	10.5	3,175,555	2,670,834	0	0
	Littleleaf linden	2,975	2,087	294.9	271.6	19.1	15.1	18.0	14.0	1.07	1.01	80.0	75.7	4,066,222	3,335,403	2,975	2,087
	European white birch	1,488	1,487	4.1	4.1	1.9	1.9	1.8	1.8	0.01	0.01	0.7	0.7	100,620	100,587	0	0
	Northern catalpa	1,488	1,487	2,243.2	2,242.5	64.1	64.1	55.5	55.5	0.30	0.30	18.1	18.0	7,561,486	7,558,944	0	0
	Ginkgo	1,488	1,487	564.8	564.6	26.7	26.7	24.5	24.5	0.16	0.16	7.0	7.0	2,962,873	2,961,877	1,488	1,487
	Other species	1,488	1,487	392.5	392.3	0.0	0.0	-107.9	107.9	0.00	0.00	0.0	0.0	0	0	0	0
	Sourwood	1,488	1,487	32.3	32.3	6.6	6.6	6.4	6.4	0.03	0.03	0.8	0.8	777,611	777,349	0	0
	Norway spruce	1,488	1,487	169.2	169.2	9.2	9.2	4.9	4.9	0.27	0.27	45.3	45.3	1,168,120	1,167,728	0	0
	White spruce	1,488	1,487	33.1	33.1	5.8	5.8	5.6	5.6	0.03	0.03	5.4	5.4	771,736	771,477	0	0
	Eastern cottonwood	1,488	1,487	6.3	6.3	2.0	2.0	1.9	1.9	0.02	0.02	1.2	1.2	69,170	69,147	0	0
	Higan cherry	1,488	1,487	11.4	11.4	3.3	3.3	3.2	3.2	0.03	0.03	1.9	1.9	233,448	233,370	0	0
	Callery pear	1,488	1,487	19.6	19.6	5.0	5.0	4.9	4.9	0.04	0.04	3.5	3.5	418,642	418,501	0	0
	Common pear	1,488	1,487	19.5	19.5	5.0	5.0	4.9	4.9	0.07	0.07	6.3	6.3	418,642	418,501	0	0
	Pussy willow	1,488	1,487	117.5	117.5	12.0	12.0	11.5	11.5	0.12	0.12	7.1	7.1	868,345	868,053	0	0
	American basswood	1,488	1,487	23.9	23.9	4.8	4.8	4.7	4.7	0.09	0.09	2.7	2.7	812,354	812,081	1,488	1,487
	Total	147,265	21,645	32,395.6	7,448.2	1,279.2	217.7	339.0	690.3	18.83	3.41	1,176.2	199.4	146,382,741	26,455,676	23,800	7,056
Vacant Land	Tree of heaven	31,398	12,510	3,820.9	1,678.3	120.0	59.9	75.0	66.4	1.96	1.15	145.5	85.2	5,411,775	2,906,903	0	0
	Black locust	26,688	18,534	1,827.5	1,268.1	87.7	60.9	85.1	59.0	2.45	1.75	132.1	94.1	5,057,135	3,507,764	0	0
	White mulberry	9,419	5,692	524.1	363.4	24.4	14.8	23.9	14.5	0.83	0.53	60.6	39.0	1,478,715	935,059	0	0
	American basswood	6,280	6,278	1,298.3	1,297.9	33.5	33.5	32.6	32.6	1.30	1.30	37.9	37.9	4,029,422	4,028,138	0	0
	Sycamore maple	4,710	3,455	452.3	445.5	34.5	33.4	32.7	31.6	1.13	1.11	79.1	77.9	2,788,040	2,755,743	0	0
	Eastern white pine	4,710	3,455	34.0	29.9	6.0	4.8	5.8	4.7	0.09	0.07	5.6	4.8	1,238,507	979,423	0	0

Continued

Land use	Species	Trees (no.)		Carbon (t)		Gross carbon sequestration (t/yr)		Net carbon sequestation (t/yr)		Leaf area (km^2)		Leaf biomass (t)		Tree value (dollars)		Number of street trees	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Siberian elm	4,710	4,708	362.3	362.3	16.4	16.4	16.0	16.0	0.39	0.39	26.6	26.5	884,014	883,733	0	0
	Northern hackberry	3,140	3,139	56.2	56.2	2.1	2.1	2.0	2.0	0.27	0.27	14.1	14.1	483,176	483,022	0	0
	Honeylocust	3,140	3,139	25.9	25.9	3.2	3.2	3.1	3.1	0.04	0.04	4.1	4.1	168,356	168,302	0	0
	Eastern cottonwood	3,140	3,139	1,043.5	1,043.2	25.9	25.8	25.1	25.1	0.81	0.81	58.7	58.7	905,099	904,811	0	0
	Black cherry	3,140	2,176	1,475.8	1,420.2	31.7	27.8	30.7	26.8	0.21	0.17	16.3	12.9	1,581,900	1,337,258	0	0
	Gray birch	1,570	1,569	361.0	360.9	23.2	23.2	19.7	19.6	0.14	0.14	8.3	8.3	1,693,777	1,693,237	0	0
	Royal paulownia	1,570	1,569	10.9	11.1	1.4	1.4	1.4	1.4	0.02	0.02	1.5	1.5	48,667	48,651	0	0
	Blue spruce	1,570	1,569	52.5	52.5	7.6	7.6	7.4	7.4	0.06	0.06	9.3	9.3	914,882	914,590	0	0
	London planetree	1,570	1,569	57.3	57.2	9.4	9.4	9.2	9.2	0.31	0.31	13.5	13.5	979,679	979,367	0	0
	Total	106,752	36,495	11,402.6	4,881.3	426.8	169.7	369.6	150.4	10.01	4.30	613.2	273.1	27,663,145	11,399,140	0	0
City Total		610,022	74,569	172,406.9	24,667.7	5,121.6	624.6	2,514.4	1,041.7	85.80	10.72	6,065.6	793.5	679,375,103	87,649,050	52,094	15,484

Leaf Area and Biomass for Trees in Brooklyn by D.b.h. Class and Land Use

		D.b.h. class																			
		0.0 - 7.6 cm				7.7 - 15.2 cm				15.3 - 22.9 cm				23.0 - 30.5 cm				30.6 - 38.1 cm			
		Leaf area (km^2)		Leaf biomass (t)		Leaf area (km^2)		Leaf biomass (t)		Leaf area (km^2)		Leaf biomass (t)		Leaf area (km^2)		Leaf biomass (t)		Leaf area (km^2)		Leaf biomass (t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	0.00	0.0	0.0
	Hawthorn	0.00	na	0.0	na	0.00	na	0.0	na	0.47	0.47	17.0	17.0	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.00	na	0.0	na	0.00	na	0.0	na	0.47	0.47	17.0	17.0	0.00	na	0.0	na	0.00	0.00	0.0	0.0
Mult. Fam. Res.	Norway maple	0.04	0.04	2.0	2.0	0.00	na	0.0	na	0.00	na	0.0	na	0.55	0.55	29.9	29.9	0.00	na	0.0	na
	Horsechestnut	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.00	0.00	0.0	0.0	0.00	na	0.0	na	0.80	0.80	59.2	59.2	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Kwanzan cherry	0.07	0.07	5.6	5.6	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Callery pear	0.06	0.06	4.8	4.8	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Japanese pagoda tree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.51	0.51	58.2	58.2
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.16	0.13	12.4	10.5	0.00	na	0.0	na	0.80	0.80	59.2	59.2	0.55	0.55	29.9	29.9	0.51	0.51	58.2	58.2
Open Space	Boxelder	0.03	0.03	2.8	2.8	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway maple	0.01	0.01	0.7	0.7	0.00	na	0.0	na	0.00	na	0.0	na	0.23	0.22	12.2	12.1	0.00	na	0.0	na
	Sycamore maple	0.00	na	0.0	na	0.24	0.24	16.7	16.7	0.37	0.37	26.2	26.1	1.24	1.24	87.0	86.9	0.00	na	0.0	na
	Red maple	0.05	0.05	3.3	3.3	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Silver maple	0.00	na	0.0	na	0.05	0.05	2.6	2.6	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.15	0.09	10.8	6.8	0.08	0.05	5.7	3.5	0.12	0.09	8.9	6.4	0.26	0.26	19.0	19.0	0.00	na	0.0	na
	European white birch	0.00	na	0.0	na	0.02	0.02	1.4	1.4	0.00	na	0.0	na	0.28	0.28	16.4	16.4	0.00	na	0.0	na
	Atlas cedar	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern redbud	0.08	0.08	5.2	5.2	0.05	0.05	3.0	3.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Flowering dogwood	0.02	0.02	1.3	1.3	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hawthorn	0.01	0.01	0.2	0.2	0.01	0.01	0.5	0.5	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Russian olive	0.00	na	0.0	na	0.00	na	0.0	na	0.11	0.11	8.2	8.2	0.00	na	0.0	na	0.00	na	0.0	na
	White ash	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.18	0.18	18.4	18.4	0.00	na	0.0	na
	Witch-hazel	0.01	0.01	0.6	0.6	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hydrangea	0.00	na	0.0	na	0.07	0.07	4.9	4.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American holly	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern redcedar	0.04	0.04	10.4	10.4	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sweetgum	0.00	na	0.0	na	0.04	0.04	2.0	2.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tuliptree	0.03	0.03	1.5	1.5	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.03	0.03	1.9	1.9	0.28	0.20	20.2	14.9	1.34	0.83	98.1	60.9	0.95	0.95	69.3	69.3	0.00	na	0.0	na
	Norway spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.16	0.15	10.0	10.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.03	0.03	2.1	2.1	0.00	na	0.0	na
	Black cherry	0.10	0.06	7.8	4.9	0.22	0.13	17.1	10.3	0.74	0.59	57.2	45.9	0.81	0.81	62.7	62.7	0.00	na	0.0	na
	Cherry	0.00	na	0.0	na	0.27	0.15	20.6	12.0	0.05	0.05	3.7	3.7	0.00	na	0.0	na	.00	na	0.0	na
	Apple	0.00	na	0.0	na	0.00	na	0.0	na	0.42	0.42	36.3	36.3	0.00	na	0.0	na	0.00	na	0.0	na
	Pin oak	0.02	0.02	2.0	1.4	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern red oak	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.12	0.12	9.7	9.7	0.00	na	0.0	na
	Smooth sumac	0.00	na	0.0	na	0.03	0.03	1.8	1.8	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black locust	0.00	na	0.0	na	0.28	0.26	14.9	13.9	0.02	0.02	1.3	1.3	0.80	0.52	43.2	28.0	0.00	na	0.0	na
	Black willow	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.25	0.25	15.3	15.3	0.00	na	0.0	na

Continued

Land use	Species	D.b.h. class: 0.0 - 7.6 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	7.7 - 15.2 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	15.3 - 22.9 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	23.0 - 30.5 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	30.6 - 38.1 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE
	American basswood	0.05	0.04	1.4	1.2	0.11	0.11	3.2	3.2	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Littleleaf linden	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.37	0.37	27.8	27.8
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.13	0.13	9.2	9.2	0.00	na	0.0	na	0.00	na	0.0	na
	Slippery elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Nannyberry	0.00	na	0.0	na	0.01	0.01	1.0	1.0	0.02	0.02	1.3	1.3	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.62	0.25	50.0	19.4	1.91	0.64	125.5	40.1	3.32	1.73	250.4	133.6	5.13	2.40	355.3	174.0	0.37	0.37	27.8	27.8
Public Facility	Tree of heaven	0.05	0.05	3.6	3.6	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.18	0.18	19.2	19.2	0.07	0.07	7.1	7.1	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.23	0.23	10.0	10.0	0.00	na	0.0	na
	Japanese pagoda tree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American elm	0.11	0.11	7.8	7.8	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.16	0.16	11.4	11.4	0.18	0.18	19.2	19.2	0.07	0.07	7.1	7.1	0.23	0.23	10.0	10.0	0.00	na	0.0	na
1-2 Residential	Japanese maple	0.10	0.06	5.6	3.5	0.18	0.15	10.0	8.2	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway maple	0.03	0.03	1.5	1.5	0.19	0.19	10.4	10.3	0.00	na	0.0	na	0.84	0.83	45.1	45.1	1.25	0.72	67.5	39.0
	Sycamore maple	0.11	0.09	7.7	6.1	0.07	0.07	4.7	4.7	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Silver maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.15	0.08	11.5	6.2	0.03	0.03	2.4	2.4	0.68	0.37	50.5	27.7	0.29	0.29	21.8	21.8	0.19	0.16	14.3	11.7
	European white birch	0.01	0.01	0.7	0.7	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern catalpa	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Flowering dogwood	0.04	0.02	2.4	1.4	0.08	0.06	4.6	3.2	0.05	0.05	2.7	2.7	0.00	na	0.0	na	0.00	na	0.0	na
	Ginkgo	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.25	0.19	18.1	14.0	0.06	0.06	4.4	4.4	0.00	na	0.0	na	0.00	na	0.0	na
	Other species	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	0.00	0.0	0.0
	Sourwood	0.00	na	0.0	na	0.03	0.03	0.8	0.8	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Royal paulownia	0.04	0.04	3.1	3.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.27	0.27	45.3	45.3	0.00	na	0.0	na
	White spruce	0.00	na	0.0	na	0.03	0.03	5.4	5.4	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Blue spruce	0.00	na	0.0	na	0.01	0.01	2.0	2.0	0.09	0.07	16.0	11.6	0.24	0.24	40.0	40.0	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.01	0.01	0.5	0.5	0.00	na	0.0	na	0.00	na	0.0	na	0.16	0.16	10.5	10.5
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.36	0.36	15.6	15.6
	Eastern cottonwood	0.02	0.02	1.2	1.2	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Kwanzan cherry	0.03	0.03	2.3	2.3	0.07	0.07	5.4	5.4	0.08	0.08	6.0	6.0	0.22	0.22	17.0	17.0	0.00	na	0.0	n
	Cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.49	0.42	38.3	32.5	0.00	na	0.0	na	0.00	na	0.0	na
	Higan cherry	0.02	0.02	1.9	1.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Callery pear	0.00	na	0.0	na	0.04	0.04	3.5	3.5	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Common pear	0.00	na	0.0	na	0.07	0.07	6.3	6.3	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Apple	0.00	na	0.0	na	0.04	0.04	3.1	3.1	0.16	0.16	13.7	13.7	0.00	na	0.0	na	0.00	na	0.0	na
	Crabapple	0.02	0.02	1.4	1.4	0.04	0.04	3.3	3.3	0.00	na	0.0	na	0.16	0.16	13.8	13.8	0.00	na	0.0	na
	Pussy willow	0.00	na	0.0	na	0.00	na	0.0	na	0.12	0.12	7.1	7.1	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.09	0.09	2.7	2.7	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Littleleaf linden	0.00	na	0.0	na	0.06	0.06	4.3	4.3	0.00	na	0.0	na	0.00	na	0.0	na	1.01	1.01	75.7	75.7
	Eastern hemlock	0.02	0.02	1.4	1.4	0.05	0.04	4.6	3.3	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.59	0.17	40.5	12.3	1.33	0.39	92.1	25.1	1.73	0.60	138.7	46.6	2.02	1.10	182.9	86.5	2.97	1.30	183.6	87.3
Vacant Land	Sycamore maple	0.02	0.02	1.1	1.1	0.00	na	0.0	na	0.20	0.20	14.1	14.1	0.91	0.91	63.9	63.9	0.00	na	0.0	na
	Tree of heaven	0.05	0.03	3.6	2.2	0.11	0.08	8.1	5.6	0.55	0.31	40.6	23.2	0.05	0.05	3.8	3.8	0.15	0.15	10.9	10.9
	Gray birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.14	0.14	8.3	8.3
	Northern hackberry	0.02	0.02	0.9	0.9	0.00	na	0.0	na	0.25	0.25	13.3	13.3	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.04	0.04	4.1	4.1	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na

Continued

		D.b.h. class																			
		0.0 - 7.6 cm				7.7 - 15.2 cm				15.3 - 22.9 cm				23.0 - 30.5 cm				30.6 - 38.1 cm			
		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass	
		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	White mulberry	0.01	0.01	0.8	0.8	0.18	0.13	12.8	9.4	0.31	0.31	22.9	22.9	0.33	0.33	24.1	24.1	0.00	na	0.0	na
	Royal paulownia	0.02	0.02	1.5	1.5	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Blue spruce	0.00	na	0.0	na	0.05	0.05	9.3	9.3	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.01	0.01	0.9	0.9	0.07	0.07	4.7	4.7	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.31	0.31	13.5	13.5	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.42	0.42	30.5	30.5
	Black cherry	0.00	na	0.0	na	0.05	0.05	3.9	3.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black locust	0.03	0.03	1.8	1.8	0.48	0.38	26.0	20.3	1.72	1.26	92.7	67.9	0.22	0.22	11.6	11.6	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.57	0.57	16.8	16.8	0.32	0.32	9.5	9.5
	Siberian elm	0.00	na	0.0	na	0.00	na	0.0	na	0.39	0.39	26.6	26.5	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.20	0.07	14.8	5.7	1.25	0.62	78.3	36.8	3.43	1.86	210.1	113.8	2.08	1.10	120.2	68.8	1.03	0.54	59.2	33.5
City Total		1.73	0.37	129.1	28.2	4.68	0.99	315.0	63.0	9.81	2.77	682.4	191.9	10.02	2.93	698.3	208.5	4.89	1.54	328.8	113.6

		D.b.h. class																			
		38.2 - 45.7 cm				45.8 - 53.3 cm				53.4 - 61.0 cm				61.1 - 68.6 cm				68.7 - 76.2 cm			
		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass	
		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hawthorn	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
Mult. Fam. Res.	Norway maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Horsechestnut	3.14	3.14	219.6	219.6	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	1.85	1.85	137.4	137.4	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.86	0.86	90.0	90.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	2.42	2.42	177.2	177.2	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	1.90	1.90	82.9	82.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Kwanzan cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Callery pear	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Japanese pagoda tree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American elm	0.00	na	0.0	na	3.29	3.29	239.3	239.3	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	5.90	3.58	392.6	239.0	5.71	3.95	416.5	288.1	1.85	1.85	137.4	137.4	0.00	na	0.0	na	0.00	na	0.0	na
Open Space	Boxelder	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway maple	0.76	0.76	40.8	40.8	0.00	na	0.0	na	1.05	1.05	56.9	56.9	0.00	na	0.0	na	0.00	na	0.0	na
	Sycamore maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Red maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Silver maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.94	0.94	49.3	49.3
	Tree of heaven	0.00	na	0.0	na	0.00	0.00	0.0	0.0	0.00	na	0.0	na	0.00	na	0.0	na	0.18	0.18	13.5	13.5
	European white birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Atlas cedar	0.00	na	0.0	na	0.00	na	0.0	na	1.09	1.09	254.7	254.6	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern redbud	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Flowering dogwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hawthorn	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Russian olive	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na

Continued

Land use	Species	D.b.h. class: 38.2 - 45.7 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	45.8 - 53.3 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	53.4 - 61.0 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	61.1 - 68.6 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE	68.7 - 76.2 cm Leaf area (km²) Estimate	SE	Leaf biomass (t) Estimate	SE
	White ash	0.00	na	0.0	na	0.00	na	0.0	na	0.53	0.53	30.0	29.9	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Witch-hazel	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hydrangea	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American holly	0.00	na	0.0	na	0.00	na	0.0	na	0.26	0.26	34.2	34.2	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern redcedar	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sweetgum	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tuliptree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.71	0.71	118.9	118.9
	Eastern white pine	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black cherry	0.57	0.50	44.4	38.5	0.19	0.19	14.6	14.6	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Apple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Pin oak	0.00	na	0.0	na	0.47	0.47	42.9	42.9	1.40	1.40	126.9	126.8	0.00	na	0.0	na	0.54	0.54	49.3	49.3
	Northern red oak	0.00	na	0.0	na	0.00	na	0.0	na	0.58	0.58	46.2	46.2	0.00	na	0.0	na	0.00	na	0.0	na
	Smooth sumac	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black locust	0.00	na	0.0	na	0.61	0.61	32.9	32.8	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	n
	Black willow	0.32	0.32	19.7	19.7	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Littleleaf linden	0.00	na	0.0	na	0.00	na	0.0	na	0.37	0.37	27.8	27.8	0.00	na	0.0	na	0.00	na	0.0	na
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Slippery elm	0.00	na	0.0	na	0.00	na	0.0	na	0.52	0.52	23.5	23.5	0.00	na	0.0	na	0.00	na	0.0	na
	Nannyberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	1.65	0.94	104.8	58.5	1.27	0.79	90.4	55.3	5.80	2.53	600.0	302.8	0.00	na	0.0	na	2.38	1.29	231.0	136.6
Public Facility	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	1.52	1.52	66.6	66.6	0.00	na	0.0	na	1.67	1.67	73.0	73.0	0.00	na	0.0	na	0.00	na	0.0	na
	Japanese pagoda tree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	2.40	2.40	273.0	272.9
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	1.52	1.52	66.6	66.6	0.00	na	0.0	na	1.67	1.67	73.0	73.0	0.00	na	0.0	na	2.40	2.40	273.0	272.9
1-2 Residential	Japanese maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway maple	0.28	0.28	14.9	14.9	0.65	0.46	35.1	24.7	0.55	0.55	29.6	29.6	0.00	na	0.0	na	0.00	na	0.0	na
	Sycamore maple	0.07	0.07	5.1	5.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Silver maple	0.67	0.67	35.5	35.5	0.00	na	0.0	na	0.02	0.02	1.1	1.1	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.26	0.26	19.4	19.4	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	0.00	0.0	0.0
	European white birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern catalpa	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.30	0.30	18.1	18.0
	Flowering dogwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Ginkgo	0.16	0.16	7.0	7.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Other species	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sourwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Royal paulownia	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na

Continued

		D.b.h. class																	
		38.2 - 45.7 cm				45.8 - 53.3 cm				53.4 - 61.0 cm				61.1 - 68.6 cm				68.7 - 76.2 cm			
		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass	
		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Blue spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	1.01	1.01	44.3	44.2	1.66	1.17	72.5	50.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Kwanzan cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.31	0.31	23.7	23.7	0.00	na	0.0	na	0.00	na	0.0	na
	Higan cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Callery pear	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Common pear	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Apple	0.00	na	0.0	na	0.00	na	0.0	na	0.34	0.34	29.0	29.0	0.00	na	0.0	na	0.00	na	0.0	na
	Crabapple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Pussy willow	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Littleleaf linden	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern hemlock	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	2.46	1.26	126.1	60.9	2.31	1.24	107.7	55.9	1.21	0.84	83.3	60.0	0.00	na	0.0	na	0.30	0.30	18.1	18.0
Vacant Land	Sycamore maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	1.06	1.06	78.5	78.5	0.00	na	0.0	na	0.00	na	0.0	na
	Gray birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern hackberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Royal paulownia	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Blue spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.39	0.39	28.2	28.2	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black cherry	0.00	na	0.0	na	0.16	0.16	12.4	12.4	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black locust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.40	0.40	11.7	11.7	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Siberian elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.79	0.55	39.9	30.1	0.16	0.16	12.4	12.4	1.06	1.06	78.5	78.5	0.00	na	0.0	na	0.00	na	0.0	na
City Total		12.32	4.24	729.9	263.8	9.46	4.22	627.0	298.9	11.59	3.80	972.2	354.4	0.00	na	0.0	na	5.07	2.74	522.0	305.7

Continued

		D.b.h. class															
		76.3 - 83.8 cm				83.9 - 91.4 cm				91.5 - 99.1 cm				99.2 - 106.7 cm			
		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass	
		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)	
Land use	Species	**Estimate**	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hawthorn	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
Mult. Fam. Res.	Norway maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Horsechestnut	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.00	na	0.0	na	2.28	2.28	169.4	169.4	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Kwanzan cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Callery pear	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Japanese pagoda tree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.00	na	0.0	na	2.28	2.28	169.4	169.4	0.00	na	0.0	na	0.00	na	0.0	na
Open Space	Boxelder	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sycamore maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Red maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Silver maple	0.00	na	0.0	na	0.75	0.75	39.3	39.3	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.25	0.25	18.9	18.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	European white birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Atlas cedar	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern redbud	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Flowering dogwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hawthorn	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Russian olive	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White ash	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.44	0.44	45.9	45.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Witch-hazel	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Hydrangea	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American holly	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern redcedar	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sweetgum	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tuliptree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	1.70	1.70	124.4	124.4	0.00	na	0.0	na
	Norway spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	1.07	1.07	46.8	46.8	1.16	1.16	50.8	50.8	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Apple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Pin oak	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern red oak	0.00	na	0.0	na	1.09	1.09	87.2	87.1	0.00	na	0.0	na	1.60	1.60	127.6	127.5
	Smooth sumac	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black locust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black willow	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na

Continued

		D.b.h. class															
		76.3 - 83.8 cm				83.9 - 91.4 cm				91.5 - 99.1 cm				99.2 - 106.7 cm			
		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass	
		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Littleleaf linden	0.00	na	0.0	na	0.00	na	0.0	na	1.97	1.97	147.4	147.3	0.00	na	0.0	na
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Slippery elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Nannyberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	1.76	1.17	111.6	67.3	3.00	1.74	177.3	106.9	3.67	2.58	271.8	191.4	1.60	1.60	127.6	127.5
Public Facility	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Japanese pagoda tree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
1-2 Residential	Japanese maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway maple	3.10	2.29	167.3	123.5	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sycamore maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Silver maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	European white birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern catalpa	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Flowering dogwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Ginkgo	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Other species	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Sourwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Royal paulownia	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Norway spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Blue spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.83	0.83	36.0	36.0	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Kwanzan cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Higan cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Callery pear	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Common pear	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Apple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Crabapple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Pussy willow	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Littleleaf linden	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern hemlock	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	3.92	2.42	203.3	127.9	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
Vacant Land	Sycamore maple	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Tree of heaven	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Gray birch	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Northern hackberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na

Continued

		D.b.h. class															
		76.3 - 83.8 cm				83.9 - 91.4 cm				91.5 - 99.1 cm				99.2 - 106.7 cm			
		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass		Leaf area		Leaf biomass	
		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)		(km^2)		(t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Honeylocust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	White mulberry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Royal paulownia	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Blue spruce	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern white pine	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	London planetree	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Eastern cottonwood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black cherry	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Black locust	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	American basswood	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Siberian elm	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
	Total	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na	0.00	na	0.0	na
City Total		5.69	2.69	314.9	144.6	5.28	2.87	346.7	200.3	3.67	2.58	271.8	191.4	1.60	1.60	127.6	127.5

Leaf Area and Biomass for Shrubs in Brooklyn by Land Use

		Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Juniper	121.80	121.79	33.83	33.83	0.37	0.37	102.54	102.53
	Japanese knotweed	56.03	56.02	4.16	4.16	0.17	0.17	12.61	12.61
	Privet	48.58	48.58	4.42	4.42	0.15	0.15	13.39	13.38
	Black locust	40.66	40.66	2.19	2.19	0.12	0.12	6.63	6.63
	Rose	4.67	4.67	0.35	0.35	0.01	0.01	1.05	1.05
	Total	271.74	219.04	44.95	39.93	0.82	0.66	136.22	121.03
Mult. Fam. Res.	Northern white-cedar	86.94	86.93	16.72	16.72	0.29	0.29	56.65	56.65
	Rose	29.18	29.18	2.17	2.17	0.10	0.10	7.34	7.34
	Privet	27.47	18.79	2.50	1.71	0.09	0.06	8.46	5.79
	Boxwood	7.00	7.00	0.52	0.52	0.02	0.02	1.76	1.76
	Norway maple	3.68	3.68	0.20	0.20	0.01	0.01	0.67	0.67
	Azalea	0.72	0.72	0.14	0.14	0.00	0.00	0.49	0.49
	Total	155.01	100.19	22.25	17.28	0.53	0.34	75.38	58.54
Open Space	Bramble	520.54	495.85	19.42	18.50	2.34	2.22	87.13	82.99
	Japanese knotweed	233.45	228.78	17.34	17.00	1.05	1.03	77.79	76.24
	Multiflora rose	201.19	165.84	14.95	12.32	0.90	0.74	67.04	55.26
	Cherry	196.56	193.46	15.21	14.97	0.88	0.87	68.22	67.14
	Shining sumac	188.87	122.48	18.03	11.69	0.85	0.55	80.86	52.44
	Deciduous shrub	81.43	69.08	6.05	5.13	0.37	0.31	27.14	23.02
	Rose	58.91	58.89	4.38	4.37	0.26	0.26	19.63	19.63
	Bayberry	54.54	40.96	18.77	14.09	0.24	0.18	84.18	63.22
	Black cherry	54.28	52.94	4.21	4.11	0.24	0.24	18.88	18.42
	Marsh elder	33.99	31.00	2.52	2.30	0.15	0.14	11.33	10.33
	American bittersweet	30.24	30.23	2.25	2.25	0.14	0.14	10.08	10.07
	Peachleaf willow	27.17	26.18	1.68	1.62	0.12	0.12	7.52	7.25
	Grape	18.36	18.36	1.22	1.22	0.08	0.08	5.49	5.49
	Holly	15.66	12.22	2.09	1.63	0.07	0.05	9.39	7.33
	Juniper	13.34	10.14	3.71	2.82	0.06	0.05	16.63	12.63
	White mulberry	7.16	7.16	0.52	0.52	0.03	0.03	2.35	2.35
	Virginia creeper	5.76	5.21	0.28	0.26	0.03	0.02	1.27	1.15
	Nannyberry	5.29	5.29	0.39	0.39	0.02	0.02	1.76	1.76
	Sycamore maple	5.23	5.23	0.37	0.37	0.02	0.02	1.64	1.64
	Azalea	4.59	4.59	0.92	0.92	0.02	0.02	4.12	4.12
	Tree of heaven	4.33	3.81	0.32	0.28	0.02	0.02	1.44	1.27

Continued

Land use	Species	Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Poison ivy	4.12	4.12	0.31	0.31	0.02	0.02	1.37	1.37
	Privet	3.18	3.17	0.29	0.29	0.01	0.01	1.29	1.29
	Green ash	3.12	3.12	0.20	0.20	0.01	0.01	0.91	0.91
	Black locust	2.49	2.49	0.13	0.13	0.01	0.01	0.60	0.60
	Rose-of-Sharon	1.59	1.59	0.08	0.08	0.01	0.01	0.34	0.34
	Boxwood	1.56	1.56	0.12	0.12	0.01	0.01	0.52	0.52
	Sweet mountain pine	1.32	1.32	0.13	0.13	0.01	0.01	0.57	0.57
	Japanese maple	0.68	0.68	0.04	0.04	0.00	0.00	0.17	0.17
	Total	1,778.94	670.54	135.92	43.70	7.98	3.01	609.68	196.04
Public Facility	Yew	94.39	94.37	10.42	10.42	0.15	0.15	16.63	16.63
	Forsythia	26.26	26.26	1.95	1.95	0.04	0.04	3.11	3.11
	Mock-orange	20.01	20.01	1.49	1.49	0.03	0.03	2.37	2.37
	Total	140.66	140.64	13.86	13.86	0.22	0.22	22.11	22.11
1-2 Residential	Yew	207.79	58.07	22.95	6.41	0.84	0.23	92.56	25.86
	Privet	90.91	68.76	8.26	6.25	0.37	0.28	33.33	25.21
	Rose-of-Sharon	86.26	39.38	4.17	1.90	0.35	0.16	16.81	7.67
	Euonymus	73.92	60.44	5.49	4.49	0.30	0.24	22.15	18.11
	Juniper	72.72	47.19	20.20	13.11	0.29	0.19	81.47	52.88
	Deciduous shrub	54.91	27.50	4.08	2.04	0.22	0.11	16.45	8.24
	Japanese pagoda tree	43.73	43.72	4.97	4.97	0.18	0.18	20.04	20.04
	Holly	37.04	14.94	4.95	2.00	0.15	0.06	19.97	8.06
	Tree of heaven	33.29	18.79	2.47	1.40	0.13	0.08	9.97	5.63
	Hydrangea	24.44	21.01	1.82	1.56	0.10	0.08	7.32	6.30
	Rose	23.27	11.58	1.73	0.86	0.09	0.05	6.97	3.47
	Northern white-cedar	20.38	14.26	3.92	2.74	0.08	0.06	15.81	11.06
	Boxwood	18.02	7.31	1.34	0.54	0.07	0.03	5.40	2.19
	Grape	12.68	12.68	0.85	0.85	0.05	0.05	3.41	3.41
	Devils-walkingstick	7.84	7.84	0.58	0.58	0.03	0.03	2.35	2.35
	Common fig	7.80	5.70	0.58	0.42	0.03	0.02	2.34	1.71
	Forsythia	7.67	6.07	0.57	0.45	0.03	0.02	2.30	1.82
	Rhododendron	6.23	2.86	1.25	0.57	0.03	0.01	5.03	2.31
	Japanese pieris	5.31	3.27	0.39	0.24	0.02	0.01	1.59	0.98
	White spruce	5.12	4.82	0.82	0.77	0.02	0.02	3.32	3.13
	Wisteria	4.65	4.64	0.35	0.35	0.02	0.02	1.39	1.39
	Azalea	4.34	2.68	0.87	0.54	0.02	0.01	3.50	2.16

Continued

		Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Viburnum	4.18	4.18	0.31	0.31	0.02	0.02	1.25	1.25
	Evergreen shrub	3.90	3.90	0.92	0.91	0.02	0.02	3.69	3.69
	Callery pear	3.65	3.65	0.31	0.31	0.01	0.01	1.27	1.27
	American bittersweet	2.44	2.44	0.18	0.18	0.01	0.01	0.73	0.73
	Unknown vine species	1.67	1.67	0.12	0.12	0.01	0.01	0.50	0.50
	Hibiscus	1.42	1.42	0.09	0.09	0.01	0.01	0.35	0.35
	White mulberry	1.13	1.13	0.08	0.08	0.00	0.00	0.33	0.33
	Barberry	0.52	0.52	0.04	0.04	0.00	0.00	0.16	0.16
	Royal paulownia	0.28	0.28	0.02	0.02	0.00	0.00	0.08	0.08
	Shining sumac	0.14	0.14	0.01	0.01	0.00	0.00	0.05	0.05
	Total	867.65	167.28	94.69	19.34	3.50	0.67	381.91	78.02
Vacant Land	Tree of heaven	95.40	61.82	7.09	4.59	0.16	0.11	12.16	7.88
	Japanese knotweed	70.21	70.18	5.22	5.21	0.12	0.12	8.95	8.94
	Deciduous shrub	15.56	12.06	1.16	0.90	0.03	0.02	1.98	1.54
	Cherry	14.81	14.80	1.15	1.15	0.03	0.03	1.97	1.96
	Unknown vine species	7.20	7.20	0.54	0.53	0.01	0.01	0.92	0.92
	Devils-walkingstick	1.84	1.84	0.14	0.14	0.00	0.00	0.23	0.23
	Eastern hemlock	1.07	1.07	0.10	0.10	0.00	0.00	0.17	0.17
	Grape	0.64	0.64	0.04	0.04	0.00	0.00	0.07	0.07
	Boxwood	0.44	0.44	0.03	0.03	0.00	0.00	0.06	0.06
	Crabapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	207.17	98.90	15.45	7.36	0.36	0.17	26.50	12.63
City Total		734.73	174.47	68.60	13.78	13.41	3.18	1,251.82	251.48

Leaf Area and Biomass for Trees and Shrubs in Brooklyn by Land Use

		Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
Land use	Species	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Hawthorn	155.78	155.77	5.60	5.60	0.47	0.47	16.98	16.98
	Juniper	121.80	121.79	33.83	33.83	0.37	0.37	102.54	102.53
	Japanese knotweed	56.03	56.02	4.16	4.16	0.17	0.17	12.61	12.61
	Privet	48.58	48.58	4.42	4.42	0.15	0.15	13.39	13.38
	Black locust	40.66	40.66	2.19	2.19	0.12	0.12	6.63	6.63
	Rose	4.67	4.67	0.35	0.35	0.01	0.01	1.05	1.05
	Tree of heaven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	427.52	285.74	50.55	41.01	1.30	0.87	153.21	124.30
Mult. Fam. Res.	Tree of heaven	1,454.20	996.44	108.03	74.02	4.93	3.38	366.03	250.81
	American elm	971.17	971.08	70.63	70.62	3.29	3.29	239.32	239.29
	Horsechestnut	926.79	926.70	64.81	64.80	3.14	3.14	219.59	219.57
	White mulberry	714.93	714.86	52.30	52.29	2.42	2.42	177.19	177.18
	London planetree	560.47	560.41	24.47	24.47	1.90	1.90	82.93	82.92
	Honeylocust	253.75	253.73	26.57	26.57	0.86	0.86	90.03	90.02
	Norway maple	178.05	163.18	9.61	8.81	0.60	0.55	32.56	29.84
	Japanese pagoda tree	151.20	151.18	17.18	17.18	0.51	0.51	58.21	58.21
	Northern white-cedar	86.94	86.93	16.72	16.72	0.29	0.29	56.65	56.65
	Rose	29.18	29.18	2.17	2.17	0.10	0.10	7.34	7.34
	Privet	27.47	18.79	2.50	1.71	0.09	0.06	8.46	5.79
	Kwanzan cherry	21.51	21.50	1.66	1.66	0.07	0.07	5.64	5.64
	Callery pear	16.27	16.26	1.40	1.40	0.06	0.06	4.75	4.75
	Boxwood	7.00	7.00	0.52	0.52	0.02	0.02	1.76	1.76
	Azalea	0.72	0.72	0.14	0.14	0.00	0.00	0.49	0.49
	Total	5,399.65	1,670.04	398.72	125.94	18.30	5.66	1,350.96	426.73
Open Space	White mulberry	963.66	559.33	70.49	40.91	4.32	2.51	316.20	183.53
	Northern red oak	757.10	445.69	60.33	35.51	3.40	2.00	270.61	159.30
	Black cherry	640.08	420.17	49.64	32.58	2.87	1.88	222.66	146.17
	Littleleaf linden	604.06	466.28	45.25	34.93	2.71	2.09	202.97	156.67
	Pin oak	544.47	383.36	49.27	34.69	2.44	1.72	221.03	155.63
	Bramble	520.54	495.85	19.42	18.50	2.34	2.22	87.13	82.99
	London planetree	498.06	497.91	21.75	21.74	2.23	2.23	97.56	97.53
	Norway maple	456.53	290.25	24.64	15.67	2.05	1.30	110.53	70.27
	Sycamore maple	418.92	307.20	29.30	21.48	1.88	1.38	131.41	96.36
	Silver maple	386.43	265.14	20.34	13.95	1.73	1.19	91.23	62.60

Continued

Land use	Species	Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Black locust	384.63	237.94	20.71	12.81	1.73	1.07	92.89	57.46
	Cherry	266.63	219.41	20.63	16.98	1.20	0.98	92.54	76.15
	Atlas cedar	242.26	242.19	56.78	56.76	1.09	1.09	254.70	254.62
	Tree of heaven	234.91	117.40	17.45	8.72	1.05	0.53	78.28	39.12
	Japanese knotweed	233.45	228.78	17.34	17.00	1.05	1.03	7.79	76.24
	Multiflora rose	201.19	165.84	14.95	12.32	0.90	0.74	67.04	55.26
	Shining sumac	188.87	122.48	18.03	11.69	0.85	0.55	80.86	52.44
	Norway spruce	159.07	159.02	26.51	26.50	0.71	0.71	118.92	118.89
	Honeylocust	137.03	104.78	14.35	10.97	0.61	0.47	64.37	49.22
	Black willow	126.21	126.17	7.79	7.79	0.57	0.57	34.95	34.94
	White ash	117.52	117.48	6.68	6.68	0.53	0.53	29.95	29.94
	Slippery elm	116.89	116.85	5.23	5.23	0.52	0.52	23.47	23.47
	Apple	93.96	93.93	8.10	8.10	0.42	0.42	36.33	36.32
	Deciduous shrub	81.43	69.08	6.05	5.13	0.37	0.31	27.14	23.02
	European white birch	66.86	61.81	3.97	3.67	0.30	0.28	17.81	16.47
	Rose	58.91	58.89	4.38	4.37	0.26	0.26	19.63	19.63
	American holly	56.97	56.95	7.62	7.61	0.26	0.26	34.16	34.15
	Bayberry	54.54	40.96	18.77	14.09	0.24	0.18	84.18	63.22
	American basswood	35.02	32.94	1.02	0.96	0.16	0.15	4.59	4.31
	Eastern white pine	34.56	34.55	2.22	2.22	0.16	0.15	9.97	9.97
	Marsh elder	33.99	31.00	2.52	2.30	0.15	0.14	11.33	10.33
	American bittersweet	30.24	30.23	2.25	2.25	0.14	0.14	10.08	10.07
	Eastern redbud	28.76	20.92	1.84	1.34	0.13	0.09	8.26	6.01
	American elm	28.16	28.15	2.05	2.05	0.13	0.13	9.19	9.18
	Peachleaf willow	27.17	26.18	1.68	1.62	0.12	0.12	7.52	7.25
	Russian olive	24.74	24.73	1.84	1.84	0.11	0.11	8.24	8.24
	Grape	18.36	18.36	1.22	1.22	0.08	0.08	5.49	5.49
	Holly	15.66	12.22	2.09	1.63	0.07	0.05	9.39	7.33
	Hydrangea	14.60	14.60	1.08	1.08	0.07	0.07	4.87	4.87
	Juniper	13.34	10.14	3.71	2.82	0.06	0.05	16.63	12.63
	Nannyberry	12.21	8.77	0.91	0.65	0.05	0.04	4.07	2.92
	Red maple	11.00	10.99	0.74	0.74	0.05	0.05	3.32	3.32
	Sweetgum	9.91	9.91	0.46	0.46	0.04	0.04	2.04	2.04
	Eastern redcedar	8.33	8.33	2.31	2.31	0.04	0.04	10.38	10.38
	Smooth sumac	7.12	7.12	0.39	0.39	0.03	0.03	1.76	1.76
	Boxelder	6.72	6.72	0.62	0.61	0.03	0.03	2.76	2.76
	Eastern cottonwood	6.39	6.39	0.46	0.46	0.03	0.03	2.07	2.07

Continued

Land use	Species	Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Tuliptree	5.76	5.76	0.34	0.34	0.03	0.03	1.52	1.52
	Virginia creeper	5.76	5.21	0.28	0.26	0.03	0.02	1.27	1.15
	Flowering dogwood	5.02	5.01	0.29	0.29	0.02	0.02	1.31	1.31
	Azalea	4.59	4.59	0.92	0.92	0.02	0.02	4.12	4.12
	Hawthorn	4.46	3.40	0.16	0.12	0.02	0.02	0.72	0.55
	Poison ivy	4.12	4.12	0.31	0.31	0.02	0.02	1.37	1.37
	Privet	3.18	3.17	0.29	0.29	0.01	0.01	1.29	1.29
	Green ash	3.12	3.12	0.20	0.20	0.01	0.01	0.91	0.91
	Witch-hazel	2.39	2.39	0.14	0.14	0.01	0.01	0.63	0.63
	Rose-of-Sharon	1.59	1.59	0.08	0.08	0.01	0.01	0.34	0.34
	Boxwood	1.56	1.56	0.12	0.12	0.01	0.01	0.52	0.52
	Sweet mountain pine	1.32	1.32	0.13	0.13	0.01	0.01	0.57	0.57
	Japanese maple	0.68	0.68	0.04	0.04	0.00	0.00	0.17	0.17
	Total	9,021.01	1,591.58	698.45	123.02	40.47	7.14	3,133.06	551.84
Public Facility	London planetree	2,147.29	1,997.25	93.77	87.22	3.43	3.19	149.59	139.14
	Japanese pagoda tree	1,505.58	1,505.32	171.09	171.06	2.40	2.40	272.95	272.90
	Honeylocust	157.70	119.52	16.51	12.51	0.25	0.19	26.34	19.97
	Yew	94.39	94.37	10.42	10.42	0.15	0.15	16.63	16.63
	American elm	66.98	66.97	4.87	4.87	0.11	0.11	7.77	7.77
	Tree of heaven	30.54	30.54	2.27	2.27	0.05	0.05	3.62	3.62
	Forsythia	26.26	26.26	1.95	1.95	0.04	0.04	3.11	3.11
	Mock-orange	20.01	20.01	1.49	1.49	0.03	0.03	2.37	2.37
	Total	4,048.75	2,393.16	302.37	185.20	6.46	3.82	482.39	295.47
1-2 Residential	Norway maple	1,705.77	641.25	92.07	34.61	6.88	2.59	371.34	139.60
	London planetree	956.32	432.04	41.76	18.87	3.86	1.74	168.44	76.10
	Tree of heaven	433.48	190.78	32.20	14.17	1.75	0.77	129.88	57.16
	Littleleaf linden	264.72	250.63	19.83	18.77	1.07	1.01	79.98	75.72
	Yew	207.79	58.07	22.95	6.41	0.84	0.23	92.56	25.86
	Cherry	198.43	127.60	15.35	9.87	0.80	0.51	61.93	39.82
	Silver maple	172.00	166.98	9.05	8.79	0.69	0.67	36.51	35.45
	Apple	131.56	91.81	11.34	7.91	0.53	0.37	45.74	31.92
	Kwanzan cherry	98.27	65.37	7.60	5.06	0.40	0.26	30.67	20.40
	Privet	90.91	68.76	8.26	6.25	0.37	0.28	33.33	25.21
	Rose-of-Sharon	86.26	39.38	4.17	1.90	0.35	0.16	16.81	7.67
	Blue spruce	84.78	60.50	14.38	10.26	0.34	0.24	58.02	41.40

Continued

Land use	Species	Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	White mulberry	77.41	49.49	5.66	3.62	0.31	0.20	22.84	14.60
	Euonymus	73.92	60.44	5.49	4.49	0.30	0.24	22.15	18.11
	Northern catalpa	73.50	73.47	4.47	4.47	0.30	0.30	18.05	18.04
	Juniper	72.72	47.19	20.20	13.11	0.29	0.19	81.47	52.88
	Japanese maple	68.70	38.77	3.87	2.18	0.28	0.16	15.60	8.80
	Norway spruce	67.37	67.35	11.23	11.22	0.27	0.27	45.29	45.27
	Sycamore maple	61.57	41.36	4.31	2.89	0.25	0.17	17.37	11.67
	Deciduous shrub	54.91	27.50	4.08	2.04	0.22	0.11	16.45	8.24
	Crabapple	53.30	40.85	4.59	3.52	0.21	0.16	18.53	14.20
	Japanese pagoda tree	43.73	43.72	4.97	4.97	0.18	0.18	20.04	20.04
	Eastern white pine	42.43	40.38	2.73	2.60	0.17	0.16	11.00	10.47
	Flowering dogwood	41.11	18.39	2.39	1.07	0.17	0.07	9.63	4.31
	Ginkgo	39.60	39.59	1.75	1.75	0.16	0.16	7.04	7.04
	Holly	37.04	14.94	4.95	2.00	0.15	0.06	19.97	8.06
	Pussy willow	28.54	28.53	1.76	1.76	0.12	0.12	7.11	7.10
	Hydrangea	24.44	21.01	1.82	1.56	0.10	0.08	7.32	6.30
	Rose	23.27	11.58	1.73	0.86	0.09	0.05	6.97	3.47
	American basswood	23.16	23.15	0.68	0.68	0.09	0.09	2.73	2.73
	Northern white-cedar	20.38	14.26	3.92	2.74	0.08	0.06	15.81	11.06
	Common pear	18.06	18.06	1.56	1.56	0.07	0.07	6.28	6.28
	Boxwood	18.02	7.31	1.34	0.54	0.07	0.03	5.40	2.19
	Eastern hemlock	16.04	11.34	1.49	1.05	0.06	0.05	6.01	4.25
	Callery pear	13.70	10.74	1.18	0.93	0.06	0.04	4.76	3.74
	White spruce	13.48	9.71	2.17	1.56	0.05	0.04	8.73	6.29
	Grape	12.68	12.68	0.85	0.85	0.05	0.05	3.41	3.41
	Royal paulownia	10.44	10.17	0.78	0.76	0.04	0.04	3.13	3.05
	Devils-walkingstick	7.84	7.84	0.58	0.58	0.03	0.03	2.35	2.35
	Common fig	7.80	5.70	0.58	0.42	0.03	0.02	2.34	1.71
	Forsythia	7.67	6.07	0.57	0.45	0.03	0.02	2.30	1.82
	Sourwood	6.52	6.51	0.20	0.20	0.03	0.03	0.80	0.80
	Rhododendron	6.23	2.86	1.25	0.57	0.03	0.01	5.03	2.31
	Higan cherry	6.19	6.19	0.48	0.48	0.02	0.02	1.93	1.93
	Japanese pieris	5.31	3.27	0.39	0.24	0.02	0.01	1.59	0.98
	Wisteria	4.65	4.64	0.35	0.35	0.02	0.02	1.39	1.39
	Azalea	4.34	2.68	0.87	0.54	0.02	0.01	3.50	2.16
	Viburnum	4.18	4.18	0.31	0.31	0.02	0.02	1.25	1.25
	Eastern cottonwood	3.94	3.94	0.28	0.28	0.02	0.02	1.15	1.15

Continued

Land use	Species	Density				Total			
		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Leaf area (km^2)		Leaf biomass (t)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Evergreen shrub	3.90	3.90	0.92	0.91	0.02	0.02	3.69	3.69
	European white birch	2.70	2.70	0.16	0.16	0.01	0.01	0.65	0.65
	American bittersweet	2.44	2.44	0.18	0.18	0.01	0.01	0.73	0.73
	Unknown vine species	1.67	1.67	0.12	0.12	0.01	0.01	0.50	0.50
	Hibiscus	1.42	1.42	0.09	0.09	0.01	0.01	0.35	0.35
	Barberry	0.52	0.52	0.04	0.04	0.00	0.00	0.16	0.16
	Shining sumac	0.14	0.14	0.01	0.01	0.00	0.00	0.05	0.05
	Other species	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	5,537.27	896.81	386.29	56.24	22.33	3.62	1,558.06	226.85
Vacant Land	Black locust	1,430.22	1,018.75	77.00	54.85	2.45	1.75	132.08	94.08
	Tree of heaven	1,237.31	673.39	91.92	50.02	2.12	1.16	157.67	85.81
	American basswood	757.07	756.83	22.10	22.10	1.30	1.30	37.92	37.90
	Sycamore maple	659.24	649.65	46.10	45.43	1.13	1.11	79.08	77.93
	White mulberry	482.82	311.11	35.32	22.76	0.83	0.53	60.58	39.04
	Eastern cottonwood	474.44	474.29	34.23	34.22	0.81	0.81	58.72	58.70
	Siberian elm	227.20	227.13	15.47	15.47	0.39	0.39	26.55	26.54
	London planetree	180.37	180.32	7.88	7.87	0.31	0.31	13.51	13.51
	Northern hackberry	158.32	158.27	8.24	8.23	0.27	0.27	14.13	14.13
	Black cherry	122.66	96.64	9.51	7.49	0.21	0.17	16.32	12.86
	Gray birch	81.59	81.56	4.85	4.84	0.14	0.14	8.31	8.31
	Japanese knotweed	70.21	70.18	5.22	5.21	0.12	0.12	8.95	8.94
	Eastern white pine	50.99	43.19	3.28	2.78	0.09	0.07	5.63	4.76
	Blue spruce	31.93	31.92	5.42	5.42	0.05	0.05	9.29	9.29
	Honeylocust	23.00	22.99	2.41	2.41	0.04	0.04	4.13	4.13
	Deciduous shrub	15.56	12.06	1.16	0.90	0.03	0.02	1.98	1.54
	Cherry	14.81	14.80	1.15	1.15	0.03	0.03	1.97	1.96
	Royal paulownia	11.60	11.60	0.86	0.86	0.02	0.02	1.48	1.48
	Unknown vine species	7.20	7.20	0.54	0.53	0.01	0.01	0.92	0.92
	Devils-walkingstick	1.84	1.84	0.14	0.14	0.00	0.00	0.23	0.23
	Eastern hemlock	1.07	1.07	0.10	0.10	0.00	0.00	0.17	0.17
	Grape	0.64	0.64	0.04	0.04	0.00	0.00	0.07	0.07
	Boxwood	0.44	0.44	0.03	0.03	0.00	0.00	0.06	0.06
	Crabapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	6,040.54	2,544.84	372.94	162.84	10.36	4.37	639.75	279.33
City Total		5,436.62	625.89	400.98	46.46	99.21	11.42	7,317.43	847.86

Per-Area Estimates for Trees in Brooklyn

Land use	Species	No. trees/ha		Carbon (kg/ha)		Gross carbon sequestration (kg/yr/ha)		Net carbon sequestration (kg/yr/ha)		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Tree value (dollars/ha)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Commercial/Ind.	Tree of heaven	2.5	2.5	684.9	684.8	0.0	0.0	-188.3	188.3	0.0	0.0	0.0	0.0	0	0
	Hawthorn	2.5	2.5	201.9	201.9	13.8	13.8	13.0	13.0	155.8	155.8	5.6	5.6	2,606	2,606
	Total	4.9	3.3	886.8	692.1	13.8	13.8	-175.3	190.2	155.8	155.8	5.6	5.6	2,606	2,606
Mult. Fam. Res.	Tree of heaven	6.2	4.8	5,046.3	3,777.2	153.1	108.3	130.8	92.6	1,454.2	996.4	108.0	74.0	7,208	4,982
	Norway maple	3.1	2.1	211.5	210.3	17.6	16.6	16.7	15.8	174.4	163.1	9.4	8.8	1,603	1,528
	Horsechestnut	1.5	1.5	768.5	768.4	32.4	32.4	29.4	29.4	926.8	926.7	64.8	64.8	3,492	3,492
	Honeylocust	1.5	1.5	574.8	574.8	27.3	27.3	25.0	25.0	253.8	253.7	26.6	26.6	3,482	3,482
	White mulberry	1.5	1.5	1,102.7	1,102.6	40.0	40.0	29.5	29.5	714.9	714.9	52.3	52.3	4,043	4,042
	London planetree	1.5	1.5	574.8	574.8	21.1	21.1	19.7	19.7	560.5	560.4	24.5	24.5	3,482	3,482
	Kwanzan cherry	1.5	1.5	11.8	11.8	3.4	3.4	3.3	3.3	21.5	21.5	1.7	1.7	242	242
	Callery pear	1.5	1.5	10.3	10.3	2.9	2.9	2.8	2.8	16.3	16.3	1.4	1.4	244	244
	Japanese pagoda tree	1.5	1.5	404.9	404.9	22.1	22.1	20.5	20.5	151.2	151.2	17.2	17.2	2,377	2,377
	American elm	1.5	1.5	847.7	847.7	31.9	31.9	28.6	28.6	971.2	971.1	70.6	70.6	3,669	3,669
	Total	21.6	6.3	9,553.4	3,814.6	351.6	114.7	306.5	98.7	5,244.6	1,662.7	376.5	124.1	29,843	8,787
Open Space	Tree of heaven	7.6	3.5	1,991.1	1,356.4	38.0	26.4	-65.4	62.4	230.6	117.2	17.1	8.7	1,705	1,121
	Black cherry	7.3	4.1	994.2	580.3	36.5	20.2	31.0	18.7	585.8	370.7	45.4	28.8	3,237	1,748
	White mulberry	6.2	4.4	1,511.2	1,098.0	35.4	21.9	19.9	18.1	956.5	554.3	70.0	40.6	3,914	2,257
	Black locust	2.9	1.8	462.7	306.9	18.1	11.2	16.5	10.3	382.1	237.9	20.6	12.8	2,232	1,447
	Sycamore maple	2.5	1.8	305.9	245.6	22.3	17.9	21.1	16.9	413.7	307.1	28.9	21.5	2,209	1,617
	Cherry	2.2	1.1	90.7	49.5	5.4	2.8	5.1	2.7	70.1	35.8	5.4	2.8	420	239
	Pin oak	2.2	1.1	2,033.9	1,431.4	39.2	27.5	36.4	25.4	544.5	383.4	49.3	34.7	5,661	4,435
	Norway maple	1.8	0.9	535.2	351.0	17.6	9.8	16.0	8.9	456.5	290.3	24.6	15.7	2,862	1,749
	Eastern redbud	1.5	1.1	6.6	4.7	1.2	0.8	1.2	0.8	28.8	20.9	1.8	1.3	102	80
	Northern red oak	1.5	0.7	2,916.1	1,784.2	52.5	28.7	41.6	22.1	757.1	445.7	60.3	35.5	15,242	8,866
	American basswood	1.5	1.1	10.2	8.8	1.7	1.4	1.7	1.4	35.0	32.9	1.0	1.0	464	379
	Red maple	1.1	1.1	10.6	10.6	1.3	1.3	1.3	1.3	11.0	11.0	0.7	0.7	76	76
	Silver maple	1.1	0.6	1,261.7	891.9	19.1	13.1	14.4	9.7	386.4	265.1	20.3	14.0	4,412	3,071
	Hydrangea	1.1	1.1	18.5	18.5	2.4	2.4	2.3	2.4	14.6	14.6	1.1	1.1	559	559
	Black willow	1.1	1.1	333.8	333.7	8.6	8.6	8.3	8.3	126.2	126.2	7.8	7.8	296	296
	Littleleaf linden	1.1	0.8	1,055.2	800.5	19.4	13.7	17.0	12.0	604.1	466.3	45.2	34.9	8,002	5,791
	European white birch	0.7	0.5	87.0	81.6	4.9	4.1	4.7	4.0	66.9	61.8	4.0	3.7	585	466
	Hawthorn	0.7	0.5	12.1	12.0	1.3	1.2	1.3	1.2	4.5	3.4	0.2	0.1	227	206
	Russian olive	0.7	0.5	35.5	24.9	1.5	1.5	-3.4	5.1	24.7	24.7	1.8	1.8	234	234
	Honeylocust	0.7	0.5	820.3	753.3	17.0	14.0	14.0	11.2	137.0	104.8	14.3	11.0	4,338	3,851
	Eastern red cedar	0.7	0.7	2.3	2.3	0.3	0.3	0.3	0.3	8.3	8.3	2.3	2.3	78	78
	Eastern white pine	0.7	0.7	9.2	9.2	1.0	1.0	1.0	1.0	34.6	34.6	2.2	2.2	393	393
	London planetree	0.7	0.7	1,695.0	1,694.5	29.2	29.2	25.4	25.4	498.1	497.9	21.7	21.7	6,389	6,387
	Nannyberry	0.7	0.7	32.3	32.3	1.9	1.9	1.9	1.9	6.9	6.9	0.5	0.5	131	130
	Boxelder	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	6.7	6.7	0.6	0.6	5	5
	Atlas cedar	0.4	0.4	156.9	156.8	3.3	3.3	2.7	2.7	242.3	242.2	56.8	56.8	2,240	2,239
	Flowering dogwood	0.4	0.4	0.2	0.2	0.1	0.1	0.1	0.1	5.0	5.0	0.3	0.3	21	21
	White ash	0.4	0.4	412.5	412.3	9.9	9.9	8.3	8.3	117.5	117.5	6.7	6.7	2,264	2,263
	Witch hazel	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2	2.4	2.4	0.1	0.1	16	16
	American holly	0.4	0.4	293.2	293.1	7.8	7.8	7.1	7.1	57.0	57.0	7.6	7.6	1,197	1,197
	Sweetgum	0.4	0.4	3.0	3.0	0.4	0.4	0.3	0.4	9.9	9.9	0.5	0.5	152	152
	Tulip tree	0.4	0.4	0.2	0.2	0.1	0.1	0.1	0.1	5.8	5.8	0.3	0.3	29	29
	Apple	0.4	0.4	29.1	29.1	2.0	2.0	1.7	1.7	94.0	93.9	8.1	8.1	328	327
	Norway spruce	0.4	0.4	415.8	415.7	7.6	7.6	6.0	6.0	159.1	159.0	26.5	26.5	3,787	3,786
	Eastern cottonwood	0.4	0.4	43.9	43.9	0.7	0.7	0.4	0.4	6.4	6.4	0.5	0.5	29	29

Continued

Land use	Species	No. trees/ha		Carbon (kg/ha)		Gross carbon sequestration (kg/yr/ha)		Net carbon sequestration (kg/yr/ha)		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Tree value (dollars/ha)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Smooth sumac	0.4	0.4	3.2	3.2	0.6	0.6	0.6	0.6	7.1	7.1	0.4	0.4	77	77
	American elm	0.4	0.4	22.1	22.1	1.6	1.6	1.6	1.6	28.2	28.2	2.0	2.1	248	248
	Slippery elm	0.4	0.4	313.4	313.3	5.1	5.2	4.9	4.9	116.9	116.9	5.2	5.2	339	339
	Total	53.4	12.4	17,925.2	3,671.3	415.4	80.2	247.6	81.2	7,242.1	1,384.7	562.5	112.1	74,500	15,164
Public Facility	Honeylocust	5.3	3.8	209.3	144.2	19.4	13.6	18.2	12.7	157.7	119.5	16.5	12.5	3,962	2,773
	London planetree	5.3	3.8	2,368.1	2,105.6	76.5	63.1	70.7	58.3	2,147.3	1,997.3	93.8	87.2	13,724	11,125
	Japanese pagoda tree	3.5	3.5	5,646.9	5,645.9	100.8	100.8	25.6	25.6	1,505.6	1,505.3	171.1	171.1	20,919	20,915
	Tree of heaven	1.8	1.8	4.5	4.5	1.4	1.4	1.3	1.3	30.5	30.5	2.3	2.3	51	51
	American elm	1.8	1.8	10.2	10.2	2.1	2.1	2.0	2.0	67.0	67.0	4.9	4.9	289	288
	Total	17.6	6.0	8,239.0	5,830.7	200.1	111.9	117.8	60.2	3,908.1	2,374.0	288.5	183.4	38,945	22,399
1-2 Residential	Tree of heaven	7.0	2.3	1,096.7	629.7	36.7	16.0	-114.9	140.8	400.2	182.4	29.7	13.6	2,180	947
	Norway maple	4.8	1.5	2,806.7	1,101.5	89.1	31.4	66.3	26.5	1,705.8	641.3	92.1	34.6	11,518	4,065
	Sycamore maple	2.2	1.6	201.3	178.2	8.3	5.4	1.6	5.7	61.6	41.4	4.3	2.9	668	438
	Flowering dogwood	2.2	0.9	43.3	28.8	7.1	3.6	6.7	3.4	41.1	18.4	2.4	1.1	588	311
	Japanese maple	1.8	0.8	26.4	15.3	4.6	2.1	4.5	2.1	68.7	38.8	3.9	2.2	505	297
	London planetree	1.8	0.8	1,444.0	777.0	51.1	25.0	45.5	22.0	956.3	432.0	41.8	18.9	7,124	3,546
	Crabapple	1.5	0.9	77.4	67.9	7.3	5.1	6.9	4.9	53.3	40.9	4.6	3.5	693	489
	Blue spruce	1.5	0.7	84.4	48.5	7.6	4.0	6.9	3.7	84.8	60.5	14.4	10.3	987	532
	Kwanzan cherry	1.5	0.9	123.0	90.2	12.2	8.0	11.7	7.7	98.3	65.4	7.6	5.1	997	660
	Apple	1.1	0.6	317.5	288.1	13.1	10.2	10.2	7.6	131.6	91.8	11.3	7.9	1,491	1,100
	White mulberry	1.1	0.6	45.7	31.4	6.3	3.8	6.1	3.6	76.3	49.5	5.6	3.6	766	462
	Cherry	1.1	0.6	406.5	362.6	18.2	13.1	14.6	9.8	198.4	127.6	15.4	9.9	1,573	1,099
	Eastern hemlock	1.1	0.8	14.6	10.6	2.8	1.9	2.7	1.9	16.0	11.3	1.5	1.1	360	256
	Silver maple	0.7	0.5	320.2	224.7	7.7	5.9	1.4	6.2	172.0	167.0	9.1	8.8	988	729
	Royal paulownia	0.7	0.7	3.0	3.0	1.0	1.0	1.0	1.0	10.2	10.2	0.8	0.8	51	51
	Eastern white pine	0.7	0.5	46.2	43.7	3.1	2.6	3.0	2.4	42.4	40.4	2.7	2.6	787	662
	Littleleaf linden	0.7	0.5	73.1	67.3	4.7	3.7	4.5	3.5	264.7	250.6	19.8	18.8	1,008	827
	European white birch	0.4	0.4	1.0	1.0	0.5	0.5	0.5	0.5	2.7	2.7	0.2	0.2	25	25
	Northern catalpa	0.4	0.4	556.2	556.0	15.9	15.9	13.8	13.8	73.5	73.5	4.5	4.5	1,875	1,874
	Ginkgo	0.4	0.4	140.0	140.0	6.6	6.6	6.1	6.1	39.6	39.6	1.7	1.8	735	734
	Other species	0.4	0.4	97.3	97.3	0.0	0.0	-26.8	26.8	0.0	0.0	0.0	0.0	0	0
	Sourwood	0.4	0.4	8.0	8.0	1.6	1.6	1.6	1.6	6.5	6.5	0.2	0.2	193	193
	Norway spruce	0.4	0.4	42.0	41.9	2.3	2.3	1.2	1.2	67.4	67.4	11.2	11.2	290	290
	White spruce	0.4	0.4	8.2	8.2	1.4	1.4	1.4	1.4	8.4	8.4	1.3	1.3	191	191
	Eastern cottonwood	0.4	0.4	1.6	1.6	0.5	0.5	0.5	0.5	3.9	3.9	0.3	0.3	17	17
	Higan cherry	0.4	0.4	2.8	2.8	0.8	0.8	0.8	0.8	6.2	6.2	0.5	0.5	58	58
	Callery pear	0.4	0.4	4.9	4.9	1.2	1.2	1.2	1.2	10.1	10.1	0.9	0.9	104	104
	Common pear	0.4	0.4	4.8	4.8	1.2	1.2	1.2	1.2	18.1	18.1	1.6	1.6	104	104
	Pussy willow	0.4	0.4	29.1	29.1	3.0	3.0	2.9	2.9	28.5	28.5	1.8	1.8	215	215
	American basswood	0.4	0.4	5.9	5.9	1.2	1.2	1.2	1.2	23.2	23.2	0.7	0.7	201	201
	Total	36.5	5.4	8,031.8	1,846.6	317.1	54.0	84.0	171.1	4,669.6	845.3	291.6	49.4	36,293	6,559
Vacant Land	Tree of heaven	18.3	7.3	2,227.4	978.4	69.9	34.9	43.7	38.7	1,141.9	668.8	84.8	49.7	3,155	1,695
	Black locust	15.6	10.8	1,065.4	739.3	51.1	35.5	49.6	34.4	1,430.2	1,018.8	77.0	54.9	2,948	2,045
	White mulberry	5.5	3.3	305.5	211.8	14.2	8.6	13.9	8.5	482.8	311.1	35.3	22.8	862	545
	American basswood	3.7	3.7	756.8	756.6	19.5	19.5	19.0	19.0	757.1	756.8	22.1	22.1	2,349	2,348
	Sycamore maple	2.7	2.0	263.7	259.7	20.1	19.5	19.1	18.4	659.2	649.7	46.1	45.4	1,625	1,606
	Eastern white pine	2.7	2.0	19.8	17.4	3.5	2.8	3.4	2.7	51.0	43.2	3.3	2.8	722	571
	Siberian elm	2.7	2.7	211.2	211.2	9.5	9.5	9.3	9.3	227.2	227.1	15.5	15.5	515	515
	Northern hackberry	1.8	1.8	32.8	32.7	1.2	1.2	1.2	1.2	158.3	158.3	8.2	8.2	282	282

Continued

Land use	Species	No. trees/ha		Carbon (kg/ha)		Gross carbon sequestration (kg/yr/ha)		Net carbon sequestration (kg/yr/ha)		Leaf area (m^2/ha)		Leaf biomass (kg/ha)		Tree value (dollars/ha)	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
	Honeylocust	1.8	1.8	15.1	15.1	1.8	1.9	1.8	1.8	23.0	23.0	2.4	2.4	98	98
	Eastern cottonwood	1.8	1.8	608.3	608.1	15.1	15.1	14.6	14.6	474.4	474.3	34.2	34.2	528	527
	Black cherry	1.8	1.3	860.3	827.9	18.5	16.2	17.9	15.6	122.7	96.6	9.5	7.5	922	780
	Gray birch	0.9	0.9	210.5	210.4	13.5	13.5	11.5	11.5	81.6	81.6	4.8	4.8	987	987
	Royal paulownia	0.9	0.9	6.4	6.4	0.8	0.8	0.8	0.8	11.6	11.6	0.9	0.9	28	28
	Blue spruce	0.9	0.9	30.6	30.6	4.4	4.4	4.3	4.3	31.9	31.9	5.4	5.4	533	533
	London planetree	0.9	0.9	33.4	33.4	5.5	5.5	5.3	5.4	180.4	180.3	7.9	7.9	571	571
	Total	62.2	21.3	6,647.2	2,845.6	248.8	98.9	215.5	87.7	5,833.4	2,504.4	357.5	159.2	16,126	6,645
City Total		33.4	4.1	9,447.5	1,351.7	280.7	34.2	137.8	57.1	4,701.9	587.6	332.4	43.5	37,228	4,803

Percent of Tree Species Population in Brooklyn by D.b.h. Class and Land Use

		D.b.h. class											
		0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
Land use	Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Commercial/Ind.	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Total	0.0	na	0.0	na	50.0	37.3	0.0	na	50.0	37.3	0.0	na	0.0	na
Mult. Fam. Res.	Norway maple	50.0	36.5	0.0	na	0.0	na	50.0	36.5	0.0	na	0.0	na	0.0	na
	Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na
	Tree of heaven	25.0	9.1	0.0	na	25.0	9.1	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na
	Kwanzan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0
	Total	28.6	11.8	0.0	na	7.1	6.2	7.1	6.2	7.1	7.4	21.4	11.8	14.3	9.7
Open Space	Boxelder	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	40.0	27.9	0.0	na	0.0	na	20.0	18.9	0.0	na	20.0	18.9	0.0	na
	Sycamore maple	0.0	na	28.6	23.3	14.3	11.6	57.1	34.9	0.0	na	0.0	na	0.0	na
	Red maple	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	0.0	na	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	38.1	16.6	14.3	8.3	9.5	7.3	23.8	16.3	0.0	na	0.0	na	4.8	3.3
	European white birch	0.0	na	50.0	35.6	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na
	Atlas cedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redbud	75.0	26.7	25.0	26.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Russian olive	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	White ash	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na
	Witch-hazel	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hydrangea	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American holly	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redcedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sweetgum	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tuliptree	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	5.9	7.0	29.4	6.1	35.3	6.7	23.5	7.6	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na
	Black cherry	35.0	8.5	25.0	12.6	15.0	6.5	10.0	5.8	0.0	na	10.0	2.9	5.0	5.6
	Cherry	0.0	na	83.3	16.3	16.7	16.3	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Pin oak	33.3	22.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	16.7	13.1
	Northern red oak	0.0	na	0.0	na	0.0	na	25.0	21.8	0.0	na	0.0	na	0.0	na
	Smooth sumac	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	37.5	11.8	12.5	7.7	37.5	7.7	0.0	na	0.0	na	12.5	11.8
	Black willow	0.0	na	0.0	na	0.0	na	66.7	0.0	0.0	na	33.3	0.0	0.0	na
	American basswood	50.0	17.8	50.0	17.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	0.0	na	0.0	na	0.0	na	0.0	na	33.3	15.8	0.0	na	0.0	na

Continued

Land use	Species	D.b.h. class													
		0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	American elm	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Slippery elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Nannyberry	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Total	23.8	5.7	25.2	4.2	12.9	3.9	17.0	6.0	0.7	0.7	2.7	1.1	2.7	1.3
Public Facility	Tree of heaven	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	66.7	32.6	33.3	32.6	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	33.3	32.6	0.0	na	33.3	16.3	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	20.0	18.3	20.0	18.3	10.0	10.3	10.0	10.3	0.0	na	10.0	9.2	0.0	na
1-2 Residential	Japanese maple	60.0	22.1	40.0	22.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	7.7	7.6	15.4	12.5	0.0	na	7.7	7.6	23.1	12.6	7.7	7.6	15.4	8.6
	Sycamore maple	66.7	13.7	16.7	6.9	0.0	na	0.0	na	0.0	na	16.7	18.1	0.0	na
	Silver maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na
	Tree of heaven	42.1	12.2	5.3	4.8	26.3	10.9	5.3	4.8	10.5	6.8	5.3	5.1	0.0	na
	European white birch	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern catalpa	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	50.0	20.6	33.3	19.4	16.7	15.3	0.0	na	0.0	na	0.0	na	0.0	na
	Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na
	White mulberry	0.0	na	66.7	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	Sourwood	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na
	White spruce	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	25.0	21.8	50.0	25.2	25.0	21.8	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	50.0	35.6	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	20.0	18.0	20.0	18.0	40.0	22.1
	Eastern cottonwood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	25.0	23.6	25.0	15.4	25.0	15.4	25.0	23.6	0.0	na	0.0	na	0.0	na
	Cherry	0.0	na	0.0	na	66.7	27.4	0.0	na	0.0	na	0.0	na	0.0	na
	Higan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Common pear	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	33.3	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na
	Crabapple	50.0	30.8	25.0	23.6	0.0	na	25.0	23.6	0.0	na	0.0	na	0.0	na
	Pussy willow	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	0.0	na	50.0	35.6	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na
	Eastern hemlock	33.3	15.8	66.7	15.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	28.3	5.0	23.2	4.4	14.1	3.8	6.1	2.9	9.1	2.9	6.1	2.4	4.0	2.0
Vacant Land	Sycamore maple	33.3	32.0	0.0	na	33.3	16.0	33.3	16.0	0.0	na	0.0	na	0.0	na
	Tree of heaven	25.0	13.7	15.0	8.1	40.0	10.9	5.0	3.9	10.0	6.8	0.0	na	0.0	na
	Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	Northern hackberry	50.0	0.0	0.0	na	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	16.7	10.6	50.0	12.0	16.7	17.4	16.7	14.4	0.0	na	0.0	na	0.0	na
	Royal paulownia	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Continued

		D.b.h. class											
		0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
Land use	Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Eastern white pine	66.7	32.0	33.3	32.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	50.0	0.0	50.0	0.0	0.0	na
	Black cherry	0.0	na	50.0	36.0	0.0	na	0.0	na	0.0	na	0.0	na	50.0	36.0
	Black locust	5.9	4.0	29.4	3.0	58.8	11.0	5.9	4.0	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	50.0	0.0	25.0	0.0	25.0	0.0	0.0	na
	Siberian elm	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Total	20.6	8.3	22.1	4.7	35.3	7.9	8.8	2.4	7.4	2.4	2.9	1.7	1.5	1.4
City Total		24.1	3.4	20.3	2.3	17.2	2.6	11.0	2.7	5.8	1.5	6.1	1.7	4.0	1.4

		D.b.h. class											
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
Land use	Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Commercial/Ind.	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Mult. Fam. Res.	Norway maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	25.0	9.1	0.0	na	0.0	na	0.0	na	25.0	27.4	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	7.1	6.2	0.0	na	0.0	na	0.0	na	7.1	7.4	0.0	na	0.0	na
Open Space	Boxelder	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	20.0	18.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Red maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	0.0	na	0.0	na	33.3	27.4	0.0	na	33.3	27.4	0.0	na	0.0	na
	Tree of heaven	0.0	na	0.0	na	4.8	3.3	4.8	5.1	0.0	na	0.0	na	0.0	na
	European white birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Atlas cedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redbud	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Russian olive	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White ash	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na
	Witch-hazel	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hydrangea	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American holly	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redcedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sweetgum	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Continued

Land use	Species	D.b.h. class													
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Tuliptree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	5.9	7.0	0.0	na
	Norway spruce	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Pin oak	33.3	26.2	0.0	na	16.7	13.1	0.0	na	0.0	na	0.0	na	0.0	na
	Northern red oak	25.0	21.8	0.0	na	0.0	na	0.0	na	25.0	21.8	0.0	na	25.0	21.8
	Smooth sumac	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	33.3	15.8	0.0	na	0.0	na	0.0	na	0.0	na	33.3	31.7	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Slippery elm	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Nannyberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	6.1	2.7	0.0	na	2.7	1.4	2.0	1.2	2.0	1.3	1.4	1.0	0.7	0.7
Public Facility	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	33.3	16.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	10.0	9.2	0.0	na	20.0	18.3	0.0	na	0.0	na	0.0	na	0.0	na
1-2 Residential	Japanese maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	7.7	7.6	0.0	na	0.0	na	15.4	10.5	0.0	na	0.0	na	0.0	na
	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	0.0	na	0.0	na	5.3	4.8	0.0	na	0.0	na	0.0	na	0.0	na
	European white birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern catalpa	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sourwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	20.0	18.0	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Cherry	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Higan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Common pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Continued

		D.b.h. class											
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
Land use	Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Crabapple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Pussy willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern hemlock	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	4.0	2.4	0.0	na	2.0	1.3	3.0	1.8	0.0	na	0.0	na	0.0	na
Vacant Land	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	5.0	5.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern hackberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Siberian elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Total	1.5	1.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
City Total		5.0	1.5	0.0	na	2.5	1.1	1.5	0.6	1.7	1.0	0.5	0.4	0.3	0.3

Percent of Tree Population in Brooklyn by D.b.h. Class

Species	D.b.h. class													
	0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Boxelder	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Japanese maple	60.0	22.1	40.0	22.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Norway maple	26.3	12.3	7.8	6.4	0.0	na	22.0	11.5	11.8	6.4	8.2	5.6	7.8	4.4
Sycamore maple	30.0	7.8	19.0	10.9	12.8	6.1	32.3	16.2	0.0	na	5.9	6.5	0.0	na
Red maple	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Silver maple	0.0	na	20.7	17.0	0.0	na	0.0	na	0.0	na	18.9	13.5	0.0	na
Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na
Tree of heaven	32.6	6.5	8.9	3.2	22.8	4.5	9.0	4.7	10.9	2.3	1.2	1.1	1.3	0.9
European white birch	31.3	0.0	34.3	24.5	0.0	na	34.3	24.5	0.0	na	0.0	na	0.0	na
Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
Northern catalpa	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Atlas cedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Northern hackberry	50.0	0.0	0.0	na	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
Eastern redbud	75.0	26.7	25.0	26.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Flowering dogwood	57.7	17.4	28.2	16.4	14.1	13.0	0.0	na	0.0	na	0.0	na	0.0	na
Hawthorn	15.2	10.8	15.2	10.8	69.7	0.0	0.0	na	0.0	na	0.0	na	0.0	na
Russian olive	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
White ash	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na
Honeylocust	15.6	0.0	28.0	13.7	14.0	13.7	8.1	5.8	0.0	na	26.1	0.0	0.0	na
Witch-hazel	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Hydrangea	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
American holly	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Eastern redcedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Sweetgum	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Tuliptree	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
White mulberry	6.8	4.7	33.8	5.1	27.4	5.9	17.3	5.4	0.0	na	0.0	na	11.2	0.0
Other species	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
Sourwood	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Royal paulownia	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Norway spruce	0.0	na	0.0	na	0.0	na	47.7	0.0	0.0	na	0.0	na	0.0	na
White spruce	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Blue spruce	0.0	na	40.7	17.3	39.6	19.9	19.8	17.3	0.0	na	0.0	na	0.0	na
Eastern white pine	28.7	13.8	57.7	16.8	0.0	na	0.0	na	13.6	9.7	0.0	na	0.0	na
London planetree	0.0	na	6.1	0.0	0.0	na	10.9	10.6	5.7	5.2	36.8	7.4	11.5	6.3
Eastern cottonwood	23.8	0.0	0.0	na	0.0	na	26.0	0.0	25.1	0.0	25.1	0.0	0.0	na
Black cherry	31.9	7.8	27.2	11.9	13.7	5.9	9.1	5.3	0.0	na	9.1	2.6	9.0	6.0
Kwanzan cherry	60.1	12.5	13.3	8.2	13.3	8.2	13.3	12.5	0.0	na	0.0	na	0.0	na
Cherry	0.0	na	57.2	11.2	32.3	14.1	0.0	na	0.0	na	0.0	na	0.0	na

Continued

Species	D.b.h. class													
	0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Higan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Callery pear	77.9	0.0	22.1	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Common pear	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Apple	0.0	na	24.4	20.1	51.2	20.1	0.0	na	0.0	na	0.0	na	0.0	na
Crabapple	50.0	30.8	25.0	23.6	0.0	na	25.0	23.6	0.0	na	0.0	na	0.0	na
Pin oak	33.3	22.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	16.7	13.1
Northern red oak	0.0	na	0.0	na	0.0	na	25.0	21.8	0.0	na	0.0	na	0.0	na
Smooth sumac	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Black locust	4.0	2.7	32.1	4.4	43.6	7.8	16.3	3.7	0.0	na	0.0	na	4.1	3.9
Pussy willow	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
Black willow	0.0	na	0.0	na	0.0	na	66.7	0.0	0.0	na	33.3	0.0	0.0	na
Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	48.2	0.0	0.0	na	0.0	na
American basswood	22.8	8.1	33.2	8.1	0.0	na	22.0	0.0	11.0	0.0	11.0	0.0	0.0	na
Littleleaf linden	0.0	na	18.9	13.5	0.0	na	0.0	na	39.6	16.7	0.0	na	0.0	na
Eastern hemlock	33.3	15.8	66.7	15.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
American elm	29.1	0.0	0.0	na	16.8	0.0	0.0	na	0.0	na	0.0	na	54.1	0.0
Siberian elm	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
Slippery elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Nannyberry	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na

Species	D.b.h. class													
	53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Boxelder	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Japanese maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Norway maple	8.2	5.6	0.0	na	0.0	na	7.8	5.4	0.0	na	0.0	na	0.0	na
Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Red maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Silver maple	18.9	13.5	0.0	na	20.7	17.0	0.0	na	20.7	17.0	0.0	na	0.0	na
Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Tree of heaven	5.4	2.0	0.0	na	2.5	1.4	1.3	1.4	4.2	4.6	0.0	na	0.0	na
European white birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Northern catalpa	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
Atlas cedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Northern hackberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Eastern redbud	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Flowering dogwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Continued

Species	D.b.h. class													
	53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Hawthorn	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Russian olive	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
White ash	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Honeylocust	0.0	na	0.0	na	0.0	na	8.1	5.8	0.0	na	0.0	na	0.0	na
Witch-hazel	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Hydrangea	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
American holly	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Eastern redcedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Sweetgum	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Tuliptree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	3.5	4.2	0.0	na
Other species	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Sourwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Royal paulownia	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Norway spruce	0.0	na	0.0	na	52.3	0.0	0.0	na	0.0	na	0.0	na	0.0	na
White spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Blue spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
London planetree	10.9	5.3	0.0	na	0.0	na	12.0	5.2	6.3	0.0	0.0	na	0.0	na
Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Black cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Kwanzan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Cherry	10.4	8.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Higan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Callery pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Common pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Apple	24.4	20.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Crabapple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Pin oak	33.3	26.2	0.0	na	16.7	13.1	0.0	na	0.0	na	0.0	na	0.0	na
Northern red oak	25.0	21.8	0.0	na	0.0	na	0.0	na	25.0	21.8	0.0	na	25.0	21.8
Smooth sumac	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Black locust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Pussy willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Black willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Japanese pagoda tree	0.0	na	0.0	na	51.8	0.0	0.0	na	0.0	na	0.0	na	0.0	na
American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Littleleaf linden	20.7	9.8	0.0	na	0.0	na	0.0	na	0.0	na	20.7	19.7	0.0	na
Eastern hemlock	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Continued

	D.b.h. class													
	53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Siberian elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Slippery elm	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Nannyberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Percent of D.b.h. Class for Trees in Brooklyn by Land Use

		D.b.h. class											
		0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
Land use	Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
Commercial/Ind.	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
Mult. Fam. Res.	Norway maple	25.0	24.2	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na
	Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	33.3	28.1	0.0	na
	Tree of heaven	25.0	24.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	33.3	28.1	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	50.0	36.5
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	33.3	28.1	0.0	na
	Kwanzan cherry	25.0	15.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	25.0	15.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	50.0	36.5
Open Space	Boxelder	2.9	2.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	5.7	5.8	0.0	na	0.0	na	4.0	4.3	0.0	na	25.0	21.8	0.0	na
	Sycamore maple	0.0	na	5.4	5.0	5.3	5.5	16.0	11.6	0.0	na	0.0	na	0.0	na
	Red maple	8.6	8.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	0.0	na	2.7	2.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	22.9	11.3	8.1	4.6	10.5	7.5	20.0	14.5	0.0	na	0.0	na	25.0	21.8
	European white birch	0.0	na	2.7	2.8	0.0	na	4.0	4.3	0.0	na	0.0	na	0.0	na
	Atlas cedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redbud	8.6	7.4	2.7	2.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	2.9	2.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	2.9	2.6	2.7	2.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Russian olive	0.0	na	0.0	na	10.5	7.5	0.0	na	0.0	na	0.0	na	0.0	na
	White ash	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	4.0	4.2	0.0	na	0.0	na	0.0	na
	Witch-hazel	2.9	2.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hydrangea	0.0	na	8.1	7.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American holly	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redcedar	5.7	5.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sweetgum	0.0	na	2.7	2.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tuliptree	2.9	2.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	2.9	2.5	13.5	10.1	31.6	12.5	16.0	13.2	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	5.4	4.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	4.0	3.3	0.0	na	0.0	na	0.0	na
	Black cherry	20.0	10.6	13.5	7.7	15.8	7.0	8.0	6.6	0.0	na	50.0	25.2	25.0	21.8
	Cherry	0.0	na	13.5	8.0	5.3	5.2	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	0.0	na	5.3	4.9	0.0	na	0.0	na	0.0	na	0.0	na
	Pin oak	5.7	3.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	25.0	21.8
	Northern red oak	0.0	na	0.0	na	0.0	na	4.0	4.3	0.0	na	0.0	na	0.0	na
	Smooth sumac	0.0	na	2.7	2.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	8.1	6.0	5.3	5.5	12.0	7.7	0.0	na	0.0	na	25.0	21.8

Continued

Land use	Species	D.b.h. class													
		0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Black willow	0.0	na	0.0	na	0.0	na	8.0	8.0	0.0	na	25.0	21.8	0.0	na
	American basswood	5.7	3.0	5.4	4.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	5.3	5.5	0.0	na	0.0	na	0.0	na	0.0	na
	Slippery elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Nannyberry	0.0	na	2.7	2.8	5.3	5.5	0.0	na	0.0	na	0.0	na	0.0	na
Public Facility	Tree of heaven	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	100.0	0.0	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	100.0	0.0	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
1-2 Residential	Japanese maple	10.7	5.7	8.7	5.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	3.6	3.5	8.7	8.3	0.0	na	16.7	12.5	33.3	16.7	16.7	15.3	50.0	25.2
	Sycamore maple	14.3	9.0	4.3	4.3	0.0	na	0.0	na	0.0	na	16.7	15.3	0.0	na
	Silver maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	16.7	15.3	0.0	na
	Tree of heaven	28.6	10.5	4.3	4.3	35.7	15.4	16.7	15.8	22.2	12.3	16.7	15.3	0.0	na
	European white birch	3.6	3.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern catalpa	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	10.7	6.2	8.7	5.2	7.1	7.1	0.0	na	0.0	na	0.0	na	0.0	na
	Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	16.7	15.3	0.0	na
	White mulberry	0.0	na	8.7	5.8	7.1	6.5	0.0	na	0.0	na	0.0	na	0.0	na
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	11.1	10.7	0.0	na	0.0	na
	Sourwood	0.0	na	4.3	4.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	7.1	6.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	16.7	15.8	0.0	na	0.0	na	0.0	na
	White spruce	0.0	na	4.3	4.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	4.3	4.3	14.3	9.0	16.7	15.8	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	4.3	4.2	0.0	na	0.0	na	11.1	9.3	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	11.1	10.7	16.7	15.3	50.0	25.2
	Eastern cottonwood	3.6	3.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	3.6	3.6	4.3	4.3	7.1	7.1	16.7	15.8	0.0	na	0.0	na	0.0	na
	Cherry	0.0	na	0.0	na	14.3	9.0	0.0	na	0.0	na	0.0	na	0.0	na
	Higan cherry	3.6	3.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	4.3	4.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Common pear	0.0	na	4.3	4.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	4.3	4.3	7.1	7.1	0.0	na	0.0	na	0.0	na	0.0	na
	Crabapple	7.1	6.7	4.3	4.2	0.0	na	16.7	12.5	0.0	na	0.0	na	0.0	na
	Pussy willow	0.0	na	0.0	na	7.1	6.5	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	4.3	3.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	0.0	na	4.3	3.9	0.0	na	0.0	na	11.1	10.7	0.0	na	0.0	na
	Eastern hemlock	3.6	3.6	8.7	6.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Vacant Land	Sycamore maple	7.1	6.8	0.0	na	4.2	4.6	16.7	16.0	0.0	na	0.0	na0.0	na	
	Tree of heaven	35.7	16.2	20.0	11.0	33.3	16.4	16.7	16.0	40.0	17.3	0.0	na	0.0	na
	Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	20.0	19.1	0.0	na	0.0	na
	Northern hackberry	7.1	6.8	0.0	na	4.2	4.6	0.0	na	0.0	na	0.0	na	0.0	na

Continued

Land use	Species	D.b.h. class													
		0.0 - 7.6 cm		7.7 - 15.2 cm		15.3 - 22.9 cm		23.0 - 30.5 cm		30.6 - 38.1 cm		38.2 - 45.7 cm		45.8 - 53.3 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Honeylocust	14.3	13.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	7.1	6.2	20.0	13.3	4.2	3.0	16.7	16.0	0.0	na	0.0	na	0.0	na
	Royal paulownia	7.1	6.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	6.7	6.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	14.3	13.6	6.7	6.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	6.7	7.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	20.0	19.1	50.0	36.0	0.0	na
	Black cherry	0.0	na	6.7	5.7	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0
	Black locust	7.1	7.3	33.3	12.4	41.7	15.5	16.7	16.0	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	33.3	25.3	20.0	14.1	50.0	36.0	0.0	na
	Siberian elm	0.0	na	0.0	na	12.5	9.1	0.0	na	0.0	na	0.0	na	0.0	na
City Total	Boxelder	1.1	1.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese maple	3.0	1.6	2.4	1.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	6.8	4.2	2.4	2.3	0.0	na	12.4	3.1	12.5	6.3	8.4	5.3	12.1	6.1
	Sycamore maple	5.1	2.7	3.8	2.7	3.0	2.3	12.0	7.4	0.0	na	4.0	3.7	0.0	na
	Red maple	3.3	3.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	0.0	na	1.3	1.1	0.0	na	0.0	na	0.0	na	4.0	3.7	0.0	na
	Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	14.1	11.9	0.0	na
	Tree of heaven	27.7	6.8	9.0	3.3	27.1	7.0	16.7	9.3	38.2	6.0	4.0	3.7	6.7	5.8
	European white birch	1.0	1.0	1.3	1.4	0.0	na	2.4	2.6	0.0	na	0.0	na	0.0	na
	Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	4.4	4.2	0.0	na	0.0	na
	Northern catalpa	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Atlas cedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern hackberry	1.1	1.0	0.0	na	1.5	1.7	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redbud	3.3	2.9	1.3	1.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	4.1	2.0	2.4	1.4	1.4	1.4	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	1.1	1.0	1.3	1.3	7.1	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	Russian olive	0.0	na	0.0	na	3.1	2.2	0.0	na	0.0	na	0.0	na	0.0	na
	White ash	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	4.0	3.7	0.0	na
	Honeylocust	2.1	2.0	4.6	0.0	2.7	0.0	2.4	2.5	0.0	na	14.1	11.9	0.0	na
	Witch-hazel	1.1	1.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hydrangea	0.0	na	4.0	3.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American holly	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redcedar	2.2	2.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sweetgum	0.0	na	1.3	1.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tuliptree	1.1	1.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	2.2	1.3	12.8	5.7	12.2	4.1	12.0	8.3	0.0	na	0.0	na	21.4	15.6
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	4.2	4.0	0.0	na	0.0	na
	Sourwood	0.0	na	1.2	1.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	3.1	2.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	2.2	2.1	0.0	na	0.0	na	0.0	na
	White spruce	0.0	na	1.2	1.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	2.5	1.8	2.8	1.8	2.2	2.1	0.0	na	0.0	na	0.0	na
	Eastern white pine	2.1	2.0	5.1	2.8	0.0	na	0.0	na	4.2	3.5	0.0	na	0.0	na
	London planetree	0.0	na	1.3	1.4	0.0	na	4.2	0.0	4.2	4.0	25.7	12.5	12.1	6.1

Continued

Land use	Species	D.b.h. class 0.0 - 7.6 cm Percent	SE	7.7 - 15.2 cm Percent	SE	15.3 - 22.9 cm Percent	SE	23.0 - 30.5 cm Percent	SE	30.6 - 38.1 cm Percent	SE	38.2 - 45.7 cm Percent	SE	45.8 - 53.3 cm Percent	SE
	Eastern cottonwood	1.0	1.0	0.0	na	0.0	na	2.4	2.0	4.4	4.2	4.2	3.1	0.0	na
	Black cherry	7.7	4.1	7.9	3.9	4.7	2.1	4.9	4.0	0.0	na	8.8	4.4	13.1	5.8
	Kwanzan cherry	4.6	2.5	1.2	1.2	1.4	1.4	2.2	2.1	0.0	na	0.0	na	0.0	na
	Cherry	0.0	na	6.6	3.9	4.4	2.3	0.0	na	0.0	na	0.0	na	0.0	na
	Higan cherry	1.0	1.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	3.6	2.3	1.2	1.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Common pear	0.0	na	1.2	1.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	1.2	1.2	3.0	2.0	0.0	na	0.0	na	0.0	na	0.0	na
	Crabapple	2.0	1.9	1.2	1.2	0.0	na	2.2	1.7	0.0	na	0.0	na	0.0	na
	Pin oak	2.2	1.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	6.7	5.8
	Northern red oak	0.0	na	0.0	na	0.0	na	2.4	2.6	0.0	na	0.0	na	0.0	na
	Smooth sumac	0.0	na	1.3	1.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	1.1	1.1	10.3	3.7	16.5	5.8	9.6	5.2	0.0	na	0.0	na	6.7	5.8
	Pussy willow	0.0	na	0.0	na	1.4	1.3	0.0	na	0.0	na	0.0	na	0.0	na
	Black willow	0.0	na	0.0	na	0.0	na	4.9	4.9	0.0	na	4.4	3.8	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	14.7	0.0	0.0	na	0.0	na
	American basswood	2.2	1.2	3.8	2.5	0.0	na	4.7	3.6	4.4	3.1	4.2	3.1	0.0	na
	Littleleaf linden	0.0	na	1.2	1.1	0.0	na	0.0	na	8.8	4.0	0.0	na	0.0	na
	Eastern hemlock	1.0	1.0	2.4	1.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	1.9	0.0	0.0	na	1.6	1.6	0.0	na	0.0	na	0.0	na	21.4	15.6
	Siberian elm	0.0	na	0.0	na	4.5	3.3	0.0	na	0.0	na	0.0	na	0.0	na
	Slippery elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Nannyberry	0.0	na	1.3	1.4	1.6	1.6	0.0	na	0.0	na	0.0	na	0.0	na

Land use	Species	D.b.h. class 53.4 - 61.0 cm Percent	SE	61.1 - 68.6 cm Percent	SE	68.7 - 76.2 cm Percent	SE	76.3 - 83.8 cm Percent	SE	83.9 - 91.4 cm Percent	SE	91.5 - 99.1 cm Percent	SE	99.2 - 106.7 cm Percent	SE
Commercial/Ind.	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Mult. Fam. Res.	Norway maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	100.0	0.0	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Open Space	Boxelder	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	11.1	11.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Continued

Land use	Species	D.b.h. class													
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Red maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	0.0	na	0.0	na	25.0	21.8	0.0	na	33.3	27.4	0.0	na	0.0	na
	Tree of heaven	0.0	na	0.0	na	25.0	21.8	33.3	27.4	0.0	na	0.0	na	0.0	na
	European white birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Atlas cedar	11.1	11.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redbud	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Russian olive	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White ash	11.1	11.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	33.3	27.4	0.0	na	0.0	na	0.0	na
	Witch-hazel	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hydrangea	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American holly	11.1	11.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redcedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sweetgum	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tuliptree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na
	Norway spruce	0.0	na	0.0	na	25.0	21.8	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	33.3	27.4	33.3	27.4	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Pin oak	22.2	16.1	0.0	na	25.0	21.8	0.0	na	0.0	na	0.0	na	0.0	na
	Northern red oak	11.1	11.0	0.0	na	0.0	na	0.0	na	33.3	27.4	0.0	na	100.0	0.0
	Smooth sumac	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	11.1	11.0	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Slippery elm	11.1	8.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Nannyberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Public Facility	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
1-2 Residential	Japanese maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	25.0	23.6	0.0	na	0.0	na	66.7	27.4	0.0	na	0.0	na	0.0	na
	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	25.0	23.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na

Continued

Land use	Species	D.b.h. class													
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	European white birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern catalpa	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sourwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	33.3	27.4	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Cherry	25.0	15.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Higan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Common pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	25.0	15.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Crabapple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Pussy willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern hemlock	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
Vacant Land	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern hackberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Siberian elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
City Total	Boxelder	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway maple	10.3	7.1	0.0	na	0.0	na	31.8	13.1	0.0	na	0.0	na	0.0	na
	Sycamore maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Red maple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Silver maple	4.9	4.6	0.0	na	10.8	9.4	0.0	na	16.1	13.2	0.0	na	0.0	na

Continued

Land use	Species	D.b.h. class													
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Horsechestnut	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tree of heaven	22.5	0.0	0.0	na	20.6	11.7	17.4	14.3	51.7	0.0	0.0	na	0.0	na
	European white birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Gray birch	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern catalpa	0.0	na	0.0	na	9.8	7.0	0.0	na	0.0	na	0.0	na	0.0	na
	Atlas cedar	5.4	5.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Northern hackberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redbud	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Flowering dogwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hawthorn	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Russian olive	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White ash	5.4	5.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Ginkgo	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Honeylocust	0.0	na	0.0	na	0.0	na	17.4	14.3	0.0	na	0.0	na	0.0	na
	Witch-hazel	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Hydrangea	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American holly	5.4	5.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern redcedar	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sweetgum	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Tuliptree	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	White mulberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Sourwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Royal paulownia	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Norway spruce	0.0	na	0.0	na	10.8	9.4	0.0	na	0.0	na	0.0	na	0.0	na
	White spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Blue spruce	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Eastern white pine	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	London planetree	9.3	0.0	0.0	na	0.0	na	33.3	19.4	16.1	13.2	0.0	na	0.0	na
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Kwanzan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Cherry	4.9	3.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Higan cherry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Callery pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Common pear	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Apple	4.9	3.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Crabapple	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Pin oak	10.8	7.8	0.0	na	10.8	9.4	0.0	na	0.0	na	0.0	na	0.0	na
	Northern red oak	5.4	5.3	0.0	na	0.0	na	0.0	na	16.1	13.2	0.0	na	100.0	0.0
	Smooth sumac	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black locust	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Pussy willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Black willow	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Japanese pagoda tree	0.0	na	0.0	na	37.2	0.0	0.0	na	0.0	na	0.0	na	0.0	na
	American basswood	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Littleleaf linden	5.4	5.3	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na

Continued

Land use	Species	D.b.h. class													
		53.4 - 61.0 cm		61.1 - 68.6 cm		68.7 - 76.2 cm		76.3 - 83.8 cm		83.9 - 91.4 cm		91.5 - 99.1 cm		99.2 - 106.7 cm	
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE
	Eastern hemlock	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	American elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Siberian elm	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Slippery elm	5.4	3.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na
	Nannyberry	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na

Percent of Condition Class for Trees in Brooklyn by Land Use

		Condition class														
		Excellent		Good		Fair		Poor		Critical		Dying		Dead		
Land use	Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
Commercial/Ind.	Tree of heaven	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
	Hawthorn	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Total	50.0	37.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	50.0	37.3	0.50
Mult. Fam. Res.	Norway maple	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Horsechestnut	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Tree of heaven	0.0	na	75.0	9.1	0.0	na	0.0	na	0.0	na	0.0	na	25.0	9.1	0.71
	Honeylocust	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	White mulberry	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	London planetree	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Kwanzan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Callery pear	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Japanese pagoda tree	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	American elm	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Total	21.4	13.4	64.3	12.2	7.1	7.4	0.0	na	0.0	na	0.0	na	7.1	6.2	0.88
Open Space	Boxelder	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Norway maple	40.0	17.1	40.0	24.8	20.0	14.0	0.0	na	0.0	na	0.0	na	0.0	na	0.94
	Sycamore maple	85.7	8.7	14.3	8.7	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.99
	Red maple	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Silver maple	33.3	27.4	66.7	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
	Tree of heaven	57.1	20.7	14.3	6.6	9.5	6.5	0.0	na	4.8	5.1	0.0	na	14.3	9.8	0.80
	European white birch	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
	Atlas cedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern redbud	75.0	8.9	25.0	8.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.99
	Flowering dogwood	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Hawthorn	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
	Russian olive	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.48
	White ash	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Honeylocust	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Witch-hazel	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Hydrangea	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	American holly	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Eastern redcedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Sweetgum	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Tuliptree	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	White mulberry	17.6	15.2	52.9	17.2	23.5	5.4	5.9	7.0	0.0	na	0.0	na	0.0	na	0.91
	Norway spruce	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern white pine	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	London planetree	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Eastern cottonwood	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.37

Continued

Land use	Species	Condition class: Excellent Percent	Excellent SE	Good Percent	Good SE	Fair Percent	Fair SE	Poor Percent	Poor SE	Critical Percent	Critical SE	Dying Percent	Dying SE	Dead Percent	Dead SE	Mean[a]
	Black cherry	15.0	9.8	70.0	12.6	10.0	5.3	5.0	5.6	0.0	na	0.0	na	0.0	na	0.93
	Cherry	33.3	17.7	50.0	20.6	0.0	na	0.0	na	16.7	16.3	0.0	na	0.0	na	0.87
	Apple	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Pin oak	16.7	16.3	83.3	16.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
	Northern red oak	50.0	25.2	50.0	25.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
	Smooth sumac	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Black locust	25.0	15.4	50.0	17.8	12.5	11.8	0.0	na	0.0	na	0.0	na	12.5	7.7	0.83
	Black willow	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	American basswood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Littleleaf linden	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	American elm	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Slippery elm	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Nannyberry	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.89
	Total	42.9	9.3	42.2	7.7	8.2	3.4	1.4	1.0	2.0	1.1	0.0	na	3.4	2.1	0.91
Public Facility	Tree of heaven	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Honeylocust	0.0	na	66.7	16.3	33.3	16.3	0.0	na	0.0	na	0.0	na	0.0	na	0.91
	London planetree	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Japanese pagoda tree	50.0	0.0	0.0	na	0.0	na	50.0	0.0	0.0	na	0.0	na	0.0	na	0.81
	American elm	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Total	30.0	18.0	50.0	19.4	10.0	9.2	10.0	9.2	0.0	na	0.0	na	0.0	na	0.92
1-2 Residential	Japanese maple	20.0	18.0	80.0	18.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
	Norway maple	23.1	10.1	61.5	12.1	7.7	7.6	0.0	na	7.7	7.6	0.0	na	0.0	na	0.91
	Sycamore maple	83.3	18.1	0.0	na	0.0	na	0.0	na	16.7	18.1	0.0	na	0.0	na	0.90
	Silver maple	50.0	35.6	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.69
	Tree of heaven	57.9	12.8	15.8	7.8	0.0	na	0.0	na	5.3	5.3	0.0	na	21.1	9.1	0.75
	European white birch	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Northern catalpa	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Flowering dogwood	50.0	20.6	33.3	19.4	16.7	15.3	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Ginkgo	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	White mulberry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Other species	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
	Sourwood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Royal paulownia	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Norway spruce	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.62
	White spruce	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Blue spruce	75.0	21.8	0.0	na	0.0	na	25.0	21.8	0.0	na	0.0	na	0.0	na	0.91
	Eastern white pine	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	London planetree	40.0	22.1	60.0	22.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
	Eastern cottonwood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Kwanzan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00

Continued

Land use	Species	Condition class														Mean[a]
		Excellent		Good		Fair		Poor		Critical		Dying		Dead		
		Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	
	Cherry	0.0	na	66.7	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.91
	Higan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Callery pear	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Common pear	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Apple	33.3	27.4	33.3	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.92
	Crabapple	25.0	23.6	75.0	23.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
	Pussy willow	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	American basswood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Littleleaf linden	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern hemlock	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Total	52.5	6.1	32.3	5.6	4.0	2.4	2.0	1.4	4.0	2.0	0.0	na	5.1	2.4	0.89
Vacant Land	Sycamore maple	66.7	16.0	33.3	16.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
	Tree of heaven	70.0	19.1	5.0	4.5	15.0	13.6	0.0	na	0.0	na	0.0	na	10.0	7.8	0.87
	Gray birch	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Northern hackberry	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Honeylocust	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	White mulberry	66.7	21.2	16.7	14.4	16.7	17.4	0.0	na	0.0	na	0.0	na	0.0	na	0.96
	Royal paulownia	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Blue spruce	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Eastern white pine	66.7	32.0	33.3	32.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
	London planetree	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern cottonwood	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Black cherry	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Black locust	11.8	9.0	29.4	22.4	52.9	35.9	5.9	4.5	0.0	na	0.0	na	0.0	na	0.87
	American basswood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Siberian elm	0.0	na	66.7	0.0	33.3	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.91
	Total	44.1	14.6	26.5	9.4	25.0	16.4	1.5	1.3	0.0	na	0.0	na	2.9	1.7	0.91
City Total		42.4	5.1	39.0	4.1	9.9	3.4	1.7	0.7	1.8	0.7	0.0	na	5.2	1.6	0.90

[a]Mean condition class based on condition rating of 1.0 for Excellent, 0.95 for Good, 0.82 for Fair, 0.62 for Poor, 0.37 for Critical, 0.13 for Dying, and 0.0 for Dead.

Percent of D.b.h. and Condition Classes for Trees in Brooklyn by Land Use

Land use	Species	D.b.h. class (cm)	Condition class														
			Excellent		Good		Fair		Poor		Critical		Dying		Dead		
			Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
Commercial/Ind.	Tree of heaven	30.6 - 38.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
	Hawthorn	15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Total	15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
Mult. Fam. Res.	Norway maple	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Horsechestnut	38.2 - 45.7	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Tree of heaven	0.0 - 7.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		83.9 - 91.4	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Honeylocust	38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	White mulberry	45.8 - 53.3	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	London planetree	38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Kwanzan cherry	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Callery pear	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Japanese pagoda tree	30.6 - 38.1	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	American elm	45.8 - 53.3	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Total	0.0 - 7.6	50.0	31.6	25.0	24.1	0.0	na	0.0	na	0.0	na	0.0	na	25.0	24.1	0.74
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		30.6 - 38.1	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	33.3	28.1	66.7	28.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
		45.8 - 53.3	0.0	na	50.0	36.5	50.0	36.5	0.0	na	0.0	na	0.0	na	0.0	na	0.89
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		83.9 - 91.4	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Open Space	Boxelder	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Norway maple	0.0 - 7.6	50.0	0.0	0.0	na	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.91
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Sycamore maple	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		23.0 - 30.5	75.0	0.0	25.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.99
	Red maple	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Silver maple	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		68.7 - 76.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		83.9 - 91.4	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Tree of heaven	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	66.7	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		23.0 - 30.5	0.0	na	40.0	0.0	20.0	0.0	0.0	na	0.0	na	0.0	na	40.0	0.0	0.54
		45.8 - 53.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00

Continued

Land use	Species	D.b.h. class (cm)	Condition class														
			Excellent		Good		Fair		Poor		Critical		Dying		Dead		
			Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
		68.7 - 76.2	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
		76.3 - 83.8	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.37
	European white birch	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Atlas cedar	53.4 - 61.0	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern redbud	0.0 - 7.6	66.7	0.0	33.3	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Flowering dogwood	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Hawthorn	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Russian olive	15.3 - 22.9	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.48
	White ash	53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Honeylocust	23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		76.3 - 83.8	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Witch-hazel	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Hydrangea	7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	American holly	53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Eastern redcedar	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Sweetgum	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Tuliptree	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	White mulberry	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	20.0	22.8	60.0	17.1	20.0	5.7	0.0	na	0.0	na	0.0	na	0.0	na	0.93
		15.3 - 22.9	16.7	18.1	50.0	20.6	33.3	13.7	0.0	na	0.0	na	0.0	na	0.0	na	0.92
		23.0 - 30.5	0.0	na	75.0	0.0	25.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.92
		91.5 - 99.1	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.62
	Norway spruce	68.7 - 76.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern white pine	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	London planetree	76.3 - 83.8	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		83.9 - 91.4	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Eastern cottonwood	23.0 - 30.5	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.37
	Black cherry	0.0 - 7.6	28.6	26.6	57.1	20.3	14.3	7.7	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		7.7 - 15.2	20.0	20.5	80.0	20.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
		15.3 - 22.9	0.0	na	66.7	31.7	33.3	31.7	0.0	na	0.0	na	0.0	na	0.0	na	0.91
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		45.8 - 53.3	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.62
	Cherry	7.7 - 15.2	40.0	20.5	60.0	20.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
		15.3 - 22.9	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.37
	Apple	15.3 - 22.9	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Pin oak	0.0 - 7.6	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		45.8 - 53.3	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		68.7 - 76.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Northern red oak	23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		83.9 - 91.4	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00

Continued

Land use	Species	D.b.h. class (cm)	Condition class														
			Excellent		Good		Fair		Poor		Critical		Dying		Dead		
			Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
		99.2 - 106.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Smooth sumac	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Black locust	7.7 - 15.2	33.3	15.8	33.3	31.7	0.0	na	0.0	na	0.0	na	0.0	na	33.3	15.8	0.65
		15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		23.0 - 30.5	0.0	na	66.7	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.91
		45.8 - 53.3	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Black willow	23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		38.2 - 45.7	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	American basswood	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Littleleaf linden	30.6 - 38.1	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		53.4 - 61.0	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		91.5 - 99.1	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	American elm	15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Slippery elm	53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Nannyberry	7.7 - 15.2	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Total	0.0 - 7.6	74.3	11.6	20.0	9.6	5.7	3.9	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		7.7 - 15.2	48.6	12.3	43.2	11.6	5.4	3.6	0.0	na	0.0	na	0.0	na	2.7	2.6	0.94
		15.3 - 22.9	26.3	12.3	42.1	17.3	21.1	13.3	0.0	na	5.3	5.2	0.0	na	5.3	5.2	0.86
		23.0 - 30.5	24.0	10.0	52.0	10.6	12.0	4.1	0.0	na	4.0	3.3	0.0	na	8.0	5.8	0.85
		30.6 - 38.1	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		38.2 - 45.7	50.0	25.2	50.0	25.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		45.8 - 53.3	0.0	na	50.0	25.2	0.0	na	25.0	21.8	0.0	na	0.0	na	25.0	21.8	0.63
		53.4 - 61.0	22.2	15.2	77.8	15.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
		68.7 - 76.2	25.0	21.8	50.0	25.2	25.0	21.8	0.0	na	0.0	na	0.0	na	0.0	na	0.93
		76.3 - 83.8	0.0	na	66.7	27.4	0.0	na	0.0	na	33.3	27.4	0.0	na	0.0	na	0.76
		83.9 - 91.4	33.3	27.4	66.7	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
		91.5 - 99.1	50.0	35.6	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.81
		99.2 - 106.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Public Facility	Tree of heaven	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Honeylocust	7.7 - 15.2	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.89
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	London planetree	23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Japanese pagoda tree	68.7 - 76.2	50.0	0.0	0.0	na	0.0	na	50.0	0.0	0.0	na	0.0	na	0.0	na	0.81
	American elm	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Total	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.89
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		68.7 - 76.2	50.0	0.0	0.0	na	0.0	na	50.0	0.0	0.0	na	0.0	na	0.0	na	0.81

Continued

Land use	Species	D.b.h. class (cm)	Condition class														
			Excellent		Good		Fair		Poor		Critical		Dying		Dead		
			Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
1-2 Residential	Japanese maple	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		7.7 - 15.2	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
	Norway maple	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		7.7 - 15.2	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	33.3	27.4	66.7	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		45.8 - 53.3	0.0	na	50.0	35.6	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.66
		53.4 - 61.0	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		76.3 - 83.8	0.0	na	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.89
	Sycamore maple	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		38.2 - 45.7	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.37
	Silver maple	38.2 - 45.7	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		53.4 - 61.0	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.37
	Tree of heaven	0.0 - 7.6	50.0	21.8	12.5	10.4	0.0	na	0.0	na	0.0	na	0.0	na	37.5	16.4	0.62
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	80.0	18.9	20.0	18.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.99
		23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	50.0	35.6	0.0	na	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.69
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		68.7 - 76.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
	European white birch	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Northern catalpa	68.7 - 76.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Flowering dogwood	0.0 - 7.6	66.7	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		7.7 - 15.2	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		15.3 - 22.9	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Ginkgo	38.2 - 45.7	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	White mulberry	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Other species	30.6 - 38.1	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
	Sourwood	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Royal paulownia	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Norway spruce	23.0 - 30.5	0.0	na	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.62
	White spruce	7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Blue spruce	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	50.0	35.6	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.81
		23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern white pine	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	London planetree	30.6 - 38.1	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		45.8 - 53.3	50.0	35.6	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		76.3 - 83.8	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern cottonwood	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Kwanzan cherry	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00

Continued

Land use	Species	D.b.h. class (cm)	Condition class														
			Excellent		Good		Fair		Poor		Critical		Dying		Dead		
			Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Cherry	15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Higan cherry	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Callery pear	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Common pear	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Apple	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Crabapple	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Pussy willow	15.3 - 22.9	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	American basswood	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Littleleaf linden	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern hemlock	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Total	0.0 - 7.6	53.6	13.9	35.7	13.1	0.0	na	0.0	na	0.0	na	0.0	na	10.7	6.0	0.88
		7.7 - 15.2	73.9	8.6	26.1	8.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.99
		15.3 - 22.9	57.1	13.8	28.6	12.0	7.1	7.1	7.1	7.1	0.0	na	0.0	na	0.0	na	0.95
		23.0 - 30.5	66.7	15.8	16.7	12.5	0.0	na	16.7	15.8	0.0	na	0.0	na	0.0	na	0.93
		30.6 - 38.1	44.4	18.9	33.3	16.7	0.0	na	0.0	na	11.1	10.7	0.0	na	11.1	10.7	0.80
		38.2 - 45.7	33.3	19.4	50.0	20.6	0.0	na	0.0	na	16.7	15.3	0.0	na	0.0	na	0.87
		45.8 - 53.3	25.0	21.8	50.0	25.2	0.0	na	0.0	na	25.0	21.8	0.0	na	0.0	na	0.82
		53.4 - 61.0	0.0	na	25.0	23.6	50.0	30.8	0.0	na	25.0	23.6	0.0	na	0.0	na	0.74
		68.7 - 76.2	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.48
		76.3 - 83.8	33.3	27.4	33.3	27.4	33.3	27.4	0.0	na	0.0	na	0.0	na	0.0	na	0.92
Vacant Land	Sycamore maple	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Tree of heaven	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	33.3	32.0	33.3	16.0	33.3	16.0	0.0	na	0.0	na	0.0	na	0.0	na	0.92
		15.3 - 22.9	75.0	19.6	0.0	na	12.5	13.3	0.0	na	0.0	na	0.0	na	12.5	13.3	0.85
		23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	0.0	na	0.0	na	50.0	36.0	0.0	na	0.0	na	0.0	na	50.0	36.0	0.41
		53.4 - 61.0	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Gray birch	30.6 - 38.1	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	Northern hackberry	0.0 - 7.6	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		15.3 - 22.9	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Honeylocust	0.0 - 7.6	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	White mulberry	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00

Continued

Land use	Species	D.b.h. class (cm)	Condition class														
			Excellent		Good		Fair		Poor		Critical		Dying		Dead		
			Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
		15.3 - 22.9	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
		23.0 - 30.5	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Royal paulownia	0.0 - 7.6	100.0	0.0	0.0	na	0.00	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Blue spruce	7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Eastern white pine	0.0 - 7.6	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	London planetree	7.7 - 15.2	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Eastern cottonwood	30.6 - 38.1	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		38.2 - 45.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Black cherry	7.7 - 15.2	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		45.8 - 53.3	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
	Black locust	0.0 - 7.6	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
		7.7 - 15.2	0.0	na	40.0	34.6	60.0	34.6	0.0	na	0.0	na	0.0	na	0.0	na	0.87
		15.3 - 22.9	20.0	11.5	30.0	17.3	40.0	34.6	10.0	5.8	0.0	na	0.0	na	0.0	na	0.88
		23.0 - 30.5	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
	American basswood	23.0 - 30.5	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		30.6 - 38.1	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
		38.2 - 45.7	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
	Siberian elm	15.3 - 22.9	0.0	na	66.7	0.0	33.3	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.91
	Total	0.0 - 7.6	71.4	15.3	7.1	6.8	21.4	15.0	0.0	na	0.0	na	0.0	na	0.0	na	0.96
		7.7 - 15.2	33.3	16.6	40.0	15.7	26.7	20.3	0.0	na	0.0	na	0.0	na	0.0	na	0.93
		15.3 - 22.9	33.3	18.1	29.2	8.5	29.2	21.3	4.2	3.5	0.0	na	0.0	na	4.2	3.5	0.88
		23.0 - 30.5	66.7	21.2	16.7	16.0	16.7	16.0	0.0	na	0.0	na	0.0	na	0.0	na	0.96
		30.6 - 38.1	20.0	14.1	20.0	19.1	40.0	25.1	0.0	na	0.0	na	0.0	na	20.0	14.1	0.72
		38.2 - 45.7	50.0	36.0	50.0	36.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
		45.8 - 53.3	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
		53.4 - 61.0	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
City Total		0.0 - 7.6	65.5	7.8	22.5	6.4	5.4	2.7	0.0	na	0.0	na	0.0	na	6.6	3.8	0.93
		7.7 - 15.2	50.5	7.2	38.2	6.8	10.0	4.3	0.0	na	0.0	na	0.0	na	1.3	1.3	0.96
		15.3 - 22.9	38.2	7.9	36.2	6.4	18.1	8.7	2.9	1.9	1.6	1.5	0.0	na	3.0	2.0	0.89
		23.0 - 30.5	32.8	7.1	48.1	7.0	9.6	3.4	2.2	2.1	2.4	2.0	0.0	na	4.9	3.5	0.87
		30.6 - 38.1	25.7	7.8	31.7	7.6	8.8	5.5	0.0	na	4.2	4.0	0.0	na	29.6	5.1	0.77
		38.2 - 45.7	35.1	13.9	60.8	14.0	0.0	na	0.0	na	4.0	3.7	0.0	na	0.0	na	0.93
		45.8 - 53.3	6.1	5.3	53.2	18.0	21.4	15.6	6.7	5.8	6.1	5.3	0.0	na	6.7	5.8	0.76
		53.4 - 61.0	16.0	7.4	69.3	8.7	9.8	6.1	0.0	na	4.9	4.6	0.0	na	0.0	na	0.91
		61.1 - 68.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	na
		68.7 - 76.2	29.4	9.4	31.4	12.9	10.8	9.4	18.6	0.0	0.0	na	0.0	na	9.8	7.0	0.79
		76.3 - 83.8	15.9	13.1	50.8	19.4	15.9	13.1	0.0	na	17.4	14.3	0.0	na	0.0	na	0.84
		83.9 - 91.4	16.1	13.2	83.9	13.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
		91.5 - 99.1	50.0	35.6	0.0	na	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.81
		99.2 - 106.7	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95

[a]Mean condition class based on condition rating of 1.0 for Excellent, 0.95 for Good, 0.82 for Fair, 0.62 for Poor, 0.37 for Critical, 0.13 for Dying, and 0.0 for Dead.

Percent of Trees in Brooklyn by Condition Class

	Condition class														
	Excellent		Good		Fair		Poor		Critical		Dying		Dead		
Species	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
Boxelder	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Japanese maple	20.0	18.0	80.0	18.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
Norway maple	20.3	6.3	67.5	8.1	8.2	4.9	0.0	na	3.9	3.9	0.0	na	0.0	na	0.92
Sycamore maple	81.3	8.2	12.8	5.0	0.0	na	0.0	na	5.9	6.5	0.0	na	0.0	na	0.95
Red maple	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Silver maple	39.6	21.7	41.4	17.0	0.0	na	0.0	na	18.9	13.5	0.0	na	0.0	na	0.86
Horsechestnut	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Tree of heaven	48.5	8.0	21.3	3.2	6.4	3.9	0.0	na	2.5	1.8	0.0	na	21.3	4.2	0.78
European white birch	34.3	24.5	65.7	24.5	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.97
Gray birch	0.0	na	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.82
Northern catalpa	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Atlas cedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Northern hackberry	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Eastern redbud	75.0	8.9	25.0	8.9	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.99
Flowering dogwood	42.3	17.4	43.6	16.4	14.1	13.0	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Hawthorn	84.8	10.8	15.2	10.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
Russian olive	0.0	na	50.0	35.6	0.0	na	0.0	na	0.0	na	0.0	na	50.0	35.6	0.48
White ash	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Ginkgo	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Honeylocust	0.0	na	70.3	6.9	29.7	6.9	0.0	na	0.0	na	0.0	na	0.0	na	0.92
Witch-hazel	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Hydrangea	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
American holly	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Eastern redcedar	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Sweetgum	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Tuliptree	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
White mulberry	33.4	10.0	34.7	10.6	28.5	4.8	3.5	4.2	0.0	na	0.0	na	0.0	na	0.92
Other species	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	100.0	0.0	0.00
Sourwood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Royal paulownia	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Norway spruce	52.3	0.0	0.0	na	0.0	na	47.7	0.0	0.0	na	0.0	na	0.0	na	0.82
White spruce	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Blue spruce	59.3	17.3	20.9	0.0	0.0	na	19.8	17.3	0.0	na	0.0	na	0.0	na	0.91
Eastern white pine	85.7	13.8	14.3	13.8	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
London planetree	17.5	6.3	82.5	6.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96

Continued

Species	Condition class														
	Excellent		Good		Fair		Poor		Critical		Dying		Dead		
	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Percent	SE	Mean[a]
Eastern cottonwood	23.8	0.0	50.2	0.0	0.0	na	0.0	na	26.0	0.0	0.0	na	0.0	na	0.75
Black cherry	13.7	8.9	72.6	11.5	9.1	4.9	4.6	5.1	0.0	na	0.0	na	0.0	na	0.93
Kwanzan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Cherry	22.9	12.2	55.2	16.5	10.4	8.6	0.0	na	11.4	11.2	0.0	na	0.0	na	0.88
Higan cherry	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Callery pear	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Common pear	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Apple	24.4	20.1	24.4	20.1	51.2	20.1	0.0	na	0.0	na	0.0	na	0.0	na	0.90
Crabapple	25.0	23.6	75.0	23.6	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
Pin oak	16.7	16.3	83.3	16.3	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
Northern red oak	50.0	25.2	50.0	25.2	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.98
Smooth sumac	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Black locust	16.1	7.9	36.2	16.2	39.7	24.4	4.0	3.0	0.0	na	0.0	na	4.1	2.5	0.85
Pussy willow	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Black willow	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Japanese pagoda tree	25.9	0.0	48.2	0.0	0.0	na	25.9	0.0	0.0	na	0.0	na	0.0	na	0.88
American basswood	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Littleleaf linden	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	1.00
Eastern hemlock	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
American elm	29.1	0.0	70.9	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.96
Siberian elm	0.0	na	66.7	0.0	33.3	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.91
Slippery elm	0.0	na	100.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.0	na	0.95
Nannyberry	0.0	na	50.0	0.0	50.0	0.0	0.0	na	0.0	na	0.0	na	0.0	na	0.89

[a]Mean condition class based on condition rating of 1.0 for Excellent, 0.95 for Good, 0.82 for Fair, 0.62 for Poor, 0.37 for Critial, 0.13 for Dying, and 0.0 for Dead.

Species Richness (S), Shannon-Wiener Species Diversity Index (H), and Percent Ground Cover in Brooklyn by Land Use

			Plant space		Cement		Tar		Bare soil		Rock		Duff/ mulch		Herbs		Grass		Wild grass		Water		Shrub		Other impervious		Building		Tree	
Land Use	S	H	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Commercial/Ind.	1	0.00	5.8	5.80	16.5	5.29	21.6	8.19	0.3	0.30	12.0	9.98	0.2	0.20	1.2	0.55	10.2	6.88	0.0	0.00	8.0	5.78	1.2	1.00	1.2	1.20	27.6	8.43	0.6	0.60
Mult. Fam. Res.	10	2.20	3.6	3.43	20.7	2.90	9.0	3.76	1.4	0.63	2.9	2.03	0.1	0.12	1.9	0.69	6.8	3.67	0.3	0.31	0.0	0.00	0.8	0.36	0.0	0.00	56.0	5.69	13.0	4.74
Open Space	38	3.13	23.0	4.56	2.4	0.91	16.0	3.61	6.1	1.96	1.6	0.58	3.1	1.35	14.6	3.18	33.1	5.05	12.4	3.03	1.1	0.69	8.4	2.49	0.3	0.24	1.1	0.79	18.0	3.02
Public Facility	5	1.50	5.9	3.70	29.5	5.73	16.1	5.56	0.8	0.71	1.0	0.71	0.0	0.00	0.3	0.29	7.1	3.75	0.4	0.36	0.0	0.00	0.6	0.64	0.1	0.07	44.1	8.20	8.7	4.34
1-2 Residential	29	2.98	3.0	0.86	21.9	2.15	9.7	2.00	0.8	0.26	0.8	0.30	0.5	0.39	3.5	0.79	4.8	1.10	1.7	1.28	0.0	0.03	2.7	0.56	1.2	0.50	52.3	3.28	10.4	2.08
Vacant Land	15	2.19	17.5	6.34	3.1	1.28	13.9	5.42	13.8	4.65	6.4	3.62	0.9	0.74	30.8	6.89	8.8	4.15	10.4	4.76	3.5	2.58	0.6	0.24	0.9	0.81	7.1	3.88	12.5	4.58
City Total	57	3.36	10.1	1.76	14.9	1.27	14.1	1.95	3.4	0.67	3.8	1.74	1.0	0.35	7.8	1.04	13.6	1.90	4.5	0.92	1.9	1.00	3.1	0.65	0.6	0.25	31.3	2.07	11.2	1.37

Percent of Native Live Trees in Brooklyn by Land Use

Land use	New York State	Africa	Asia	Australia	Europe	EuroAsia	North America	North America[a]	Americas[b]	Americas[c]	South America	Unknown[d]
Commercial/Ind.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Mult. Fam. Res.	7.7	0.0	53.8	0.0	0.0	23.1	15.4	0.0	0.0	0.0	0.0	7.7
Open Space	41.5	0.7	24.6	0.0	2.8	13.4	49.3	0.0	0.0	7.7	0.0	1.4
Public Facility	10.0	0.0	30.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	30.0
1-2 Residential	18.1	0.0	34.0	0.0	3.2	25.5	24.5	4.3	0.0	3.2	0.0	5.3
Vacant Land	21.2	0.0	42.4	0.0	0.0	4.5	51.5	0.0	0.0	0.0	0.0	1.5
City Total	26.2	0.3	33.5	0.0	1.9	15.1	38.6	1.0	0.0	5.2	0.0	4.5

[a]North America and any other continent excluding South America.
[b]North and South America.
[c]North and South America, and any other continent.
[d]Mostly hybrids with undetermined continent of origin.

Susceptibility of Trees in Brooklyn to Gypsy Moth by Land Use

	Leaf area (%)				Leaf area (km^2)				No. of trees				Tree value (dollars)			
Land use	Susceptible	Resistant	Immune	Unknown	Susceptible	Resistant	Immune	Unknown	Susceptible	Resistant	Immune	Unknown	Susceptible	Resistant	Immune	Unknown
Commercial/Ind.	100.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	7,489	0	0	0	7,897,122	0	0	0
Mult. Fam. Res.	0.0	50.3	49.7	0.0	0.0	8.9	8.8	0.0	0	41,861	26,163	0	0	43,934,294	57,180,292	0
Open Space	31.1	31.1	37.6	0.2	10.1	10.1	12.2	0.1	45,640	109,211	71,721	4,890	139,275,989	77,306,225	115,098,066	2,506,387
Public Facility	0.0	2.5	97.5	0.0	0.0	0.2	6.1	0.0	0	5,632	22,526	0	0	542,149	61,588,694	0
1-2 Residential	11.0	60.7	28.4	0.0	2.1	11.4	5.4	0.0	17,850	101,152	20,825	0	14,656,547	85,188,725	46,537,469	0
Vacant Land	14.4	46.4	39.2	0.0	1.4	4.6	3.9	0.0	7,849	50,236	45,527	0	5,723,199	13,724,218	8,215,728	0
City Total	16.4	41.1	42.4	0.1	14.1	35.3	36.4	0.1	78,829	308,092	186,762	4,890	167,552,856	220,695,610	288,620,250	2,506,387

Susceptibility of Trees in Brooklyn to Asian Longhorned Beetle by Land Use

Land use	Leaf area (%)				Leaf area (km^2)				No. of trees				Tree value (dollars)			
	Known Host	Genera Host	Immune	Unknown	Known Host	Genera Host	Immune	Unknown	Known Host	Genera Host	Immune	Unknown	Known Host	Genera Host	Immune	Unknown
Commercial/Ind.	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.5	0	0	0	7,489	0	0	0	7,897,122
Mult. Fam. Res.	53.8	13.6	27.7	4.8	9.6	2.4	4.9	0.9	41,861	5,233	15,698	5,233	51,196,426	13,697,556	24,421,840	11,798,763
Open Space	55.7	31.2	9.3	3.9	18.1	10.1	3.0	1.3	117,361	44,010	39,120	30,970	155,346,014	111,320,956	36,800,915	30,718,781
Public Facility	95.2	0.0	0.8	4.0	5.9	0.0	0.0	0.3	16,895	0	2,816	8,447	55,728,951	0	81,834	6,320,058
1-2 Residential	81.5	1.6	13.2	3.7	15.4	0.3	2.5	0.7	80,326	4,463	38,676	16,363	110,070,953	3,088,053	19,342,357	13,881,379
Vacant Land	67.4	8.3	21.0	3.3	6.7	0.8	2.1	0.3	51,806	9,419	34,538	7,849	17,919,067	1,478,715	7,565,164	700,199
City Total	64.9	15.9	14.7	4.5	55.7	13.7	12.6	3.9	308,249	63,125	130,847	76,351	390,261,412	129,585,280	88,212,110	71,316,302

Percent of Predicted Land Use in Brooklyn in Other Use Categories

Actual land-use types	Predicted land-use type					
	Commercial/ind.	Multifamily res.	Open space	Public facility	1-2 residential	Vacant land
Commercial/industrial	50.0	4.7	2.9	0.0	3.0	3.7
Cemetery	10.0	0.0	11.8	0.0	0.0	0.0
Golf course	0.0	0.0	13.2	0.0	0.0	0.0
High-density residential	0.0	28.1	0.0	0.0	19.4	1.1
Institutional	30.0	6.3	0.6	85.7	1.5	3.7
Low-density residential	0.0	0.0	0.0	0.0	6.0	0.0
Moderate-density residential	10.0	31.3	2.4	7.1	68.7	2.6
Park	0.0	3.1	44.1	7.1	0.0	6.3
Transportation	0.0	0.0	1.5	0.0	0.0	0.0
Vacant	0.0	0.0	23.5	0.0	0.0	75.2
Multifamily residential	0.0	26.6	0.0	0.0	1.5	7.4

Nowak, David J.; Crane, Daniel E.; Stevens, Jack C.; Ibarra, Myriam. 2002. **Brooklyn's urban forest.** Gen. Tech. Rep. NE-290. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 107 p.

An assessment of trees in Brooklyn, New York, reveal that this borough has approximately 610,000 trees with canopies that cover 11.4 percent of the area. The most common trees are estimated to be tree of heaven, white mulberry, black locust, Norway maple and black cherry. Brooklyn's trees currently store approximately 172,000 metric tons of carbon with an estimated value of $3.5 million. In addition, these trees remove about 2,500 tC per year ($51,000/yr) and about 254 metric tons of air pollution per year ($1.3 million/yr). The replacement or compensatory value of Brooklyn's trees is estimated at $679 million. Potential damage from an Asian longhorn beetle infestation is $390 million (51 percent of the population). Management strategies are suggested for maximizing air quality and carbon benefits from urban trees.

Keywords: urban forestry, carbon sequestration, global climate change, air quality, air pollution

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