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Editorial

The purpose of the *Science and Technology Undergraduate Research Notes (SATURN) Journal* is to provide a venue for publication of undergraduate research. This research may include any novel findings of note while providing an opportunity for undergraduates to experience dissemination of their findings to the scientific community. Our goal is for the *SATURN Journal* to serve as both an educational and research tool. Each publication in this issue of the *SATURN Journal* has been reviewed by the professor for the course and by an outside scientist. Worthwhile data from embedded research in laboratory course curricula can be disseminated to the world community. By contributing their own novel findings for the greater good, students can be engaged in science through embedded research pedagogy more than through conventional pedagogy, and a source of large scale cataloging information can be developed by many students contributing novel data.

The *SATURN J.* Tree Survey pedagogy is an ongoing, cost competitive method of including embedded research in a non-majors science course, and has been successfully implemented at SCCC since the Spring Semester of 2012. It easily fits into the curriculum of contemporary Principles of Biology non-major science courses. Also, it has evolved into an instructed, crowd sourcing method for research that can readily be adopted by other institutions. This pedagogy has the capacity to provide valuable and long term undergraduate research experience nationwide. The *SATURN J.* began its' first issue with students from a Principles of Biology class at Suffolk County Community College (SCCC) in New York contributing their findings from a research project embedded in the laboratory curriculum. Specimens of each tree found on residential properties were brought to class. The species of each tree was identified by using a traditional dichotomous key. Students collaborated in groups to develop hypotheses based on the locations of the properties where the trees were found, the distribution of species, circumferences of trunks and population densities. The students followed the instructions for authors at the web site for the *SATURN Journal* (www.saturnjournal.org), and submitted their manuscripts to their instructor who acted as a peer reviewer. Those students whose manuscripts were accepted upon revision received a grade of "A" and were given extra credit for the revision and publication. This has been a cost effective exercise that has resulted in enthusiastic student engagement, and is building a catalogue of the distribution of tree species on residential properties in Suffolk County, New York. There was also a publication in this issue by a group of students who were enrolled in a statistics course. They compared the growth rates of different cultivars of the American Elm (*Ulmus americana*) planted on campus at SCCC.

In the second issue of the *SATURN Journal* there was a continuation of student publications pertaining to the embedded research project analyzing tree species distribution. Students found it helpful to compare their findings to the findings of student investigators who have published previously in the *SATURN Journal*, which resulted in citations of previously published students. The second issue also contained publications from a research project embedded in a microbiology course from which students reported their findings from tests of the antimicrobial properties of spices.

In the third issue of *SATURN J.* there was continuation of the tree survey and studies on the antimicrobial properties of spices that produced publications in the previous journals. New publications compared findings to a larger battery of previously identified trees. Students used

the web site from the United Stated Geological Survey (www.usgs.gov) to report the latitude and longitude of properties included in the studies. Additional web based tools used by students included online dichotomous keys such as vTree at Virginia Tech located in Blacksburg, Virginia (http://dendro.cnre.vt.edu/dendrology/idit.htm).
The fourth issue of *SATURN J.* included an article published by students at Molloy College regarding sweeteners and inflammation in macrophages, three additional articles from the microbiology course at SCCC, and a continuation of the *SATURN J.* tree survey. In addition, the abstracts from the MAY 2014 Northeast Regional Sigma Xi Conference held at SUNY Old Westbury were presented.
In the fifth issue of the *SATURN Journal* we presented an additional article from the microbiology course at SCCC that compares soil bacterial communities on Long Island, and multiple articles that continue the *SATURN J.* Tree Survey.

In the sixth issue of the *SATURN Journal* we presented additional articles from the microbiology course at SCCC that compares soil bacterial communities on Long Island. In addition, we presented two articles from students at Molloy College that test the effects of teratogens on *Planeria*. We present an article that is a statistical analysis of a 2016 presidential poll. We also presented multiple articles that compare soil composition, and multiple articles that continue the *SATURN J.* Tree Survey. Both are from a Principles of Biology course at SCCC.

In the seventh issue of the *SATURN Journal* we presented an additional article from a microbiology course at SCCC that compares soil bacterial communities on Long Island, an article that compares soil composition from a Chemistry course, and an article that is a statistical study of variables on opinions regarding voting preferences. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the eighth issue of the *SATURN Journal* we presented an article on the effect of carboplatin on tadpole and planarian regeneration, an article on the effects of dopamine and serotonin on bacterial growth, and an article that is a statistical study of variables on opinions of travel bans. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the ninth issue of the *SATURN Journal* we presented an article on the identification of a housekeeping gene for use in inflammatory studies, an article pertaining to the water quality of a lake in in a developing watershed in Minnesota, and an article that is a statistical study of variables on opinions regarding gun control. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the tenth issue of the *SATURN Journal*, we presented two articles authored by students in Ramsey Community College in Minnesota. One of these articles is a study on wildlife restoration, and the other is a water quality study. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In this eleventh issue of the *SATURN Journal*, we present a study of the distribution of hard-shelled ticks (*Ixodidae*) in preserves on Long Island, NY. We also present multiple additional articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

We encourage instructors to have their students participate in the *SATURN Journal.* The publications in the journal are a source of embedded research project designs that instructors may include in their curricula. The journal serves as a venue for dissemination of student research and a source for students to compare their work to the work of others. Instructors are welcome to design additional projects from which their students can submit manuscripts.

Louis Roccanova, Ph.D.
Editor in Chief *SATURN Journal*

Pitch Pines are Dominant in the Towns of Selden, Commack and Brentwood in Suffolk County, New York

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Keywords: Pitch Pine, dominant, Suffolk

Abstract:

Forty-three trees were surveyed in four residential properties in Suffolk County, NY. The trees were identified by using one dichotomous key. Pitch Pines were dominant in the Towns of Selden, Commack and Brentwood.

Introduction:

This study was conducted in Suffolk County, NY to see the variety of tree species that grow in the areas that was surveyed. Suffolk County has a humid subtropical climate and the coldest month average is around 0°C (Hunter College 2011). The soil type for the regions that are listed on Table 1. is coarse-loamy, mixed, mesic Typic Dystrochrepts (USDA 2018).

The Pitch Pine (*Pinus rigida*) grows to an average 20 meters tall and 1 meter in diameter (USDA 2013). They are conifers and have needles that grow in bundle of three. Needles reach up to 15 centimeters long and will retain them for two to three years (USDA 2013). They grow in shallow sands and gravels on steep slopes, ridges and river valleys (USDA 2013).

Methods:

A total of 43 tree samples, with at least three leaves intact on them, were collected from Long Island, NY. Students brought those samples to the lab to identify them. In the lab, students used a dichotomous key (Watts and Watts 1998) to identify the tree samples; then students were asked to confirm their identification with a second dichotomous key (Petrides and Wehr 1998). After confirmation, students wrote the names, scientific names, and quantity of each tree sample that were surveyed. Students continued identifying trees until they reached the sufficient amount of samples. Finally students used Google Earth (Google Corporation 2018) to gather the properties coordinations.

Results:

After collecting 43 data points, it is observed that in Suffolk County, Pitch Pines comprising 70% of the trees surveyed, a tree native to the US, were dominant in the areas that were surveyed. These areas are listed in the Table 2.

Table 1: Location of Each Data Point

	Location 1	**Location 2**	**Location 3**	**Location 4**
Town	Selden	Commack	Brentwood	Brentwood
Coordinates	Latitude 40.8599827 Longitude -73.0372763	Latitude 40.8316359 Longitude -73.2585215	Latitude 40.792390 Longitude - 73.244910	Latitude 40.7894253 Longitude - 73.2520940
Amount of trees	6	20	10	7

Table 2: Results of Identified Trees

Tree Type (Scientific Name)	**Quantity**	**Location**	**Percentage**
Pitch Pine *(Pinus rigida)*	30	Commack, Brentwood, Selden	70%
Scrub Oak *(Quercus ilicifolia)*	3	Commack	7%
Red Cedar *(Juniperus virginiana)*	2	Selden	5%
American Holly *(Ilex opaca)*	1	Selden	2%
Sugar Maple *(Acer saccharum)*	3	Selden, Brentwood	7%
Osage Orange *(Maclura pomifera)*	1	Brentwood	2%
White Oak *(Quercus alba)*	2	Selden, Brentwood	5%
Japanese Maple *(Acer palmatum)*	1	Brentwood	2%

Discussion:

In this study, coniferous trees were found to be dominant in the towns of Selden, Commack and Brentwood. Ohanian and Borah (2018) also found that coniferous trees were dominant in Suffolk County town of Deer Park. However, Castro and Rovelo (2018) and Biscaro et al. (2018) found that deciduous trees were dominant in Suffolk County, NY.

Conclusion:

After using the dichotomous key, students identified total of forty-three trees in four residential properties. The Dominant tree species found in those four properties is the coniferous Pitch Pine (*Pinus rigida*), and was 70% of the trees surveyed. It is native to the locations surveyed.

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Arbor Vitae is the Dominant Tree Species on the Brentwood and Dix Hills Properties

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Keywords: Dix Hills, Brentwood

Abstract:

In this experiment we had a total of 45 tree and bush samples. Our samples come from the residential properties in Brentwood and Dix Hills, which are located in Suffolk County. 67% of the trees identified are Arbor Vitae, making it the dominant tree species in the Brentwood and Dix Hills properties.

Introduction:

A dichotomous key is a book that is used to identify trees, shrubs and other plants that are native to the area. The climate in Suffolk County tend to have moderate fall and spring season with summer and winter having extreme weather conditions. The summers tend to have hurricanes and the winter has snowstorms and blizzards. According to *The Old Farmer's Almanac* (2018), the weather during this winter in Brentwood tends to be cold, windy, and rainy.

Method:

We brought in leaves and branches from the trees and shrubs located on the Brentwood and Dix Hills residential properties. If any of the trees were too tall for us to reach the leaves, we took pictures of the leaves and branches to identify them. Using the Watts (2004) tree identification guide and the Symonds (2004) shrub identification guide we were able identify our 45 leaf samples. Using Google Maps (Google Inc.2018), we found the Longitude and Latitude of both properties. The coordinates for the Brentwood property are 40°46'17.0"N 73°13'57.4"W and the coordinates for the Dix Hills property are 40°48'40.5"N 73°18'23.2"W.

Results:

The table below lists all the different trees and shrubs found on the Brentwood and Dix Hill properties. The most dominant tree on both properties was found to be the Arbor Vitae, with 30 out of the 45 (67%) of the trees identified as such.

Table 1: Location and Percent of Identified Trees

	Number	Location Dix Hills: 40°48'40.5"N 73°18'23.2"W Brentwood: 40°46'17.0"N 73°13'57.4"W	Percent
Arbor Vitae (*Thuia accidentails*)	30	Dix Hills & Brentwood	67%
Flowering Dogwood (*Cornus Flordia*)	4	Dix Hills & Brentwood	9%
Rhododendron (*Rhododendron ferrugineum*)	2	Dix Hills & Brentwood	4%
Norway Maple (*Acer platanoides*)	2	Dix Hills &Brentwood	4%
Sugar Maple (*Acer saccharum*)	1	Brentwood	2%
Black Ash (*Fraxinus nigra*)	1	Dix Hills	2%
Green Ash (*Fraxinus pennsylvanica subintegerrima*)	1	Dix Hills	2%
English Oak (*Quercus Robur*)	1	Dix Hills	2%
Yellowwood (*Cladrastus kentukea*)	1	Dix Hills	2%
Colorado Spruce (P*icea pungens*)	1	Brentwood	2%
Unknown	1	Dix Hills	2%
Total	45	-	100%

One of the trees located on the Dix Hills property was unable to be positively identified using the Watts key and the National Audubon Society key. The Watts key identified the unknown tree as a Dogwood tree, but the Dogwood tree has no teeth along the side of the leaves while the unknown leaves do. The Audubon key identified the tree as a Smooth Blackhaw, but the Smooth Blackhaw has fruit and the unknown tree doesn't have any fruit.

Discussion:

As we found in the Watts dichotomous key, the Arbor Vitae is found to be native to the Northeastern area of the United States of America. Espey et. al. (2018), Chaparro (2018), and Ashan et. al. (2018) found that Maple trees are dominant on Long Island. These findings differed

from our results as our more dominant tree species was the Arbor Vitae (67%) while only 13% of the trees we identified were Maple. The first of the two Maple species identified was the Norway Maple. It was found on both properties, but only made up 4% of the trees identified. The second Maple tree identified was the Sugar Maple which was only found on the Brentwood property and made up 2% of the identified trees.

Conclusion:

We originally hypothesized that Maple Trees would be the most dominant tree due to the amount of Maple Trees found on Long Island. Once we looked at our results, we were able to see that the Arbor Vitae was the dominant species on the two properties.

References:

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Non-Native Trees are Dominant to Native Trees in Northport and Patchogue

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Keywords: Patchogue, Northport, Native, Non-Native

Abstract: A total of 61 tree branch specimens were sampled from each tree on a Patchogue, N.Y residence and a Northport, N.Y residence. The tree sample species were then identified by using two dichotomous keys. It was found that non-native trees are dominate to native trees in Northport and Patchogue.

Introduction: The sample species came from two Long Island, NY locations; Patchogue and Northport. Long Island temperatures in January average -0.6C^0. Temperatures 32.2C^0 (*Metric Conversions, 2008-2018)* or higher occur anywhere from late May to mid-September (*The National Climate Data Center 2016*). Patchogue's sea elevation is 1.0 meter. Northport's sea elevation is 42.0 meters. Patchogue has an Average annual temperature of 11.5°C. Northport has an average annual temperature of 11.05°C (The National Climatic Data Center. 2016).

Methods: In this study, specimens of tree branches were retrieved from each tree located on one Patchogue, NY residence and one Northport, NY residence. Two dichotomous keys (Watts, T. 1998), and (Petrides, G. & Wehr, J. 1998), were used to identify each specimen's genus and species. A comparison was then made as to which trees were native to Long Island, NY and which were not. Latitude and Longitude of each property and elements were found using Earth Explorer (USGS 2018).

Results: In a survey of a residential property in Northport a total of 35 trees were identified, Red Maple (*Acer rubrum)*, White Oak (*Quercus alba),* American Sycamore (*Platanus occidentalis)*, Sugar Maple (*Acer saccharum)*, Norway Maple (*Acer platanoides)*, Groundsel Tree (*Baccharis halimifolia)*, Magnolia Tree (*Southern magnolia*).

In a survey of a residential property in Patchogue a total of 26 trees were identified, Silver Maple (*Acer saccharinum),* American Sycamore (*Plantanus occidentalis)*, American Beech tree (*Fagus grandifolia)*, Yellowwood tree (*Cladrastis lutea)*, Pin Oak (*Quercus palustris),* and Norway Maple (*Acer platanoides)*.

According to the results, it was found that 3 out of the 13 species identified were native to Long Island. The non-native tree percentage is 77%, while native tree percentage is 23%. Both properties shared the species of Norway Maple and American Sycamore. Thirty-one out of sixty-one trees in this study belong to the genus *Acer* family, showing Maple trees are a dominate tree on Long Island.

Table 1: Types of Trees in Northport

Types of Trees	Number of Trees Found	Percentage of Trees on the Property	Native	Scientific Name
Red Maple	10	29%	Yes	*Acer rubrum*
White Oak	3	9%	No	*Quercus alba*
American Sycamore	2	6%	Yes	*Platanus occidentalis*
Sugar Maple	8	23%	Yes	*Acer saccharum*
Norway Maple	5	14%	No	*Acer platanoides*
Groundsel Trees	3	9%	No	*Baccharis halimifolia*
Magnolia Tree	4	11%	No	*Southern magnolia*

Table 2: Types of Trees in Patchogue

Types of Trees	Number of Trees Found	Percentage of Trees on the Property	Native	Scientific Name
Silver Maple	6	23%	No	*Acer saccharinum*
American Sycamore	4	15%	Yes	*Platanus occidentalis*
American Beech	1	4%	No	*Fagus grandifolia*
Yellowwood	5	19%	No	*Cladrastis Lutea*
Pin Oak	8	31%	No	*Quercus palustris*
Norway Maple	2	8%	No	*Acer platanoides*

Table 3: Locations of Towns and Sea Elevation Level

Town	Coordinates	Sea Elevation Level
Northport	Lat: 40 ^{0} 51' 50" N, Lon: 073 ^{0} 20' 15" W	42.0m
Patchogue	Lat: 40^{0} 45’ 23” N, Lon: 073^{0} 01’ 20” W	1.0m

Discussion: Previous investigators found results similar to those of this research as the majority of trees located on these properties were non-native to the land geographically. In one study it was found 44% were native, and 68% were non-native (Campitiello et al. 2015). In

another study it was found 35% were native, while 65% were non-native. (Longo et al. 2015). Both studies found that there is an excessive amount of non- native trees compared to native trees found on Long Island.

The following is reviewed by Urban Forest Ecosystems Institute. (2012). Red Maple *(Acer rubrum)* is a native tree to Long Island. These trees can reach a high of 12.2m to 21.3m in height and spread about 9.1m to 15.2m wide. The Maple trees compose 51% of the trees in this study. The White Oak *(Quercus alba)* is not a native tree to Long Island. The White Oak is native to North America, and is found in the areas of Quebec, and southern Maine south and as far as northern Florida and eastern Texas. The White Oak tree can grow to be about 27.4m to 21.3m wide. The American Sycamore *(Platanus occidentalis)* is native to Long island and other various areas. Such as, eastern and central United States, southern Ontario and northeastern Mexico. The American Sycamore tree can grow to 30.5m tall. Sugar Maple (*Acer saccharum)* is native to Long island and can grow 15.2m to 21.3m tall. Norway Maple (*Acer platanoides)* is native to eastern and central Europe and western Asia, from France east to Russia, north to southern Scandinavia and southeast to northern Iran. It is a large deciduous tree that can grow up to 12.2m to 18.3m. Groundsel Tree (*Baccharis halimifolia)* is native to Florida and can grow to 3.0m tall. Magnolia Tree (*Southern magnolia)* is native to southeastern United States, from Washington, D.C. to central Florida, and west to East Texas and can grow as large as 36.6m. The Sliver Maple tree *(Acer saccharinum)* is another tree that is not native to Long Island. This tree can grow to about 15.2m to 27.4m tall. The Silver Maple is a fast-growing deciduous tree that is native to the area of North America. The American Beech tree *(Fagus grandifolia)* grows in the northern forests in the Adirondack Mountains of upstate New York. This tree isn't native to Long Island, this tree grows to 15.2m to 21.3m tall. Yellowwood (*Cladrastis lutea)* grows throughout Eastern Kentucky, but is most common along the Kentucky River palisades in the Bluegrass region. Pin Oak (*Quercus palustris*) is native to Rhode Island, Pennsylvania, Michigan, to Kansas south to North Carolina and northern Arkansas and can grow as large as 18.3m to 21.3m. Norway Maple (*Acer platanoides)* is native to eastern and central Europe and western Asia, from France east to Russia, north to southern Scandinavia and southeast to northern Iran. It is a large deciduous tree that can grow up to 12.2m to 18.3m.

Conclusion: In Northport and Patchogue the following species were found, Red Maple (*Acer rubrum)*, White Oak (*Quercus alba)*, American Sycamore (*Plantanus occidentalis)*, Sugar Maple (*Acer saccharum)*, Norway Maple (*Acer platanoides)*, Groundsel Tree (*Baccharis halimifolia)*, and Magnolia Tree (*Southern magnolia)*, Silver Maple (*Acer saccharinum),* American Sycamore (*Plantanus occidentalis),* American Beech (*Fagus grandifolia),* Yellowwood (*Cladrastis lutea)*, Pin Oak (*Quercus palustris)* and Norway Maple (*Acer platanoides)*. The similar trees that were common in both areas was the American Sycamore (*Platanus occidentalis)* and the Norway Maple (*Acer platanoides*). It was found that the majority of the trees that were identified were non-native to Long Island in both Northport and Patchogue. It was also found that 3 out of the 13 species to be identified were native to Long Island. The non-native tree percentage is 77%, while native tree percentage is 23%. It was also found that 51% of the 61 trees in the study were Maple (*Acer*).

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Maple, Gray Birch, Butternut, and Sycamore Trees are Common on the North and South Shore of Long Island

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Keywords: Species, North Shore, South Shore, Long Island, New York

Abstract:

A total of forty tree samples were collected from three different towns in different parts of Long Island, New York. These tree specimen consisted of no less than three leaves and buds, and were collected from both the North Shore and the South Shore. The South Shore locations include Massapequa where ten specimens were collected, and Central Islip where another ten specimens were collected. The North Shore location was Greenlawn where twenty specimens were collected. We utilized dichotomous keys in order to identify each individual collected sample; based on the tree's specific characteristics including, but not limited to, size, texture, shape, color and leaf structure. The identified tree species collected were separated into two categories, the first being trees in common on both the North Shore and South Shore and the second being trees that are not common on the North Shore and South Shore of Long Island. Once we identified each tree species categorized by North Shore versus South Shore, we were able to see which trees were common in both locations and which trees were not. Our findings show that there were less trees in common on the North Shore and South Shore. As well as finding that the genus Maple *(Acer)*, and species such as the Gray Birch *(Betula populifolia)*, Butternut *(Juglans cinerea)* , and Sycamore *(Platanus occidentalis)* are found in common on both the North and South Shore of Long Island.

Introduction:

We hypothesized that there would be less trees in common than there would be common on the North Shore and South Shore of Long Island. There were twenty tree specimen collected on the North Shore and twenty tree specimen collected on the South Shore and out of those, five were common to both the North and South Shore. The five trees identified that were common to both were Sycamore *(Platanus occidentalis)*, Butternut *(Juglans cinerea)*, Gray Birch *(Betula populifolia)*, Red Maple *(Acer rubrum)* and Norway Maple *(Acer platanoides)*. The American Sycamore *(Platanus occidentalis)* is a, "deciduous tree and averages between 23-30 meters tall with a massive trunk and open crown of huge crooked branches (Gettinger, B.)." The Sycamore *(Platanus occidentalis)* is a, "shade tree that grows to a larger diameter than any other native hardwood. The bark of large, old trunks sloughs off in scales or plates leaving a smooth, whitish inner bark (Gettinger, B.)." Gray birch *(Betula populifolia)* is a, "narrow, columnar single or multi-trunked tree that averages 11-15 meters in height. The tree is small and bushy with open, conical crown of short slender branches (Gettinger, B.)." The white, non-peeling bark darkens with age. A pioneer tree on clearings, abandoned farms and burned areas, the Gray Birch *(Betula populifolia)* grows rapidly but has a short life span. The Gray birch *(Betula populifolia)* is considered a nurse tree, "meaning it shades and protects seedlings of the larger long-lived forest trees (Gettinger B.)." The Red Maple *(Acer rubrum)* is a large tree, "with a narrow or rounded,

compact crown and red flowers, fruit, leafstalks and autumn foliage. In the wild this tree averages around 30-36 meters in height (Gettinger B.)." Red Maple *(Acer rubrum)* is considered a shade tree and is named for its often-red autumn leaf display. The bark appears silvery gray in the winter, and the roots are a dense fibrous network often preventing other plants from growing near its' trunk. The Butternut tree *(Juglans cinerea)* is a species of walnut tree. The nuts that grow on these wild trees are easy to process and delicious to eat. Butternut trees are also called white walnut trees because they have pale gray bark. "The tree has an average 75-year life span (Gettinger, B.)." The Norway Maple *(Acer platanoides)* is a large deciduous tree that averages between, "12-18 meters in height (Gettinger, B.)." They are adaptable to grow in a variety of environments. Norway maples *(Acer platanoides)* have very shallow roots and are also considered to be a shade tree making it difficult for other plants to grow close by.

Methods:

Tree samples were taken from specified locations in Greenlawn, New york of the North Shore, as well as Massapequa, and Central Islip, New York on the South Shore of Long Island, New York. From the North Shore twenty different tree samples were collected from one single property, and on the South Shore ten different samples were collected from two separate properties on the South Shore. Each tree sample was required to have three leaves or three buds, in order to be classified as a specific species of tree. These samples were brought into class and identified using two dichotomous keys (Watts 1998, Petrides & Wehr 1988). These diverse samples were classified according to the species found within the dichotomous keys. The students then recorded the specific species found, in relation to the shore of Long Island where the sample was taken from. In order to find the exact locations of the towns that were being researched, the longitudes and latitudes were researched. The website, *LatLong.net* (Latlong.net 2012), was very helpful for finding the correct coordinates for the towns that were sampled. After doing so the findings were analyzed, and the amount of species that were found to be common the North and South Shore of Long Island was recorded.As well as, the species both shores didn't have in common.

Results:

Table 1 - Locations of Species Sampled

North Shore Property	South Shore Properties	
GPS Coordinates	40.8613°N, -73.3645°E	40.69227°N, -73.4652°E	40.80207°N, -73.21191°E
Town	Greenlawn	Massapequa	Central Islip
Lot Size	0.30 Hectares	0.20 Hectares	0.20 Hectares

Table 2 - North and South Shore Species Sampled

North Shore Tree Species		South Shore Tree Species	
Common Name	Scientific Name	Common Name	Scientific Name
Cherry Blossom	*Prunus serrulata*	Flowering Dogwood	*Cornus Florida*
Cherry Blossom	*Prunus serrulata*	Red Bud	*Cercis canadensis*
Pignut Hickory	*Carya glabra*	Osage Orange	*Maclura pomifera*
Bitternut Hickory	*Carya cordiformis*	Southern Magnolia	*Magnolia grandiflora*
Pitch Pine	*Pinus rigida*	Sycamore	*Platanus occidentalis*
Eastern White Pine	*Pinus strobus*	Cockspur Hawthorn	*Crataegus crus galli*
Eastern White Pine	*Pinus strobus*	Mulberry	*Morus*
Red Maple	*Acer rubrum*	Crabapple	*Malus*
Red Maple	*Acer rubrum*	Gray Birch	*Betula populifolia*
Japanese maple	*Acer palmatum orangeola*	Prairie Crabapple	*Malus ioensis*
Norway Maple	*Acer platanoides*	Red Maple	*Acer spicatum*
Gray Birch	*Betula populifolia*	Arborvitae	*Thuja Plicata*
Northern Red Oak	*Quercus rubra*	Coulter Pine	*Pinus coulteri*
Northern Red Oak	*Quercus rubra*	Velvet Ash	*Fraxinus velutina*
American Elm	*Ulmus americana*	Washington Hawthorn	*Crataegus phaenopyrum*

American Elm	*Ulmus americana*	Paper Birch	*Betula papyrifera*
Butternut	*Juglans cinerea*	Western Chokecherry	*Prunus virginiana*
American Chestnut	*Castanea dentata*	Swamp Cottonwood	*Populus deltoides*
American Chestnut	*Castanea dentata*	Norway Maple	*Acer platanoides*
Sycamore	*Platanus occidentalis*	Butternut	*Juglans cinerea*

Table 3 - Trees Found on Both the North and South Shore

Total Trees in Common	Total Tree Species in Common

Red Maple	*Acer rubrum*	Red Maple	*Acer rubrum*
Red Maple	*Acer rubrum*	Norway Maple	*Acer platanoides*
Norway Maple	*Acer platanoides*	Gray Birch	*Betula populifolia*
Gray Birch	*Betula populifolia*	Butternut	*Juglans cinerea*
Butternut	*Juglans cinerea*	Sycamore	*Platanus occidentalis*
Sycamore	*Platanus occidentalis*		

As displayed in Table 2, the following tree species were found on the North Shore of Long Island; two two specimens of Cherry Blossom *(Prunus serrulata),* two specimens of Eastern White Pine *(Pinus strobus),* Pitch Pine *(Pinus rigida),* Bitternut Hickory *(Carya cordiformis),* Pignut Hickory *(Carya glabra)*, two specimens of Northern Red Oak *(Quercus rubra),* two specimens of American Elm *(Ulmus americana),* two specimens of American Chestnut *(Castanea dentata),* and only one specimen of Japanese Maple *(Acer palmatum orangeola)*, one specimen of Norway Maple *(Acer platanoides)*, Gray Birch *(Betula populifolia),* Butternut *(Juglans cinerea),* two specimen of Red Maple *(Acer rubrum),* and one specimen of Sycamore *(Platanus occidentalis).*

The proceeding trees were found on the South Shore of Long Island; one specimen of Red Maple *(Acer rubrum),* Norway Maple *(Acer platanoides)*, Gray Birch *(Betula populifolia),* Swamp Cottonwood *(Populus deltoides),* Sycamore *(Platanus occidentalis),* Western Chokecherry *(Prunus virginiana),* Paper Birch *(Betula papyrifera),* Washington Hawthorn *(Crataegus phaenopyrum),* Butternut *(Juglans cinerea),* Velvet Ash *(Fraxinus velutina),* Coulter Pine *(Pinus coulteri),* Arborvitae *(Thuja plicata),* Prairie Crabapple *(Malus ioensis),* Crabapple *(Malus),* Mulberry *(Morus),* Osage Orange *(Maclura pomifera),* Southern Magnolia *(Magnolia*

grandiflora), and the Cockspur Hawthorn *(Crataegus crus galli).*

The properties surveyed on the North and South Shore had the following five different species in common; the Red Maple *(Acer rubrum),* Norway Maple *(Acer platanoides)*, Gray Birch *(Betula populifolia),* Butternut *(Juglans cinerea),* and Sycamore *(Platanus occidentalis).* According to the samples it was also found that two species of the genus *Pinus,* and two species of the genus *Carya* were found on the North Shore. On the South Shore it was found that two species of the genus *Malus,* and two species of the genus *Crataegus* were present. However the most abundant species found to have the same genus, belong to the genus *Acer.* Three species of the genus *Acer* were found on the North Shore, as well as two species of the genus *Acer* on the South Shore.

Discussions:

After comparing this study to others done on Long Island in the past, there were many similarities. There have been several different tree studies that sampled similar species to those found on the North and South Shores of Long Island.

When comparing our studies to Boccard et al. (2016), the Eastern White Pine *(Pinus strobus)* and Sycamore *(Plantus occidentalis)* were found on the North Shore. This correlates to the results displayed when surveying the North Shore in this study.

In another study conducted by Bartlett et al. (2014), found that species of Red Maples *(Acer rubrum)* and Sycamore *(Platanus occidentalis)* were located on the South Shore, which correlates to the findings of this experiment.

Muffaletto et al. (2015), found that the Red Maple *(Acer rubrum)* is a dominant species on the North Shore of Long Island. This suggest a strong reasoning as to why Red Maples *(Acer rubrum)* were found to be very common not only throughout the studies of the North Shore, but also those conducted on the South Shore.

Lasot et al. (2017), also found that the Norway Maple *(Acer platanoides)* and the Arborvitae *(Thuja plicata)* can be found on the South Shore of Long Island. The study conducted by Lasot et al. (2017), has very similar findings when it comes to the trees that were sampled on the South Shore of Long Island.

Perks et al. (2013), discovered that the Sycamore *(Platanus occidentalis)* and the Norway Maple *(Acer platanoides)* were prevalent on the North Shore. While the Paper Birch *(Betula papyrifera),* Red Maple *(Acer rubrum),* and Sycamore *(Plantus occidentalis)* were located on the South Shore. This data provides a strong relationship between the recent findings about common trees on both the North and South Shores.

Conclusion:

The following five tree species were found on the North and South Shores of Long Island, Red Maple *(Acer rubrum),* one specimen of Norway Maple *(Acer platanoides)*, Gray Birch *(Betula populifolia),* Butternut *(Juglans cinerea),* and Sycamore *(Platanus occidentalis).* The tree species that were only found on the North Shore are as follows, two specimen of Cherry Blossom *(Prunus serrulata),* two specimen of Eastern White Pine *(Pinus strobus),* Pitch Pine *(Pinus rigida),* Bitternut Hickory *(Carya cordiformis),* Pignut Hickory *(Carya glabra)*, two specimen of Northern Red Oak *(Quercus rubra),* two specimen of American Elm *(Ulmus americana),* two specimen of American Chestnut *(Castanea dentata),* and only one specimen of Japanese Maple *(Acer palmatum orangeola).* The tree species that were sampled from the South

Shore consist of, the Swamp Cottonwood *(Populus deltoides),* Western Chokecherry *(Prunus virginiana),* Paper Birch *(Betula papyrifera),* Washington Hawthorn *(Crataegus phaenopyrum),* Velvet Ash *(Fraxinus velutina),* Coulter Pine *(Pinus coulteri),* Arborvitae *(Thuja plicata),* Prairie Crabapple *(Malus ioensis),* Crabapple *(Malus),* Mulberry *(Morus),* Osage Orange *(Maclura pomifera),* Southern Magnolia *(Magnolia grandiflora),* and the Cockspur Hawthorn *(Crataegus crus galli).*

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Maple is the Dominant Tree Species in Sunken Meadow State Park in Kings Park, New York

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Keywords: Species, Maple, Trees, Kings Park

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Abstract:

There was a total of 45 trees surveyed in this study using a dichotomous key from Sunken Meadow State Park located in Kings Park, New York. All of the species were identified using their bark, buds, and leaves. Maple trees were the dominant species in this park in Kings Park.

Introduction:

According to New York State Parks, Recreation and Historic Preservation (2019), the elevation of Sunken Meadow State Park located in Kings Park, New York is approximately 3 meters and is a flatland. Sunken Meadow is known for its variety of different species of trees throughout the trails and the park itself. The climate zone of this area is a transitional zone because it ranges from snowy, cold weather, to hot weather. The yearly temperature ranges from -4 to 24°C.

Silver Maple trees (*Acer saccharinum*) are a medium to large type of evergreen tree that grows to an average between 15 to 24 meters and 0.3 to 0.6 meters in diameter. They are found all across Central and Eastern North America (Williams 2007). It is grown in average medium to wet soil in full sun and part shade and can be seen growing in dry soils as well, (Missouri Botanical Gardens 2019). This tree got its name because of the silvery undersides of its leaves (Missouri Botanical Gardens 2019). The leaves grow opposite of each other and are roughly 16 to 22 centimeters long and they have coarse toothed lobes, (Williams 2007).

Methods:

Forty-five trees were surveyed in Sunken Meadow State Park during the spring season of 2019 by using a dichotomous key (Williams 2007). All tree samples were found within the area of these coordinates: Point 1 latitude 40° 54’17” N, longitude 73 15’21” W, Point 2 latitude 40° 54’ 21”N, longitude 73° 15’18” W, Point 3 latitude 40° 54’35” N, longitude 73° 15’21” W, and Point 4 latitude 40° 54’29” N, longitude 73° 15’28” W. The latitude and longitude points were found through using Google Earth, (Google Corporation 2019). The circumference of each tree was measured by using a tape measure perpendicular to the axis of the trunk, and was recorded in centimeters.

Results:

Table 1: Quantity, Percentage, and Circumference of Identified Species

Of the 45 trees that were surveyed, 18 of them were Silver Maple and 9 of them were Red Maple. Together both of those trees come out to be 60% of the total trees that were surveyed. Additionally, there were 5 Eastern White Pine, 4 Scarlet Oaks, 4 White Ash, Maple trees are the

dominant species of trees in the area that was surveyed.

Tree Type (Scientific Name)	Quantity	Percentage	Circumference (cm)
Eastern White Pine (*Pinus strobus*)	5	11%	58 to 81 cm
Scarlet Oak (*Quercus coccinea*)	4	9%	25 to 32 cm
Red Maple (*Acer rubrum*)	9	20%	177 to 193 cm
White Ash (*Fraxinus americana*)	4	9%	5 to 8 cm
Silver Maple (*Acer saccharinum*)	18	40%	106 to 208 cm
Eastern Redcedar (*Juniperus virginiana*)	3	7%	170 to 176 cm
White Poplar (*Populus alba*)	2	4%	45 to 47 cm

Discussion:

All of the trees reported in this study are commonly found all across the upper and eastern part of North America, (Williams 2007).

In a study done by Cardinale (2017) of trees in Makamah Nature Preserve in Northport, New York, one of the most common tree species that was found was also the Red Maple trees. Makamah Nature Preserve is 7.5 kilometers away from Sunken Meadow State Park and is also located on the North Shore of Long Island. The only tree that they both had in common was the Red Maple tree.

Conclusion:

Of the 45 trees surveyed from Sunken Meadow State Park in Kings Park, New York 18 or 40% were Silver Maple trees, and 9 or 20% of the trees that was surveyed were Red Maple trees. The circumference of the trees and shrubs ranged from 5cm to 208cm.

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Non-Native Trees are Dominant to Native Trees on Residential Properties in Western Suffolk County, New York

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Keywords: Taxonomy, Non-Native, Trees, Suffolk County, Native, Copiague, Central Islip, Deer Park, Huntington, Amityville

Abstract:

For this survey, there was a total of 62 samples of trees collected from five towns in Suffolk County, NY. We collected 16 tree samples from the town of Huntington, 7 tree samples from town of Islip, 13 from the town of Deer Park, 14 samples from Copiague and 11 from Amityville. The species were carefully observed and examined to identify each one using four dichotomous keys and supported using different reference books. This survey's results showed that non-native trees were dominant to native trees in Suffolk County, NY. It was also found that the rapid growing trees were dominant to slow growing trees as shown in the results table. One more finding was that the deciduous trees were dominant to coniferous trees.

Introduction:

Native trees have adapted over time to various environmental influences such as soil types and micro-climates. They tend to be more naturally adapted to local growing conditions and often require less inputs for successful establishment and can reduce maintenance. Exotic plants are often referred to as non-native which have been introduced into our landscapes and ecosystem, and some are labeled as invasive plants which displays natural species (Wolf 1991).

Taxonomy is the study that classifies all living things. It was developed by the Swedish botanist Carolus Linnaeus. Linnaeus invented the binomial nomenclature, in which two terms are used to denote a species of living organism, the first one indicating the genus and the second the specific species (Buckley 2017).

Dichotomous keys were used for this particular study, which helped for identifying trees. The type of specimens that were collected from the five properties were native or non-native. In this study, trees samples were taken from residential properties in the towns of Amityville, Central Islip, Copiague, Deer Park, and Huntington Station. The students' hypothesis is that there would be more invasive trees on Long Island over native trees.

Methods:

For this study, tree surveys were done on five residential properties located on Suffolk, County, New York. These towns were Copiague, Amityville, Huntington Station, Deer Park, and Central Islip. The latitude and longitude were also noted using an online geographic tool, LatLong.net (LatLong.net 2019). Each tree on the residential property was identified according to its species using four dichotomous keys; Tree Finder (Watts, 1998), Winter Tree Finder (Watts and Watts 1970), Identifying Trees (Williams, 2017), A Field Guide to Eastern Trees (Petrides and Wehr 1998). In Table 1 we recorded properties on Long Island. We also classified the trees by quantity and location of the trees in Table 2. Table 3 contains the scientific name of each tree.

Results:

Property 1 had sixteen trees, property 2 had seven trees, property 3 had thirteen trees, property 4 had fourteen trees, and property 5 consisted of eleven trees. The total town area ranged from 2.5 square miles to 162.98 square miles. Property 1 consisted of 12 non-native and 4 native trees; property 2 consisted of 5 non-native and 2 native trees; property 3 consisted of 9 non-native and 4 native trees; property 4 consist of 12 non-native and 2 native trees; property 5 consist of 8 non-native and 3 native trees.

Table 1: Properties on Long Island

	Property 1	Property 2	Property 3	Property 4	Property 5
Latitude and Longitude	40.83979 -73.36265	40.794510 -73.196770	40.7617653 -73.3292858	40.68149 -73.39984	40.6790 -73.7171
Town	Huntington	Central Islip	Deer Park	Copiague	Amityville
Region	Northern L.I.	Central L.I.	Central L.I	Southern L.I	Southern L.I
Total Town Area	244,116,739 Sq m	18,531,365 Sq m	16,202,966 Sq m	8,417461 Sq m	6,604,470 Sq m
Tree Count	16	7	13	14	11

(This table reports the locations used on Long Island. This is helpful in discovering if there is a trend regarding the location of trees. It also shows where the properties were located with regard to Long Island and the number of trees there were on each property. This could possibly help determine tree densities around Long Island.)

Property 1 contained 2 American Chestnuts (*Castanea dentata*), 3 American Sweet Gums (*Betula lenta*), 2 Cherry Blossom (Prunus Serrulata), a Common Olive Tree (*Olea europea*), Eastern Hemlock (*Tsuga canadensis*), European Larch (*Larix decidua*), and a Lombardy Poplar (*Populus nigra*); property 2 contained a Cherry Blossom (*Prunus serrulata*), 2 European Larch's (*Larix decidua*), 2 Flowering Dogwoods (*Cornus florida*), and 2 Pin Oaks (*Querus palustris*); property 3 contained an American Chestnut (*Castanea dentata*), 2 American Sweet Gums (*Betula lenta*), a Common Olive Tree (*Olea europea*), Eastern Hemlock (*Tsuga canadensis*), European Larch (*Larix decidua*), 2 Flowering Dogwoods (*Cornus florida),* 2 Hills Oaks (*Quercus ellipsoidais*), a Lombardy Poplar (*Populus nigra*), Pin Oak (*Querus palustris*), and a Silver Maple (*Acer Saccharnum sapindacea*); property 4 contained 2 Cherry Blossoms (*Prunus Serrulata*), an Eastern White Pine (*Pinus strobus*), 2 Northern White Cedars (*Thuja occidentalis*), a Norway Maple (*Acer platanoids*), American Sweet Gum (*Betula lenta*), 5 Red Maples (*Acer rubrum*), and a Weeping Forsythia (*Forsythia suspensa*); property 5 contained 4 Cherry Blossoms (*Prunus serrulata*), 3 Flowering Dogwoods (*Cornus florida*), a Norway Maple (*Acer platanoids*), and 3 Sweet Birch trees (*Betula lenta*). Eastern Hemlocks, Common Olive Trees, Cherry Blossoms, and the Northern White Cedar were coniferous-the rest of the maple trees were deciduous trees.

Table 2: Quantity and Location of Trees (with regard to property)

Tree Species	Property 1	Property 2	Property 3	Property 4	Property 5
American Chestnut	2		1		
American Sweetgum	3		2		

Cherry Blossom	2	1		2	4
Common Olive Tree	1		1		
Eastern Hemlock	1		1	1	
Eastern White Pine				2	
European Larch	1	2	1		
Flowering Dogwood		2	2		3
Hills Oak	1		2		
Lombardy Poplar	1		1		
Northern White Cedar				1	
Norway Maple				1	1
Pin Oak	1	2	1		
Silver Maple	2		1		
Silk Tree	1				
Sweet Birch				1	3
Red Maple				1	
Weeping Forsythia				5	

(This table organizes the species of trees with regard to the property they were found in.)

Table 3: Tree Analysis

Tree Species	Scientific Name	Type	Growth	Native or Non-Native	Number of Samples
American Chestnut	*Castanea dentata*	Deciduous	Moderate, Rapid	Native	3
American Sweetgum	*Liquidambar styraciflua*	Deciduous	Rapid	Invasive	5
Cherry Blossom	*Prunus serrulata*	Coniferous	Moderate	Invasive	9
Common Olive Tree	*Olea europea*	Coniferous	Slow	Invasive	2
Eastern Hemlock	*Tsuga canadensis*	Coniferous	Slow, Moderate	Invasive	3
Eastern White Pine	*Pinus strobus*	Deciduous	Moderate, Rapid	Invasive	2
European Larch	*Larix decidua*	Deciduous	Moderate Rapid	Invasive	4
Flowering Dogwood	*Cornus florida*	Deciduous	Slow, Moderate	Native	7
Hills Oak	*Quercus ellipsoidais*	Deciduous	Moderate	Invasive	3
Lombardy Poplar	*Populus nigra*	Deciduous	Rapid	Invasive	2
Northern White Cedar	*Thuja occidentalis*	Coniferous	Slow	Native	1
Norway Maple	*Acer platanoids*	Deciduous	Rapid	Invasive	2

Persian Silk Tree	*Albizia julibrissin*	Deciduous	Rapid	Invasive	1
Pin Oak	*Querus palustris*	Deciduous	Rapid	Invasive	4
Silver Maple	*Acer saccharinum*	Deciduous	Rapid	Native	3
Sweet Birch	*Betula lenta*	Deciduous	Moderate	Invasive	4
Red Maple	*Acer rubrum*	Deciduous	Moderate	Native	1
Weeping Forsythia	*Forsythia suspensa*	Deciduous	Rapid	Invasive	5

(The trees are listed in this table with their common species name, scientific name, type (coniferous or deciduous), growth rate (slow, moderate, rapid), native, non-native or invasive and the number of samples collected from all the properties used in this report).

Discussion:

One main non-native tree found was the *Prunus serrulata* or otherwise known as the Cherry Blossom tree. This species is native to China, Japan and Korea. It reached America in 1912 as a gift from Mayor Yoko Ozaki of Tokyo City to the city of Washington D.C (Rothman 2016). Our study showed that the Cherry Blossom tree was found on 4 out of 5 of the individual properties. While property 3 did not retain the dominant non-native tree. We identified 59 total tree samples, and 9 were Cherry Blossoms, which is approximately 15.25% of our total findings. This showed that this particular species was more prominent in many regions of Long Island, from the northern area of Long Island, to central the regions, and also the southern regions of Long Island. Five individual sites showed 25% of the trees are native to North America for this study. Another study (Alexander et al. 2016) found that 70% of the trees were White Cedar (*Thuja occidentalis*). Their study was conducted on 4 properties regarding native and non-native trees on Long Island. There were two locations in West Babylon, one in Bay Shore and one in Islip. They did not have any Cherry Blossom trees on any of the 4 properties (Alexander et al. 2016). This showed that this particular classification of Cherry Blossoms were more prominent for our properties while for the properties in the previous mentioned studies, the White Cedar tree was prominent . A different study by (B. Longo et al. 2015) found that the Cherry Blossom tree (*Prunus serrulata*) is a native tree but in our study it is considered to be a non-native tree. Cherry blossom trees were found at two of their properties, in Bay Shore and Lindenhurst. Lastly, another study (Valencia, C 2017) found two Cherry Blossom trees in North Brentwood, New York. When comparing our study with other findings we found that the Cherry Blossom is dominant on Long Island.

Conclusions:

In this study, trees were surveyed in Huntington, Islip, Deer Park, Copiague and Amityville in Suffolk County New York. Most of the trees that were found on these properties were non-native. The non-native trees consisted of Cherry Blossom, Sweet Birch, and Weeping Forsythia were dominant in the towns of Copiague and Amityville. However, there were also several native tree species. Furthermore, the trees that were non-native are also rapidly growing trees. The tree samples that were native either had a slow or moderate growth rate. These native trees consisted of American chestnut, Flowering Dogwood, Northern White Cedar, Silver Maple, and Red Maple.

The native trees were dominant in the towns of Huntington, Islip and Deer Park when compared to the non-native. In addition, the rapidly growing trees were dominant to the slow growing trees. There were more non-native trees surveyed in this study than native trees.

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The South Shore of Long Island is a Reservoir for a Variety of Tree Species and Maple (*Acer)* are a Dominant Clade

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Keywords: Maple, South Shore

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Abstract: A total of forty-four tree samples were taken from four residential properties on Long Island, New York. Sixteen samples were taken from a property in Lindenhurst, eleven samples were taken from a property in Commack, seven sample was taken from a property in Brentwood, and six samples were taken from a property in Bay Shore. With dichotomous keys and an online application called Leafsnap, we were able to identify the species of each tree. We discoverd that the South Shore of Long Island serves as a reservoir for a diversity of tree species, and that the Genus *acer* is a dominant clade on the South Shore of Long Island.

Introduction:

Long Island is home to both native and non-native trees. Due to the seasonal changes, only some trees can inhabit the area. “Suffolk County has a humid temperature climate that is strongly influenced by the Long Island Sound and the Atlantic Ocean. These bodies of water temper extremes of heat in summer and cold in winter” (Warner Jr., et. al 1975). In 2012, Paul Mateyunas commented on Long Island’s vast topography, stating that it has everything from beaches that are primarily located on the south shore, hills, wooded areas, and harbors along the north shore. These geographic factors affect the types of trees that are able to grow throughout the island. “The North Shore tends to be more hilly and rocky where the South Shore is flat and sandy. The change in gradient and topographic makeup from north to south is evident of glacial movement, so the Long Island of today was shaped by glaciation” (Jean-Michel 2014).

By using a dichotomous key, users can attempt to identify a tree from a leaf they are studying. According to Davis and Clegg (2017), a dichotomous key is a stepwise tool for identification where based on two options based of different characteristics at each step. An individual may follow the steps and still not identify the tree if the leaf belongs to a tree that is not native to the region. There may be trees, such as Maple, that have certain species that are indigenous to an region, but other types that are not.

Method:

Students brought leaves from each tree found on their property to class. They used two dichotomous keys to identify the leaves that belonged to each tree. This process included, but was not limited to, following a series of steps in, “Eastern Trees” (Petrides & Wehr 1998) to correctly identify the leaf based on, shape, size, and texture, as well as taking pictures of the leaves on a mobile device to see if the application could find a match to the leaf. Another book by May Theilgaard Watts (1998) entitled, “Tree Finder” also helped in the exploration to correctly identify the leaves The students then used a website entitled EarthExplorer (USGS 2016) to identify the longitude and latitude of each property where the trees were identified.

Results:
Many different species were found that existed within the properties. One leaf, shaped similarly to an upside down heart, was identified from a Hardy Catalpa leaf (*Catalpa speciosa*). Another leaf with ridged edges was identified from a Gray Birch tree (*Betula populifolia)*. A leaf with ridged edges, as well as pointed ends, was identified from a Sycamore tree (*Plantanus occidentalis)*. A leaf that appeared different from all the others, as it was thinner and pointier, was identified from a Northern White Cedar tree (*Thuja occidentalis)*. A round leaf with pointed edges was identified from a Big Toothed Aspen (*Populus grandidentata)*. Lastly, the final tree identified was the *Acer palmatum* tree, also known as a Japanese Maple tree, which was identified due to its reddish color and pointed edges.

Property 1 (Table 1) had sixteen trees in total, two of which were the genus *Acer.* In this location, Fig Trees (*Ficus carica)* and Rhododendron (*Rhododendron ferrugineum)* were dominant, having three trees per species.

Table 1: Trees Identified at Property 1 - North Lindenhurst (40.6924, -73.3870)

Common Name	**Scientific Name**	**Quantity**
Big Toothed Aspen	*Populus grandidentata*	1
Fig Tree	*Ficus carica*	3
Golden Delicious Apple Tree	*Malus sylvestris*	1
Locust Tree	*Robinia pseudoacacia*	1
Sugar Maple	*Acer saccharum*	1
Mutsu	*Malus domestica*	1
Northern White Cedar	*Thuja occidentalis*	1
Northern Red Oak	*Quercus rubra*	1
Pin Oak	*Quercus palustris*	1
Red Delicious Apple Tree	*Malus sylvestris*	1
Rhododendron	*Rhododendron ferrugineum*	3
Silver Maple	*Acer saccharinum*	1

Property 2 (Table 2) had eleven trees in total, in which there were two species with the genus *Acer.* Arborvitae (*Thuja occidentalis)* was most prominent on this property with five trees from this species. Sycamore (*Plantanus occidentalis)* had the second highest total on this property with two of the species.

Table 2: Trees Identified at Property 2 - Commack (40.8424, -73.3027)

Common Name	Scientific Name	Quantity
Arborvitae	*Thuja occidentalis*	5
Gray Birch	*Betula populifolia*	1
Hardy Catalpa	*Catalpa speciosa*	1
Japanese Red Maple	*Acer palmatum*	1
Red Maple	*Acer rubrum*	1
Sycamore	*Plantanus occidentalis*	2

Property 3 (Table 3) had eleven trees, two of which were the genus *Acer*. Chinese Hibiscus (*Hibiscus rosa-sinensis)* were the highest quantity of trees on this property with five in total. Both the Sourwood Tree (*Oxydendrum arboreum)* and Red Maple (*Acer rubrum)* have two trees per species.

Table 3: Trees Identified at Property 3 - Brentwood (40.7961, -73.2652)

Common Name	Scientific Name	Quantity
Chinese Hibiscus	*Hibiscus rosa-sinensis*	5
Eastern Red Cedar	*Juniperus virginiana*	1
Red Maple	*Acer rubrum*	2
Sourwood Tree	*Oxydendrum arboreum*	2
Striped Maple	*Acer rubrum*	1

Property 4 had six trees, one of which was the genus *Acer*. Scarlet Oak (*Quercus coccinea*) had the greatest number of trees on this property with a total of two.

Table 4: Trees Identified at Property 4 - Bay Shore (40.7504, -73.2554)

Common Name	Scientific Name	Quantity
Eastern Hemlock	*Tsuga canadensis*	1
Live Oak	*Quercus virginiana*	1
Norway Maple	*Acer platanoides*	1
Scarlet Oak	*Quercus coccinea*	2

White Oak	*Quercus alba*	1

Out of 44 trees located on four residential properties, 28 species were represented. Maple (*Acer)* were the dominant genus.

Discussion:

In our study we found two Red Maple Trees (*Acer rubrum*) on the property of Brentwood, and one on the property of Commack. Sharma et al. (2018) found one each in Babylon and in Deer Park, along with two in properties in Brentwood. We also found one Silver Maple Tree (*Acer saccharinum*) in North Lindenhurst. Sharma et al. (2018) found one in Deer Park and three in two different properties in Brentwood. We found one Live Oak tree (*Quercus virginiana*) in the property of Bay Shore. Castro et al. (2018) found three on a property in West Islip. There was one Apple Tree (*Malus*) in our study that we found on a property in North Lindenhurst. Castro et al. (2018) found an Apple Tree (*Malus*) as well on a property in West Islip. According to a study done in 2012 by Marino et al, The Red Japanese Maple (*Acer palmatum)* was found on a property in Suffolk County, specifically Babylon. This tree is not native to Long Island, but was found on a property in Commack. We also found one Eastern Red Cedar tree (*Juniperus virginiana*) on a property in Brentwood. Orto et al. (2017) found a Eastern Red Cedar (*Juniperus virginiana)* tree as well on a property in Brentwood. All other species in the study including Big Toothed Aspen (*Populus Grandidentata),* Fig Tree (*Ficus carica)*, Locust tree (*Robinia pseudoacacia)*, Maple (*Acer),* Mutsu (*Malus domestica)*, Northern White Cedar (*Thuja occidentalis)*, Pin Oak *(Quercus palustris)*, Rhododendron (*Rhododendron ferrugineum)*, Arborvitae (*Thuja occidentalis)*, Gray Birch (*Betula populifolia)*, Hardy Catalpa (*Catalpa speciosa)*, Red Maple (*Acer rubrum)*, Sycamore (*Plantanus occidentalls)*, Chinese Hibiscus (*Hibiscus rosa-sinensis)*, Sourwood Tree (*Oxydendrum arboreum),* Eastern Hemlock (*Tsuga canadensis)*, Norway Maple (*Acer platanoides)*, Scarlet Oak (*Quercus coccinea)*, and White Oak (*Quercus alba)* were not found on Long Island properties while comparing data.

Conclusion:

Based on the tree species identified in North Lindenhurst, Commack, Brentwood and Bay Shore, each property has many different species of trees, yet, each property has trees that are similar to each other. The most dominant tree species which were found on each property was the Maple (*Acer) tree.*

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Deciduous Trees were Found to be Dominant in Comparison to Coniferous Trees, and Coniferous Shrubs were Found Dominant in Comparison to Deciduous Shrubs in two Residential Properties of Bay Shore, NY

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Keywords: Taxonomy, Native, Non-native, Trees, Shrubs.

Abstract: Twenty-eight trees and sixteen shrubs were surveyed in two residential properties of Bay Shore, NY. The trees and shrubs were identified using three dichotomous keys. Deciduous trees were dominant compared to coniferous trees, whereas the coniferous shrubs were dominant in comparison to the deciduous shrubs.

Introduction:

Taxonomy is the study of the classification of living organisms (SCCC Biology Department 2011). A native plant is the one that has grown in a particular region and environment over thousands of years. In the USA native plants are only those that have been planted before the European settlements. Any plant that was brought and planted on purpose or accidentally after the settlements is not considered a native plant of the USA (USDA 2018). A non-native plant is one that is found in a region or environment where it did not previously grow. Non-native plants cannot continue to grow in a region without help from humans. An example of these would be ornamental plants. Another point to be noted is that not all non-native plants are invasive. (USDA 2018). Having data at hand about native and invasive trees and shrubs of NY state may help future scientists to help conserve and save the environment.

Method:

Tree branches were collected with at least three leaves intact and were identified using two dichotomous keys. The tree branches were first identified using Watts and Watts (1998) and then the identity was confirmed using *The Petersons Guide* (Petrides and Wehr 1998). After that the student wrote the name, scientific name and quantity along with the types on separate tables in the result section. Each property was given its own table.

The same method was applied for the identification and counting of shrub samples. *The Shrub Identification Book* by George W.D Symonds (1963) was used to confirm identity for complete accuracy.

The first table in the result section was of the coordinates and general data of the residential properties used as the sample. The data of the coordinates was calculated using Earth Explorer (USGS 2018).

Results:

After collecting data and analyzing it through two dichotomous keys it was observed that on one property a total of seventeen trees grew. There, deciduous trees were dominant in comparison to coniferous trees. White Ash (*Fraxinus americana)* was in the most numerous, and Pitch Pine (*Pinus rigida)*, also a native tree, was the least numerous. No shrubs grew on property one.

On property two, eleven trees were observed in total. All of them were deciduous. The highest count was Norway Maple (*Acer platanoides)*. The sixteen shrubs that grew on property two were all native and coniferous.

Table 1 Locations from Where Sample of Trees and Shrubs Were Collected.

	Location 1	**Location 2**
Town	Bay Shore, NY.	Bay Shore, NY.
Coordinates	Longitude: -73.2589 Latitude: 40.7526	Longitude: -73.2592 Latitude: 40.7525
Count of Trees	17	11
Count of Shrubs	0	16

Table 2 Trees found in the First Property

Name of Tree	**Scientific Name of Tree**	**Amount Counted**	**Type (Native or Non-native)**	**Type (Deciduous or Coniferous)**
Sugar Maple	*Acer saccharium*	4	Native	Deciduous
Norway Maple	*Acer platanoides*	3	Non-native	Deciduous
White Ash	*Fraxinus americana*	5	Native	Deciduous
Pitch Pine	*Pinus rigida*	2	Native	Coniferous
Black Locust	*Robinia pseudoacacia*	3	Non-native	Deciduous

A total of 17 trees were surveyed in the first property. There were no shrubs. Deciduous trees were dominant. More native species grew in comparison to non-native species. The percentage of deciduous trees was 88% and the percentage of coniferous trees was 12%. The percentage of native trees was 65% and the percentage of non-native trees was 35%.

Table 3 Trees Found in the Second Property.

Name of Tree	**Scientific Name of Tree**	**Amount Counted**	**Type (Native or Non-Native)**	**Type (Deciduous or Coniferous)**
Sugar Maple	*Acer saccharum*	2	Native	Deciduous
Norway Maple	*Acer platanoides*	3	Non-Native	Deciduous
Silver Maple	*Acer saccharinum*	2	Non-Native	Deciduous
Japanese Maple	*Acer Plamatum*	2	Non-Native	Deciduous
Norway Spruce	*Picea abies*	2	Non-native	Coniferous

A total number of nine trees were surveyed on property number two. Most of them were found to be deciduous but some were coniferous. Non-native species were found to be dominant on the second property. The percentage of deciduous trees was 82% and the coniferous trees was 18%. The percentage of native trees was 18% and the non-native trees was 82%.

Table 4 Shrubs Found in Second Property.

Name of Shrub	Scientific Name of Shrub	Amount Counted	Type (Native or Non-Native)	Type (Deciduous or Coniferous)
American Yew	*Taxus canadensis*	16	Native	Coniferous

Discussion:

A mix of native and non-native trees can be found in Bay Shore, N.Y., but the native trees outnumber the non-native trees (Espey et al. 2018). According to Castro et al. (2017) Non-native trees and Maples are majority. According to Valencia et al. (2017) Maples are the most common native trees in Bay Shore and Brentwood, where-as trees of Asian origin are the most common non-native trees. Whereas, according to Alexander et al. (2016) Native trees out number Non-native trees in Long Island residential properties.

Conclusion:

The 28 trees and 16 shrubs were identified in two residential properties. The majority of trees found in both properties were native and deciduous, although non-native and coniferous trees were found. There were no shrubs on the first property, but on the second property there were 18 shrubs. All of the shrubs were native and coniferous. Therefore, it can be concluded that more native and deciduous trees grow in residential properties of Bay Shore than coniferous and non-native.

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Coniferous Trees and Shrubs Are Dominant on a Private Property in Smithtown, NY

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Keyward: Suffolk County, Smithtown, Species, Trees, Shrubs.

Abstract:

Fifty-two different tree and shrub samples were collected at a residential property in Smithtown, Long Island. All trees were identified by their leaves and buds using a dichotomous key specifically for trees, and shrubs were identified using an identification book specifically for shrubs. There were six different species found, five were trees and one shrub. Coniferous were dominant within the data. The Leyland Cypress *(Cupressus x leylandii)* was found to be the most dominant to this collection of data (46% of species). The Apple tree *(Malus evereste)* was found to have the least amount of samples in the survey (3.8% of species).

Introduction:

The residential property surveyed in this study is located in Smithtown, NY 11787. According to Sterling (2018), the land is 2387.65 square meters in size containing various different trees and plant life. Typically the area has a comfortable year round climate, with highs in the summer reaching near 26 degrees Celsius and lows in the winter dropping to nearly -4 degrees Celsius. Smithtown gets on average 1.2 meters of rain per year, which is considerably more than the United States average of 1 meter. Recently it was found that Smithtown gets some kind of precipitation 74 days of the year (rain, snow, sleet, hail). This type of environment is consistent with the growth of deciduous trees.

Deciduous trees are found all over the world. They lose their leaves in the fall and regrow them in the spring. The term “deciduous” in the field of botany refers to “falling off at maturity.”, and common examples of deciduous trees are Oak, Maple, and Hickory trees (Yael, 2017). Conifers also known as Coniferophyta or Pinophyta are a vascular plant coming from the Pinopsida. Examples of conifers include, cypresses, junipers and pines. Most Conifers are small in size but they are dominant over the Northern Hemisphere (Yael, 2017).

Method:

In Smithtown, tree and shrub samples were collected from a residential property which were then identified using *A Manual for Identification of Trees by Their Leaves* (Watts, 1991). *Shrub Identification Book* (Symonds, 1963) was used in order to identify shrubs and confirm their species. The veins, buds, the way the leaves were proportionate or parallel helped in the process of identifying the species of the specific tree or shrub. In the dichotomous key, each step identified a specific characteristic of the tree or shrub, and after matching it with the sample it would lead you to the next step, eventually showing the name of the definitive shrub or tree. we found whether each species was deciduous or a coniferous. Both dichotomous keys were used throughout the collection of data to help identify the trees and shrubs. Google earth was used to find the latitude and longitude of the property of where the data was collected (Latitude 40.86, Longitude 73.24). A chart was created to keep the records of the scientific names of the trees and

shrubs, the number of each tree and shrubs, the percentage on the property, and whether the specific sample was deciduous or coniferous.

Results:

The trees and shrubs in this study were procured from one residential property located in Smithtown. After the data was analyzed and examined, we found that out of the six species, five of them were trees and one was found to be a shrub. As shown in Table 1, the shrub, Leyland Cypress dominated the property with 46.2% found while all the trees combined made up the other half. The Sugar Maple had the second biggest sample at 17.3% which was followed by the Pitch Pine with 13.5%. Next came the Norway Maple with 11.5%, then Eastern Red Cedar at 7.7%. The Apple tree came in with the least amount of samples covering 3.8% of the whole data as shown in Table 1. Coniferous trees were found to be 67.4% of the trees on the property, making them the dominant species on the property.

Table 1: Tree Samples found in Smithtown. Latitude 40.86, Longitude 73.24.

Specimen Type	Tree/Shrub Name	Botanical Name	Quantity	Sample Percentage
Conifer	Pitch Pine	*Pinus rigida*	7	13.5%
Conifer	Leyland Cypress	*Cupressus X leylandii*	24	46.2%
Deciduous	Apple Tree	*Malus evereste*	2	3.8%
Deciduous	Norway Maple	*Acer platanoides*	6	11.5%
Conifer	Eastern Red Cedar	*Juniperus virginiana*	4	7.7%
Deciduous	Sugar Maple	*Acer saccharum*	9	17.3%

Discussion:

In our survey, the coniferous trees and shrubs were found to be more dominant in Smithtown, located in Suffolk County. Another study by Castro and Rovelo (2018) surveyed an area in Suffolk County called West Babylon, and found the opposite of our results. In the study they found that the deciduous trees dominated the conifers in their respected area located in Suffolk County while our study found that the coniferous trees and shrubs dominated. There were some similarities in both of our results which included finding the same species of trees including the Sugar Maple, Apple Tree, Eastern Red Cedar and the Pitch Pine. All these trees were found in both studies. Another difference to keep in mind is that our surveys would possibly be more alike if the survey done by Castro and Revelo also included shrubs in the area they surveyed.

Conclusion:

There were 52 samples of trees and shrubs surveyed on this property located in Smithtown. The specimen type that dominated were the conifers, making up 35 of the 52 shrubs and trees that were collected (67%), while there were only 17 total deciduous trees found (32%). The results show that the shrub, Leyland Cypress *(Cupressus x leylandii)* dominated the property. This one shrub species was almost half of the properties tree and shrub life (46.2%). The Sugar Maple followed (17.3%), which was followed by the Pitch Pine (13.5%), then Norway Maple (11.5%), Then Eastern Red Cedar (7.7%), and lastly the Apple tree (3.8%).

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Deciduous Trees and Shrubs Are Dominant Over Evergreens in Long Island

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Keywords: Deciduous, Evergreen, Long Island

Abstract: 130 trees, shrubs, and plants were surveyed in this study. 25 trees, 12 shrubs, and 2 plants were from Mastic, 10 trees, and 5 shrubs were from Brentwood and 38 trees, 28 shrubs, and 10 plants were from Shirley. The trees, shrubs, and plants were identified using a dichotomous key, the Missouri Botanical Garden website, and various other websites and references. We discovered that deciduous trees, shrubs, and plants were dominant over the evergreens, with specific towns being dominated by either deciduous or evergreen.

Introduction: Taxonomy is known to be the science of classification, but can be considered more strictly as the classification of living and extinct organisms (Cain 2018). Evergreens are defined as having foliage that eminently stays green and strong through growing seasons whereas the deciduous ones lose all their leaves seasonally (Higgins 2019). Many tropical species of broad-leaved flowering plants are evergreen, but in cold-temperate and Arctic areas the evergreens commonly are cone-bearing shrubs or trees (conifers), such as pines and firs (Britannica 2017). Some deciduous types are trees, shrubs, and herbs, especially the broadleaf trees such as Oak, Maple, Beech, Hickory and Chestnut which are very common. The height above sea level in both town one (Mastic) and town three (Shirley) was 16.56m while town two's (Brentwood) height above sea level was 33.75m. Each town is located in the USDA Plant Hardiness Zone of 7a (-17.8 to -15) (Wilson 2013) (Table 1). We found the soils pH levels which showed that town one's pH levels were strongly acidic (pH 6.0 to 6.5), town's two pH levels were a little less acidic but nonetheless still high (4.6-5.1), and town's three pH levels were also strongly acidic (6.2-6.7) (Wilson 2013) (Table 1). Our hypothesis was that deciduous trees, shrubs, and plants were dominant over the evergreen in each location.

Method: We found trees, shrubs, and plants were collected from three residential properties in three different locations. These three properties were located in the towns of Mastic, Brentwood, and Shirley. We used the dichotomous keys (Watts 1991) (Watts 2004) and the website to (Missouri Botanical Garden 2019) to identify them. By examining the branches and leaves, we were able to determine whether they were deciduous or evergreen using dichotomous keys. We also classified them in different categories according to their type, common name, and botanical name within each of the three towns and locations.

Results: When looking closely at the data collected from the three locations, it is evident that the most dominant were the deciduous trees totalling up to 47 out of 73 trees (Table 5). For the shrubs, the most dominant type was also deciduous since out of the 45 shrubs, 34 were deciduous (Table 5). However, out of the 12 plants--only 5 of them were deciduous while 7 of them were evergreen (Table 5). Overall, the deciduous types were dominant within the data gathered from the locations.

Table 1: Location of towns, longitude and latitude, closest shore, planting zone, soil pH level, height above sea level, property size, and the total tree and shrub count.

	Town 1	Town 2	Town 3
Towns	Mastic, NY	Brentwood, NY	Shirley, NY
Longitude	0.0000	-73.2681	-73.2374
Latitude	40.8100	40.8823	40.7486
Town	Mastic	Brentwood	Shirley
Closest Shore	South shore	Central	South Shore
Planting Zone	7a (-17.8 to -15)	7a (-17.8 to -15)	7a (-17.8 to -15)
Soil pH Levels	6.0-6.5	4.6-5.1	6.2-6.7
Height Above Sea Level	16.56 m	33.75 m	16.56 m
Lot Size	1861.55 m2	728.45 m2	3439.82 m2
Tree Count	25	10	38
Shrub Count	12	5	28
Plant Count	2	0	10

Table 2: Town One's trees, shrubs, or plant, type (deciduous or evergreen), common name, botanical name, quantity, and the range between circumferences.

Specimen Type	Name	Botanical Name	Quantity	Tree, Shrub, or Plant
Evergreen	Southern Magnolia	*Magnolia grandiflora*	2	Tree
Deciduous	Eastern Redbud	*Cercis canadensis*	2	Tree
Deciduous	Domestic Apple	*Malus (Pyrus) sylvestris*	1	Tree
Evergreen	Northern White-Cedar	*Thuja occidentalis*	2	Tree
Evergreen	Western Red-Cedar	*Thuja plicata*	3	Tree
Deciduous	Shumard Oak	*Quercus shumardii*	1	Tree
Deciduous	Red Maple	*Acer rubrum*	3	Tree
Deciduous	Crapemyrtle	*Lagerstroemia indica*	1	Tree
Evergreen	Western Juniper Sierra Juniper	*Juniperus occidentalis*	1	Tree
Evergreen	Sea Hibiscus	*Hibiscus tiliaceus*	6	Shrub

Deciduous	Common Lilac	*Syringa vulgaris*	6	Shrub
Evergreen	White Mangrove	*Laguncularia racemosa*	1	Tree
Evergreen	Weeping Spruce	*Picea sitchensis*	1	Tree
Deciduous	Black Maple	*Acer nigrum*	1	Tree
Deciduous	Mountain Maple	*Acer spicatum*	3	Tree
Evergreen	Chinese Privet	*Ligustrum sinense*	2	Tree
Deciduous	Boston Ivy	*Parthenocissus tricuspidata*	2	Plant
Deciduous	Miranda Climbing Hydrangea	*Hydrangea petiolaris*	1	Tree

Table 3: Town Two's trees and shrubs, type (deciduous or evergreen), common name, botanical name, and the range between circumferences

Specimen Type	Name	Botanical Name	Quantity	Tree, Shrub, or Plant
Deciduous	October Glory Maple	*Acer rubrum*	3	Tree
Deciduous	Laceleaf Japanese Maple	*Acer palmatum dissectum*	3	Tree

Deciduous	Bing Sweet Cherry	*Prunus avium 'bing'*	1	Tree
Deciduous	Double Red Althea	*Hibiscus syriacus 'double red'*	3	Shrub
Deciduous	Black Diamond Crimson Red	*Lagerstroemia hybrid 'ebony fire'*	1	Tree
Deciduous	Dwarf Korean Lilac	*Syringa meyeri 'palibin'*	2	Shrub
Deciduous	Mcintosh Apple	*Malus domestica 'mcIntosh'*	2	Tree

Table 4: Town Three's trees and shrubs, type (deciduous or evergreen), common name, botanical name, quantity, and the range between circumferences.

Specimen Type	Name	Botanical Name	Quantity	Tree, Shrub, or Plant
Evergreen	Dwarf Alberta Spruce	*Picea glauca 'conica'*	5	Shrub
Evergreen	Leyland Cypress	*Cupressocyparis leylandii*	5	Tree
Evergreen	Winter Gem Boxwood	*Buxus sinica var. insularis*	7	Shrub
Evergreen	Vicary Golden Privet	*Ligustrum x vicaryi*	7	Shrub

Deciduous	Autumn Blaze Maple	*Acer freemanii 'jeffersred'*	6	Tree
Evergreen	Painted Lady Hibiscus	*Hibiscus rosa-sinensis*	5	Plant
Evergreen	Geranium	*Pelargonium x hortorum*	2	Plant
Deciduous	Cleveland Select Flowering Pear	*Pyrus calleryana 'cleveland select'*	5	Tree
Deciduous	Weeping Yoshino Cherry	*Prunus x yedoensis 'shidare yoshino'*	7	Tree
Deciduous	Pink Flowering Dogwood	*Cornus florida var. rubra*	6	Tree
Evergreen	Green Tower Boxwood	*Buxus sempervirens 'monrue'*	2	Shrub
Deciduous	Flutterby Petite Blue Heaven Nectar Bush	*Buddleja x 'podaras*	3	Plant
Deciduous	Muskogee Crape Myrtle	*Lagerstroemia 'muskogee'*	5	Shrub

Deciduous	Autumn Fullmoon Japanese Maple	*Acer shirasawanum 'autumn moon'*	6	Tree
Evergreen	Crapemyrtle	*Lagerstroemia indica 'plum magic'*	2	Shrub

Table 5: The total amount of Deciduous and Evergreen trees and shrubs that were found on the three properties.

Specimen Type	Trees	Shrubs	Plant	Total
Deciduous	47	34	5	86
Evergreen	26	11	7	44
Overall Total	73	45	12	130

Discussion: When looking at the overall results and everything that was collected, it is quite evident that deciduous trees were dominant over evergreens. As also found by another study by Chiuchiolo et al. (2018), deciduous came out to be significantly dominant to coniferous evergreen types in Long Island. Two other studies also found that deciduous were dominant. (Biscaro 2018, Castro 2018)

Conclusions: We can determine that out of 130 trees, shrubs, and plants that were collected, 86 of them were deciduous and 44 of them were evergreen signifying that deciduous is the dominant type within all of three locations.

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Distribution of Hard-Shelled Ticks *Ixodidae* Located on Makamah Nature Preserve and the Aztakea Woods Nature Preserve, Northport, NY

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Key Words: Long Island, Northport, Lyme disease, ticks, arachnids, *Ixodidae*

Abstract

Forty-two hard-shell tick (*Ixodidae)* samples were found from three separate species in the Makamah Nature Preserve and Aztakea Woods located in Northport, New York on the northern shore of Long Island. The ticks were identified between the hours of 19:30 and 23:30 and included the lone star tick *(Amblyomma americanum)*, American dog tick *(Dermacentor variabilis)*, and the blacklegged deer tick *(Ixodes scapularis)*. All species were identified using a dichotomous key. The identified *Ixodidae* displayed a high concentration of disease vectors in the area, as well as a tendency towards nocturnality.

Introduction

Recently, there has been a heightened interest in *Ixodidae* found on Long Island. This may correlate to the expansion of Lyme disease found in these ticks, which pose an increased risk of transmitting the disease to people living in the Northeastern United States (Division of Vector-Borne Diseases 2019). There is a lack of proper *Ixodidae* distribution research in Northport, New York. Deer ticks, including *Ixodes scapularis*, are the most common vectors for Lyme disease (Division of Vector-Borne Diseases 2019). According to Eisen, *I. scapularis* is also the primary vector to humans in the eastern United States of the deer tick virus lineage of *Powassan viru*s (*Powassan virus* disease); the protozoan parasite *Babesia microti* (babesiosis); and multiple bacterial disease agents including *Anaplasma phagocytophilum* (anaplasmosis), *Borrelia burgdorferi* and *Borrelia mayonii* (Lyme disease), *Borrelia miyamotoi* (relapsing fever-like illness, named *Borrelia miyamotoi* disease*)*, and *Ehrlichia muris eauclairensis* (a minor causative agent of *ehrlichiosis*). With the notable exception of *Powassan virus*, which can be transmitted within minutes after attachment by an infected tick, there is no doubt that the risk of transmission of other *I. scapularis*-borne pathogens, including Lyme disease spirochete, increases with the length of time (number of days) infected ticks are allowed to remain attached. Crispell also mentions that development of specific IgE antibodies to the oligosaccharide galactose-α-1, 3-galactose (α-gal) following tick bites has been shown to be the source of a red meat allergy in humans. In the study, the presence of α-gal was tested in four tick species: the lone-star tick *Amblyomma americanum*, the Gulf-Coast tick *Amblyomma maculatum,* the American dog tick *Dermacentor variabilis*, and the blacklegged tick *Ixodes scapularis* using a combination of immunoproteomics approach and carbohydrate analysis. Anti-α-gal antibodies identified α-gal in the salivary glands of both *Am. americanum* and *Ix. scapularis*, while *Am. maculatum* and *De. variabilis* appeared to lack the carbohydrate. These findings show that both *Am. americanum* and *Ix. scapularis* can cause red meat allergies in humans.

Methods

This study was conducted using a tick dragging method. A sheet of white cloth was dragged across the ground and over low-lying vegetation. This presents a large potential host for questing ticks to grab onto which allows scientists to collect and identify them. The white cloth was 1.8288 meters by 2.4384 meters and was held by two students from the top of the cloth, 2.4384 meters (including arm lengths), and dragged across the ground for 6.096 meters. Tick drags were conducted during various times of day, with the only successful drags occurring after sundown. After obtaining several samples from both the Makamah and Aztakea Woods Nature Preserves in Northport, and finding none at Suffolk Community College Grant Campus in Brentwood, the species were identified using a dichotomous key.

Results

The drag of Makamah Nature Preserve produced two lone star ticks *Amblyomma americanum* and six black-legged deer ticks *Ixodes scapularis.* Meanwhile, the two Aztakea Woods drags produced three *Am. americanum*, eighteen American dog ticks *Dermacentor variabilis*, and thirteen *Ix. scapularis*. The students conducted three dragging expeditions that produced no samples. The daylight dragging expeditions of the Suffolk County Community College Grant Campus and of the Aztakea Woods produced no samples. These two tick drag expeditions were the only ones attempted during daylight hours. There was also an expedition in Makamah Nature Preserve during heavy rain which produced no samples. With a total of nineteen *Ixodes scapularis*, 45% of samples that were found were potential vectors for Lyme disease.

Table 1: Azakea Woods

Age/Sex	Species	Number
Adult Male	*Amblyomma americanum*	1
Adult Female	*Amblyomma americanum*	2
Adult Male	*Dermacentor variabilis*	2
Adult Female	*Dermacentor variabilis*	6
Nymph	*Dermacentor variabilis*	9
Larva	*Dermacentor variabilis*	1
Adult Male	*Ixodes scapularis*	6
Adult Female	*Ixodes scapularis*	4
Larva	*Ixodes scapularis*	3

Table 2: Makamah Nature Preserve

Age/Sex	Species	Number
Adult Male	*Amblyomma americanum*	2
Nymph	*Ixodes scapularis*	6

Discussion

Ixodidae are perceived as dangerous and for good reason. They carry multiple diseases that are undoubtedly harmful to humanity. The prevalence of ticks found on Long Island within the wooded areas surveyed is reason enough to be concerned for our health as a whole. This is

important because New York State has a high incidence of Lyme disease infections, with 5155 confirmed and probable cases in 2017 alone (Division of Vector-Borne Diseases 2019). New York State has also been known to underreport their findings, meaning the total number of infections may be much higher (White, J. et al., 2016). With regards to these findings, those in the wooded areas of Long Island should seek measures to protect themselves against ticks.

Conclusion

This study produced 42 tick samples from three successful and three unsuccessful tick dragging expeditions. In total, during the Makamah Nature Preserve expeditions we found two lone star ticks *Amblyomma americanum* and six black-legged deer ticks *Ixodes scapularis.* The Aztakea Woods expeditions produced three *A. americanum*, eighteen American dog ticks *Dermacentor variabilis*, and thirteen *Ix. scapularis*. While ticks are difficult to find earlier in the day and while it is raining, the high incidence of tick-borne diseases in New York State, as well as the high ratio of disease vectors, makes evident that these arachnids are an issue. Proper care and prevention methods should be exercised in Northport and the surrounding areas for disease prevention, and at-risk individuals should check for ticks immediately after exposure to tick-prone areas in order to lower the risk of contracting a tick-borne illness.

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