The historical and extant vascular flora of Pelham Bay Park, Bronx County, New York 1947–1998

Robert DeCandido

Department of Biology, The City College of the City University of New York, New York, NY 10031

Eric E. Lamont

Honorary Research Associate, Institute of Systematic Botany, The New York Botanical Garden, Bronx, NY 10458

Received for publication March 1, 2002, and in revised form February 11, 2004.

Pelham Bay Park (PBPK), Bronx County, New York is located along the southwestern shore of the Long Island Sound (40° 52' 30" N, 73° 47' 30" W), north of Manhattan and south of New Rochelle, Westchester County. At 1119.4 hectares, it is the second largest park in New York City, and the largest under the jurisdiction of the New York City Department of Parks and Recreation. The park was established in 1884 through the efforts of the New Parks Movement (Schnitz and Loeb 1984). Since the 1930’s, numerous development projects have transformed much of the park (see Monachino 1958, Kaltman 1968). Fortunately, there still remain several natural areas representing a diversity of habitats of the region.

PBPK is mostly isolated from the surrounding communities by several large water bodies and roadways, including the Long Island Sound, Hutchinson River, and the New England Thruway (Figure 1). The park is heavily used by the public from June through August, but, except for areas immediately adjacent to the water, the natural areas are not as frequently visited. The only previous extensive plant survey of PBPK was conducted in 1946–47 by Harry E. Ahles. (For a brief biography of H. E. Ahles, see Tippo 1982.) In his two-year field study of PBPK, Ahles collected 1531 specimens, eventually donating these to the New York State Museum, but his research in PBPK has only been analyzed recently (DeCandido 2001). Ahles never published any papers based on collections he made at PBPK, and published only one paper that incorporated specimens from the Bronx (see Ahles 1951).

Landform in PBPK was largely determined by several glacial flows during the Pleistocene Period. Evidence for these glaciers in the park is in the form of roche moutonées, rock erratics, striae and groove markings. The underlying ge-

1 Funding for this research came from the City of New York Department of Parks and Recreation and the Bobolink Foundation.

2 This paper is dedicated to the late Jess Hanks of the City College of New York (CUNY), since he encouraged everyone to take an active interest in the local flora. Howard Becker of the Bronx accompanied the senior author on plant collecting forays from 1994–1998. We thank him for his indefatigable effort and friendship. We also want to thank Andrew M. Greller, Professor Emeritus of Botany, Queens College (CUNY) for his encouragement and thoughtful suggestions.

3 Present Address: International Bird Research Center, Eilat, Israel; E-mail: rdcny@earthlink.net
ology of PBPK is primarily metamorphic in origin and includes felsic gneisses, sillimanite schists and amphibolites, with extensive veins of quartz (Schubert 1968, Leveson and Seyfert 1969). These rocks are classified as part of the Hutchinson River Group that is correlative with the Hartland Formation of western Connecticut and southeastern New York (Merguerian and Sanders 1993).

Pre-historical evidence of Native American land use exists in the form of recovered Indian artifacts as well as oyster and clam middens, remnants of which can still be found today (Bolton 1922, Kaeser 1970). Recovered Zea mays pollen indicates that Native Americans were utilizing PBPK at least by 1175 A.D., ± 100 years (Loeb 1998a). From 1888–1934, much of the park remained an open canopy woodland and grassland, since trees were selectively removed by the City of New York Department of Parks.
and Recreation from Hunter Island and other areas of PBPK (Loeb 1998b). Other more grand-scale projects, such as those undertaken by the WPA in the 1930s, changed water flow patterns through the salt marshes and even some of the woodlands of PBPK. From 1934–1948, the New York City Department of Parks under the direction of Robert Moses made significant changes to the park by filling in the original Pelham Bay for use as a parking lot, creating Orchard Beach (Caro 1974). Beginning in 1964, approximately 105 acres in the southern portion of the park were taken over by the Department of Sanitation and converted to a landfill (Kaltman 1968). This site was eventually closed in the 1970s, but not before it had become the highest point in the eastern Bronx (Pons 1987). During the last fifty years, one major roadway (the New England Thruway) has been built through PBPK, while another (the Hutchinson River Parkway) has been expanded. Today, the more serious forms of disturbance continue to be anthropogenic in nature, including intentionally set fires, abandonment of stolen cars, off-trail dirt biking and jet-skiing in the water bodies adjacent to the park. In the late 1990s, it was estimated that 28% of the PBPK was mixed deciduous woods, 24% marine, 7% salt marsh, 6% salt flats, 3% meadows and 2% shrub or scrub land (Wells 1998). The remaining 33% of the park has been classified as developed, including golf courses, parking lots, buildings, a New York City Police Department Pistol Range and the man-made Orchard Beach (Wells 1998).

Since no comprehensive flora of PBPK had ever been published, and no systematic plant collections made in fifty years, the authors initiated the present study. Our objectives were to study the plants that H.E. Ahles collected in 1946–1947 and incorporate them into the present research; collect and identify extant plant species of Pelham Bay Park; determine the relative status of each species collected in 1994–1998 (rare, uncommon, common); and describe several of the more distinctive habitats in the park. By compiling these data, we hope to make it possible for future researchers to assess long-term changes in plant species diversity in PBPK and facilitate comparisons with other parks in the region.

Methods. Pelham Bay Park was sampled a minimum of two times per week, from April through August, and at least once per week in February and March, as well as September and October, from 1994 to 1998 (inclusive) for a total of at least 200 field days over five years by the senior author. The park was walked for about five hours each visit, in such a way that all areas of the park were sampled at least every other week. Voucher specimens of each taxon with collection notes were deposited at the New York State Museum in Albany in 1999. These voucher specimens have since been transferred to the Brooklyn Botanic Garden.

The plant specimens of PBPK that H.E. Ahles collected in 1946–1947, and now held at the New York State Museum at Albany, were examined along with his field notes for those two years (Ahles 1947, 1948). Ahles spent a total of 33 days of the 1946 field season making his collections (from 10 March to 6 October) in PBPK. During 1947, Ahles did not record the specific date a species was collected, so it is not known how many total days he spent in the field that year. If the nomenclature by which a species was known and listed by Ahles in 1946–1947 has changed, the authors made the appropriate updates to those adopted by Mitchell and Tucker (1997) and Mitchell (2000). In one instance a paper by Lamont (1994) was consulted for information regarding a species collected by Ahles in 1946.

The species checklist of PBPK (Appendix A) presents an inventory of the vascular plants found in PBPK by H. E. Ahles in 1946–47 or for at least one season in the years from 1994–1998 with one exception (see DeCandito 1991). Appendix A includes native species, naturalized alien (non-native) species, species that have escaped from cultivation and have become established in the park, and species planted by the New York City Department of Parks and Recreation. Alien species are those not native to the northeastern United States. These are designated by a leading asterisk (*). All planted or escaped species (those not reproducing to any significant degree) are enclosed by brackets [ ]. Vascular plants are preceded by a plus (+) sign if they were only collected as part of the 1994–98 survey, and not by Ahles in 1946–47. Vascular plants collected only by Ahles in 1946–47, but not collected or observed by the authors in 1994–1998 are listed in Appendix A by a leading minus (−) sign. These species are considered to be extirpated from the park. Vascular plants collected both by Ahles and during 1994–1998 have no special leading designation unless they are not native to the area.

Identification of specimens was made using
Gleason and Cronquist (1991). Nomenclature followed Mitchell and Tucker (1997) the minor revisions in Mitchell (2000). For the data analysis, subspecies and varieties were treated as full species. Clemants (1990), the New York Flora Association (1990) and Clemants (1999) were the primary references used to verify the historical occurrence(s) of particular species in the Bronx and New York City.

In Appendix A, following the scientific name of all native and non-native species is the current status in PBPK as follows. Rare: if an herbaceous species then it must only have been present at three different sites or fewer, with no more than 25 individuals present at any one site; or, present at one site with no more than 50 total plants. If a tree or shrub, it must only have been present at six or fewer locations, with no site having more than five individuals; or present at one site with no more than 10 individuals found at that location. Uncommon: if an herbaceous species then it must have been present at four to six sites with no more than 50 individuals at any one of those sites; or present at one locality only, with no more than 100 individuals found at that site. If a tree or shrub, the species must have been present at 7 to 10 sites with no stand greater than five individuals; or, present at one site only with 15 or fewer individuals. A species was listed as extirpated if it was found during one or more field seasons, but not seen subsequently, despite several attempts at relocating plants at the site or in other likely areas of PBPK. Species that were abundant or common are not designated with any symbol on this list. Species that are indicated as planted have not been evaluated regarding their status in the park.

**Results.** Appendix A, the vascular flora of PBPK, lists 123 families, 471 genera and 956 species with the H.E. Ahles flora of 1947–1948 combined with the 1994–1998 flora. Of these, 583 (61.0%) were native, 321 (33.6%) were non-native and 52 (5.4%) were planted and not spreading to any degree (Table 1). One species, *Hibiscus laevis*, originally collected in 1991 (DeCandido 1991) and since extirpated, was new to New York State (Mitchell and Tucker 1997, Mitchell 2000). In addition, PBPK is one of only two sites in New York State for *Lactuca floridana*. New records for the park (as compared to the 1946–1947 unpublished list compiled by Ahles) number 284 species. These included 102 native species that Ahles probably overlooked, 135 non-native species, and 47 species that have been planted and are not reproducing in the park. By comparison, 142 native and 25 non-native species were collected by Ahles and not found during the course of this study. Most likely, these 167 species have been extirpated from PBPK in the last 50 years (DeCandido 2004). A comparison of numbers of species from PBPK collected by Ahles (1946–1947) and the current authors during 1994–1998 is presented in Table 1. According to Table 2, collections made in Bronx County since the late

<table>
<thead>
<tr>
<th>Number of Species</th>
<th>Locale</th>
<th>Families</th>
<th>Native</th>
<th>Non-Native</th>
<th>Planted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBPK 1946–1947</td>
<td>108</td>
<td>483 (71.8%)</td>
<td>187 (27.8%)</td>
<td>3 (0.4%)</td>
<td>672</td>
<td></td>
</tr>
<tr>
<td>PBPK 1994–1998</td>
<td>117</td>
<td>442 (55.8%)</td>
<td>300 (37.9%)</td>
<td>50 (6.3%)</td>
<td>792</td>
<td></td>
</tr>
<tr>
<td>Bronx County</td>
<td>146</td>
<td>988 (65.3%)</td>
<td>417 (27.7%)</td>
<td>106 (7.0%)</td>
<td>1511</td>
<td></td>
</tr>
<tr>
<td>New York City</td>
<td>161</td>
<td>1357 (62.3%)</td>
<td>610 (28.0%)</td>
<td>210 (9.6%)</td>
<td>2177</td>
<td></td>
</tr>
</tbody>
</table>
19th century and kept at the State Museum at Albany (NYFA 1990) show that there have been at least 146 families of plants present in the boro, with 1511 total species. Of this species total, 988 are native (65.3%), 417 non-native (27.7%) and 106 were planted (7.0%). For all of New York City (see DeCandido et al. 2004), 2177 species in 161 families have been found. Of these, 1357 have been native species (62.3%), 610 have been non-native species (28.0%), and 210 species were planted (9.6%).

When the Ahles’ flora and the present flora are combined, the families with the greatest species richness at PBPK are the Asteraceae (120 species) and the Poaceae (106 species), and the largest genera are Carex (35 spp.), Aster (18) Polygonum (18) and Panicum (15). The families in the flora (collections from 1994–98) with the greatest species richness are the Asteraceae with 45 genera and 101 species, and the Poaceae, with 48 genera and 88 species. Together, they comprise 21.8% of all genera and 23.9% of all species collected from 1994–98. Other large families are the Fabaceae (21 gen., 35 spp.), Rosaceae (15 gen., 32 spp.), Brassicaceae (18 gen., 29 spp.), Cyperaceae (5 gen., 29 spp.), Liliaceae (18 gen., 23 spp.) and the Caryophyllaceae (11 gen., 20 spp.). The largest genera are: Carex, Polygonum (each with 16 spp.), Aster (15 spp.), Quercus (10 spp.), Eupatorium, Solidago (each with 8 spp.), and Acer, Panicum (each with 7 spp.). When extant flora was analyzed by habitat, (see Reschke 1990), 30 species were found primarily in the maritime plant community that was periodically inundated with brackish or marine water. By comparison, 255 species occurred mostly in the woodland community including gaps within the forest; 288 species usually occurred in the grassland/meadow community; 139 species occurred in sites that have been disturbed in the recent past, such as roadsides, parking lots and areas adjacent to buildings and other structures. A further 30 species were primarily confined to freshwater riparian areas distributed throughout the park.

During the course of the 1994–1998 survey, 53 of the 326 (16.3 %) native herbaceous species (exclusive of planted species) were judged to be rare at PBPK, while 27 native herbaceous species (8.3%) were considered uncommon. For the woody species, 15 of the 116 native species (12.9%) were classified as rare, while 5 (4.8%) were considered uncommon. In all, of the 742 extant native and non-native species of PBPK, 142 (19.1%) have been judged to be rare or uncommon in the park. Another 21 species (5 native; 16 non-native) became extirpated during five years of field work in PBPK. Overall, 26 native species (5.9% of the native flora) of PBPK collected in 1994–98 are considered endangered, threatened or rare in New York State (Mitchell 2000, Young and Weldy 2003). These include 22 herbaceous and four woody species.

As compared to a recent list of the 26 most serious invasive plants in the state (New York State Ad Hoc Invasive Plant Group 2001), PBPK currently has 17 of the species on the list. At least 16 of these have established themselves widely in natural areas of the park, or have formed monodominant stands in disturbed areas. These are: Acer platanoides, Alliaria petiolata, Ampelopsis brevipedunculata, Berberis thunbergii, Celastrus orbiculata, Centaurea maculosa, Cynanchum louiseae, Elaeagnus umbellata, Lonicera japonica, Lonicera morrowii, Lonicera x bella, Lythrum salicaria, Phragmites australis, Rhamnus cathartica, Rhamnus frangula, Robinia pseudoacacia, and Rosa multiflora. In addition, three other species not on the state list: Populus alba, Viburnum dilatatum and Viburnum sieboldii (for the last of these, see Kunster 1993), had also established themselves in some of the natural areas of PBPK. These 19 species posed the greatest threat to natural communities in PBPK.

Discussion. The vascular flora of PBPK is composed of 956 species in 471 genera and 123 families. Compared to an unpublished flora of PBPK by H.E. Ahles in 1946–47, there were more total species, genera and families collected in 1994–98. However, there were fewer native species collected during 1994–98 than in the Ahles’ study (Table 1). In the intervening years, the proportion of native plant species declined from 71.8% in 1946–47 to 55.8% in this study. As the absolute and proportional number of native species declined, the number of non-native species increased from the 187 collected by Ahles, to 300 collected in 1994–98 (Table 1). Overall, according to Table 2, 44.6% of all the native plant species ever collected in Bronx County were collected in 1994–1998 in PBPK. Also, 72.1% of all non-native species ever collected in Bronx County were present in PBPK in 1994–1998. Similarly, almost half (49.1%) of all the non-native species ever collected in New York City were collected in PBPK as part of this study.

The vegetation of Pelham Bay Park from
1994–1998 can be classified into five general plant communities based upon descriptions developed by Reschke (1990): Maritime including intertidal marine, gravelly shores, beach and salt marsh; forest including lowland and upland woods; freshwater riparian areas; meadows/grasslands; and wasteland/disturbed sites. Each of these habitats (except for wasteland/disturbed) contains more non-native than native species compared with the same habitat in 1946–1947 (DeCandido 2004). Four of these habitats are discussed below. By far, most of the species in this study came from two communities: upland forest and grasslands/meadows.

**Maritime Plant Community.** Salt marshes flourish where the Long Island Sound and the Hutchinson River estuary border PBPK. The vegetation of the low salt marsh consists primarily of Spartina alterniflora, while the high marsh is dominated by Spartina patens, Distichlis spicata and Juncus gerardii. In this marine plant community, four herbaceous species that are disappearing from many other salt marshes in southern New York State can be found: Aster subulatus, Aster tenuifolius, Limonium carolinianum and Suaeda linearis. Salt pannes are interspersed throughout the salt marsh. In these poorly drained areas, especially in the high marsh, species such as Salicornia europaea, S. perennis, Pluchea odorata, Spargularia salina, and S. rubra can be found. Although gravelly shores are fairly common at PBPK, there was no extensive beach plant community typical of the nearby north shore of Long Island as described by Lamont and Stalter (1991). Also, no primary dune system exists at PBPK, such as found in parks on the south shore of Long Island that border the Atlantic Ocean at the Fire Island National Seashore (see Stalter et al. 1986).

Moving landward from the high salt marsh, one encountered a transition zone before the upland forest begins. This area is largely dominated by stands of Tripssacum dactyloides. Here also can be found Hibiscus moscheutos, Phragmites australis, Polygonum ramosissimum and Teucrium canadense. In other places, especially where the terrain is slightly elevated or the bedrock was exposed, a salt shrub and grass community is found. Species of this drier zone include Baccharis halimifolia, Iva frutescens ssp. oraria and Myrica pennsylvanica. Typical herbaceous species include Panicum virgatum, Euthamia graminifolia, Solidago sempervirens and rarely, Spartina pectinata. In more rocky and slightly elevated areas, species that can be found are Amelanchier stolonifera, Aronia x prunifolia, Lechea mucronata, Parthenocissus quinquefolia, Quercus stellata, and Silene caroliniana var. pensylvanica.

**Woodland Plant Community.** The upland forest community occurs on well-drained acidic soils beginning approximately three meters above sea level. The amount of land classified as forest in one section of the park (Hunter Island) has increased by more than 2.5 times from 1888–1984 (Loeb 1998a). The upland woodland community in PBPK most closely resembles an Appalachian oak-hickory forest of the northeastern United States also described from other parks in New York City (Lefkowitz and Greller 1973, Loeb 1986). Most trees in the canopy are between 15 and 25 meters high though certain individuals (such as specimens of Liriodendron tulipifera) are estimated to be up to 45 meters in height. The dominant trees in the two largest patches of mature forest in PBPK (Hunter Island and the Central Woodlands) are Quercus alba, Q. rubra and Q. velutina. Mixed with the oaks but less frequently encountered are Betula lenta, Carya glabra, C. tomentosa and Fraxinus americana. Occasional stems of Castanea dentata still emerge from stumps of dead trees. In the sub-canopy, species such as Cornus florida and Sassafras albidsbium predominate, while Amelanchier arborea and Hammamelis virginiana occur to a lesser extent. Common low shrubs include Cornus sericea, Gaylussacia baccata, Rubus allegheniensis, Vaccinium pallidum, and Viburnum acerifolium. The ground layer herbaceous flora is diverse and includes such species as Alliaria petiolata, Aster divaricatus, Circaea lutetiana ssp. canadensis, Geranium maculatum, Helianthus divaricatus, Maianthemum canadensis, Monotropa uniflora, Pedicularis canadensis, Solidago bicolore, S. caesia and S. canadensis var. scabra.

In richer and moister soils of the forest, species such as Betula allegheniensis, Carpinus caroliniana ssp. virginiana, Cornus alternifolia, Liquidamber styraciflua, Platanus occidentalis, Quercus bicolor, and Ostrya virginiana were collected. Beneath this canopy layer, certain shrub species are more abundant, such as Corylus americana, Ilex verticillata and Lindera benzoin. Herbaceous species include Agrimonia gryposepala, Arisaema triphyllum, Cardamine coccatenata, Impatiens capensis, Osmunda cin-
Smilacina, Phyrra leptostachya, Piptochaetium avenaceum, and Thalictrum pubescens.

A unique aspect of the upland forest for New York City Parks is that at PBPK this community extends out in hillocks into the salt marsh in some areas. These hillocks can also occasionally be found as lone islands surrounded by the salt marsh. Typical understory species in this habitat include: Andropogon gerardii, Aralia nudicaulis, Aster macrophyllus, Aster patens, Aureolaria flava, Chima phila maculata, Gaylussacia baccata, Helianthus divaricatus, Lespedeza hirta, L. virginica, Lysimachia quadrifolia, Pteridium aquilinum var. latiusculum, Smilax glauca, Smilacina racemosa, Sorghastrum nutans and Tripsacum dactyloides.

Many herbaceous species that are rare and uncommon within PBPK are confined to forest edges and isolated small gaps within the forest. In the latter case, the canopy gaps are often produced and maintained because of elevated, rocky areas of the forest floor overlain with thin soils. In addition, gaps are formed at PBPK when freshwater collected to form small pools within the forest, above which few trees have grown. Since these areas have been too difficult to maintain by mowing or artificial plantings, isolated havens exist for several species otherwise rare or uncommon in the park. These taxa include: Agastache nepetoides, Ceanothus americana, Desmodium canadense, Dicentra cucullaria, Diervilla lonicera, Eupatorium sessilifolium, Mimulus alatus, Mitchella repens, Paronychia canadensis, Poly podium virginianum, Pyrola americana and Viola pubescens.

Grassland/Meadow Plant Community. From 1885–1984, land classified as meadow declined by 85%, from 69.7 hectares to 10.5 hectares (Sisinni and Anderson 1993). Compared to habitat descriptions provided by Ahles (Ahles 1947, 1948), there were many more grasslands, meadows and fields in 1946–47 than in 1994–1998 (DeCandido 2001, DeCandido 2004). In the last fifty years, many open areas have become dominated by shrubs and young trees. The only “natural” meadow (the topsoil was removed for fill in the 1930s) with a high diversity of native herbaceous species in PBPK is composed primarily of Tripsacum dactyloides. Other important species of this meadow are Lythrum salicaria, Pycnanthemum tenuifolium, P. virginianum, Solidago species, Viburnum dentatum var. lucidum and V. dentatum var. venosum. Elsewhere, fields and shrub lands were often dominated by non-native species such as Amelopsis brevipedunculata, Artemisia vulgaris, Bromus spp., Centarea spp., Cynanchum louiseae, Linaria vulgaris, Lonicera japonica, Prunus spp., Trifolium pratense, and Vicia spp.

Wasteland/Disturbed Habitat. Plants inhabiting frequently disturbed or artificially maintained areas include species that are often non-native in origin. Such species occur primarily in and around buildings, parking lots, golf courses, highways, railways and the abandoned landfill. Typical species of these habitats include Hieracium spp., Ma cus punilus, Poa pratensis, Taraxacum officinale, Veronica spp., as well as many of the non-native species that may also invade successional old fields and shrub lands. If these disturbed sites were left alone over time, woodlands with a limited number of plant species could develop. These habitats are then frequently dominated by woody species such as Acer platanoides, Acer pseudoplatanus and Populus alba.

Rare Plants and Extirpated Species. Twenty-seven species found during 1994–98 are considered uncommon, rare, threatened or endangered in New York State (Mitchell 2000, Young and Weldy 2003). Eight of these species were at or near the northern limits of their range at PBPK. These were: Cyp erus echinatus, Diospyros virginiana, Eupatorium hyssopifolium var. laciniatum, Eupatorium serotinum, Lactuca floridana, Lechea racemulosa, Ptelea trifoliata and Viburnum dentatum var. venosum. Other New York State listed species were indicative of habitats (e.g., salt marshes) that have a limited distribution in the state, or were found in a habitat that has declined in New York City (grasslands). These were: Asclepias purpurascens, Aster subulatus, Aster tenuifolius, Cent chrus tribuloides, Cuscuta pentagona, Iris prismatia, Juncus brachycarpus, Oenothera laciniata, Oenothera parviflora var. oakesiana, Paspalum setaceum var. mahunbergii, Suaeda linearis, and Tripsacum dactyloides. Finally there were seven New York State species found in PBPK for which no discernible cause of decline could be determined. These were: Agastache nepetoides, Juglans cinerea, Mimulus alatus, Polygonum hydropiperoides var. opelousanum, Ranunculus hispidus var. niti dus, Silene caroliniana var. pensylvanica and Veronicastrum virginicum.

Appendix A also lists 17 plant species collected by H.E. Ahles in 1946–47 that have spe-
cial rarity designations in New York State, and have since become extirpated in PBPK. These are: Carex bushii, Carex buxbaumii, Carex polymorpha, Carex seorsa, Crotalaria sagittalis, Cyperus lupulinus, Eleocharis halophila, Juncus scirpoideus, Lespedeza violacea, Oxalis violacea, Panicum scabriusculum, Plantago maritima ssp. juncoides, Polygonum erectum, Prunus pumila var. depressa, Salicornia bigelovii, Solidago sempervirens var. mexicana and Spiranthes ver-nalis. With the exception of P. pumila var. depressa (a small shrub), each of these extirpated plants is an herbaceous species.

There were also two important discoveries of plant species not known from New York State, or believed to have been extirpated in the state. One of these (Hibiscus laevis) was first seen in flower in July of 1990 (DeCandido 1991). It was subsequently extirpated due to repeated mowing of the area in the summer of 1992. The second species, Lactuca floridana, was found in the same location it was originally discovered in 1954 (see Monachino 1955). This species was previously thought to have been extirpated in New York State.

During the course of this five-year study, a total of 21 plant species became extirpated (5 native; 16 non-native) from PBPK. The five native species were: Aster patens, Desmodium cuspidatum, Hibiscus laevis, Oenothera laciniata and Spiranthes cernua. Each of these five species had been reduced to a small population of less than three individuals when initially discovered. It was difficult to determine whether proximate or long-term factors were the decisive causes of particular native plant species extirpations. Overall, 100 of 442 (22.6%) native species identified in this study were considered rare or uncommon at PBPK (Appendix A). The majority of the native species at greatest risk of extirpation were herbaceous plants. Two factors seemed to be at work in the decline of herbaceous species: successional ecological forces and the loss of open habitat such as meadows/grasslands to development (DeCandido 2004).

NON-NATIVE SPECIES. Compared to the 1946–1947 study of the flora of PBPK, there were 135 more non-native species collected in the park in 1994–98. Since the earlier study, significant disturbance events have affected PBPK (see Monachino 1958, Kaltman 1968). These included the placement of a sanitary landfill in the southern region of the park, the expansion of highways in the park and other, small-scale disturbance events such as construction of buildings or even natural area restoration efforts. In the woodlands, the most pernicious of these non-native species are: Acer platanoides, Allaria petiolarata, Celastrus orbiculatus, Lonicera japonica, Lonicera morrowii, and Rhamnus frangula. The most widespread alien species in open habitats are Amelopsis brevipedunculata, Artemisia vulgaris, Lythrum salicaria, and Populus alba.

The flora of Pelham Bay Park is a rich assemblage of native and non-native species in one of the world’s largest cities. Though much of the plant species diversity found by H. E. Ahles in 1946–47 still remains, significant changes have occurred in the last half-century. Establishing a park does not insure the preservation of its native species diversity, and may not even protect its natural areas from development. As we enter a new millennium with open space at a premium in New York City, parks represent low-cost land, where developers and city officials frequently attempt to build recreational facilities, expand highways or place water treatment facilities. At Pelham Bay Park from 1990–2001, there have been proposals for placing an ice-skating rink, bicycle paths, tennis courts, and baseball fields in natural areas. In the 21st century, the future of the natural areas of PBPK depends on those people who believe that biologically significant habitats for plants, wildlife (and humans) must continue to exist in New York City. The degree to which biologists and educators create opportunities for people to appropriately enjoy the remaining natural areas will determine the level of popular support, and in turn, the future of natural areas in PBPK and New York City.

Literature Cited


New York State Ad Hoc Invasive Plant Group. 2001. Top twenty list of the most serious invasive plants in New York State. The Nature Conservancy, Troy, NY.


Appendix A

The following is a checklist of the vascular flora of Pelham Bay Park (PBPK), Bronx County, New York State. Nomenclature follows that of Mitchell and Tucker (1997) with minor revisions by Mitchell (2000). The following symbols have been used throughout the list: an asterisk (*) indicates a species non-native (alien) to northeastern United States. Brackets [ ] surrounding the scientific name indicate a species planted in the park that is not reproducing to any great degree in any natural area of PBPK. Species preceded by a plus (+) sign were collected only in 1994–1998. Species preceded by a minus (−) sign were collected only by H. E. Ahles in 1946–47. Vascular plants collected in both 1946–47 and 1994–1998 are preceded by no symbol unless the species is non-native (alien).

Immediately following the scientific name, certain plants collected in 1994–98 have been classified as rare or uncommon in Pelham Bay Park (see the Methods section for definitions of these terms). If no mention is made regarding the status of a plant, it should be considered common in the appropriate habitat. Finally, if a species is considered uncommon, rare, threatened or endangered in New York State (NYS), its rarity designation is provided (see Young and Weldy 2003 for exact definitions of these terms for New York State plants).

DIVISION: EQUISETOPHYTA
Family SELAGINETACEAE
−Selaginella apoda
−Selaginella rupestris

Family EQUISETACEAE
Equisetum arvense

DIVISION POLYPODIOPHYTA
Family OPPIGOLOSSACEAE
−Botrychium dissectum

Family OSMUNDACEAE
Osmunda cinnamomea
Osmunda claytoniana—Rare in PBPK
Osmunda regalis var. spectabilis

Family DENNSTAEDTIACEAE
−Dennstaedtia punctiloba
Pteridium aquilinum var. latiusculum

Family THELYPTERIDACEAE
+Phegopteris hexagonoptera
Thelypteris noveboracensis
Thelypteris palustris var. pubescens

Family ASPLENIACEAE
+Asplenium platyneuron—Rare in PBPK

Family DRYOPTERIDACEAE
+Athryum filix-femina var. asplenioides
−Dryopteris intermedia
Onoclea sensibilis
−Polystichum acrostichoides

Family POLYPODIACEAE
+Polypodium virginianum—Uncommon in PBPK

DIVISION: PINOPHYTA
Family GINKGOACEAE
+[Ginkgo biloba]

Family TAXACEAE
+[Taxus cuspidata]

Family PINACEAE
+[Picea abies]
+[Pinus nigra]

[Pinus resinosa]
[Pinus strobus]
*Pinus sylvestris

Family TAXODIACEAE
+[Taxodium distichum]

Family CUPRESSACEAE
+Juniperus communis var. depressa—Rare in PBPK
[Juniperus virginiana]

DIVISION: MAGNOLIOPHYTA
CLASS: MAGNOLIOPSIDA
Family MAGNOLIACEAE
Liriodendron tulipifera

Family LAURACEAE
Lindera benzoin
Sassafras albidum

Family SAURURACEAE
Saururus cernuus

Family ARISTOLOCHIACEAE
*+Aristolochia clematitis—Uncommon in PBPK
Asarum canadense—Rare in PBPK

Family RANUNCULACEAE
−Actaea pachypoda
Anemone quinquifolia
Anemone virginiana—Uncommon in PBPK
Aquilegia canadensis
[*+Aquilegia vulgaris]
Caltha palustris
Cimicifuga racemosa
*[+Clematis terniflora
+Clematis virginiana
Ranunculus arborvitae
*Ranunculus acris
*Ranunculus bulbosus
Ranunculus hispidus var. nitidus—NYS Endangered S1
Ranunculus recurvatus—Uncommon in PBPK
*Ranunculus sceleratus—Uncommon in PBPK
−Thalictrum aquilegifolium
Thalictrum dioicum
+Thalictrum pubescens
+Thalictrum revolutum—Rare in PBPK
−Thalictrum thalictroides
Family **BERBERIDACEAE**
*Berberis thunbergii*  
*Podophyllum peltatum*

Family **MENISPERMAECEAE**
*Menispernum canadense*

Family **PAPAVERACEAE**
*Chelidonium majus*  
*+Macleaya cordata—Uncommon in PBPK*  
*Sanguinaria canadensis—Uncommon in PBPK*

Family **FUMARIACEAE**
*Dicentra cucullaria*

Family **PLATANACEAE**
*Platanus occidentalis*

Family **HAMAMELIDACEAE**
*Hamamelis virginiana*  
*Liquidambar styraciflua*

Family **ULMACEAE**
*Celtis occidentalis—Uncommon in PBPK*  
*Ulmus americana*  
*+Ulmus minor*  
*Ulmus pumila*  
*Ulmus rubra*  
[Zeikova serrata]

Family **CANNABACEAE**
[+Cannabis sativa]—no specimen collected  
*Humulus japonicus*  
*Humulus lupulus*

Family **MORACEAE**
*Broussonetia papyrifera*  
*[Maclura pomifera—Uncommon in PBPK]*  
*Morus alba*  
*Morus rubra—Rare in PBPK*

Family **URTICACEAE**
*Boehmeria cylindrica*  
–Laportea canadensis  
*Pilea pumila*  
[+Urtica dioica]

Family **JUGLANDACEAE**
*Carya cordiformis*  
+Carya glabra*  
*Carya ovata*  
*Carya tomentosa*  
+Juglans cinerea—Rare in PBPK; NYS Uncommon S4  
Juglans nigra

Family **MYRICACEAE**
–*Comptonia peregrina*  
*Myrica pensylvanica*

Family **FAGACEAE**
*Castanea dentata*  
*Fagus grandifolia*  
[+Fagus sylvatica]  
*Quercus alba*  
*Quercus bicolor—Uncommon in PBPK*  
*Quercus coccinea*  
*[+Quercus macrocarpa]*  
*Quercus montana*  
*Quercus pallidiflora*  
*[+Quercus robur]*  
*Quercus rubra*  
*Quercus stellata*  
*Quercus velutina*

Family **BETULACEAE**
*Alnus glutinosa*  
+*Alnus incana ssp. rugosa—Rare in PBPK*  
*Betula alleghaniensis—Rare in PBPK*  
*Betula lenta*  
*Betula populifolia*  
*Carpinus caroliniana ssp. virginiana*  
*Corylus americana*  
*[+Corylus avellana]*  
*Ostrya virginiana—Rare in PBPK*

Family **PHYTOLACCACEAE**
*Phytolacca americana*

Family **NYCTAGINACEAE**
*Mirabilis nyctaginea*

Family **CACTACEAE**
+Opuntia humifusa—Rare in PBPK

Family **CHENOPODIACEAE**
*Atriplex patula*  
*[Atriplex prostrata]*  
*[Bassia scoparia]*  
*[Chenopodium album]*  
*[Chenopodium ambrosioides]*  
*[Chenopodium glaucum—Uncommon in PBPK]*  
*[Chenopodium simplex]*  
*[Cycloloma atriplicifolium—Rare in PBPK]*  
–Salicornia bigelovii–NYS Threatened S2-S3  
Salicornia europaea  
Salicornia perennis  
[Salsola kali*  
Suaeda calceolariformis*  
Suaeda linearis—NYS Endangered S1  
–Suaeda maritima*

Family **AMARANTHACEAE**
*Amaranthus albus—Uncommon in PBPK*  
*[Amaranthus blitum—Uncommon in PBPK]*  
*[Amaranthus cruentus]*  
*[Amaranthus hybridus]*  
*[Amaranthus retroflexus]*

Family **PORTULACACEAE**
*Claytonia virginica*  
*Portulaca oleracea*

Family **MOLLUGINACEAE**
*Mollugo verticillata*

Family **CARYOPHYLLACEAE**
*[Agrostemma githago—Rare in PBPK]*  
*[Arenaria serpyllifolia]*
**Cerastium fontanum**
**Cerastium glomeratum**
**+Cerastium semidecandrum**
**Dianthus armeria**
[+Lechnis coronaria]  
**Paronychia canadensis**—Rare in PBPK
**+Sagina procumbens**
**Saponaria officinalis**
**Scleranthus annuus**
Silene antirrhina—Uncommon in PBPK
Silene caroliniana var. pensylvanica—NYS Vulnerable S3
**Silene latifolia**
Silene stellata
**Silene vulgaris**—Rare in PBPK
**+Spergularia rubra**
**+Spergularia salina**
**Stellaria graminea**
—Stellaria longifolia
**Stellaria media**

**Family POLYGONACEAE**
**+Polygonum arenastrum**
Polygonum arifolium
**+Polygonum aviculare**
**+Polygonum bellardii**
**+Polygonum cespitosum** var. longisetum
**-Polygonum convolvulus**
**+Polygonum cuspidatum**
**-Polygonum erectum**—NYS: Extirpated
**-Polygonum hydropiper**
 Polygonum hydropiperoides
**+Polygonum lapathifolium**
**+Polygonum persicaria**
**+Polygonum punctatum** var. confertiflorum—Uncommon in PBPK
**Polygonum americana**—Rare in PBPK
**Polygonum sagittatum**
**+Polygonum scandens**
**Polygonum virginianum**
**+Rumex acetosella**
**+Rumex crispus**
**+Rumex obtusifoliis**
**+Rumex patientia**
**+Rumex salicifolius** var. mexicanus

**Family PLUMBAGINACEAE**
Limonium carolinianum

**Family CLUSIACEAE**
—Hypericum boreale
Hypericum gentianoides—Rare in PBPK
+Hypericum mutilum
**+Hypericum perforatum**
Hypericum punctatum

**Family TILIACEAE**
Tilia americana
[+Tilia cordata]

**Family MALVACEAE**
*Abutilon theophrasti*
[+Alcea rosea]
*Althaea officinalis*
+Hibiscus laevis—Extirpated in PBPK
Hibiscus moscheutos
[+Hibiscus syriacus]  
**+Malva moschata**—Extirpated in PBPK
**+Malva neglecta**

**Family CISTACEAE**
—Helianthemum canadense
+Lechea mucronata—Uncommon in PBPK
—Lechea pulchella
+Lechea racemulosa—NYS Rare S3

**Family VIOLACEAE**
—Viola affinis
—Viola conspersa
—Viola cucullata
*Viola odorata*
—Viola palma
[+Viola pedata]
—Viola x porteri

**Family MALVACEAE**
*Abutilon theophrasti*
[+Alcea rosea]
*Althaea officinalis*
+Hibiscus laevis—Extirpated in PBPK
Hibiscus moscheutos
[+Hibiscus syriacus]  
**+Malva moschata**—Extirpated in PBPK
**+Malva neglecta**

**Family CISTACEAE**
—Helianthemum canadense
+Lechea mucronata—Uncommon in PBPK
—Lechea pulchella
+Lechea racemulosa—NYS Rare S3

**Family VIOLACEAE**
—Viola affinis
—Viola conspersa
—Viola cucullata
*Viola odorata*
—Viola palma
[+Viola pedata]
—Viola x porteri

**Family CUCURBITACEAE**
*+Citrullus colocynthis*
+Hibiscus moscheutos
[+Hibiscus syriacus]  
**+Malva moschata**—Extirpated in PBPK
**+Malva neglecta**

**Family CISTACEAE**
—Helianthemum canadense
+Lechea mucronata—Uncommon in PBPK
—Lechea pulchella
+Lechea racemulosa—NYS Rare S3

**Family VIOLACEAE**
—Viola affinis
—Viola conspersa
—Viola cucullata
*Viola odorata*
—Viola palma
[+Viola pedata]
—Viola x porteri

**Family CAPPARIDACEAE**
[+Cleome hassleriana]—Extirpated in PBPK

**Family BRASSICACEAE**
*Alliaria petiolata*
—Allysum alyssoides
*Arabidopsis thaliana*
**+Armoracia rusticana**—Extirpated in PBPK
*Barbarea vulgaris*
—Brassica nigra
**+Brassica rapa**
Cakile edentula
**Capsella bursa-pastoris**
Cardamine bulbosa
Cardamine concanata
Cardamine diphylla—Rare in PBPK
**+Cardamine hirsuta**
—Cardamine x maxima
+Cardamine parviflora var. arenicola
Cardamine pensylvanica
**+Cardamine pratensis**—Rare in PBPK
**+Cardaria draba**
**+Diplotaxis muralis**
**+Diplotaxis tenuifolia**
**+Draba verna**
Family CLETHRACEAE
Clethra alnifolia

Family ERICACEAE
+Chimaphila maculata
Gaylussacia baccata
+Kalmia latifolia
Lyonia ligustrina—Rare in PBPK
Monotropa uniflora
+Pyrola americana—Rare in PBPK
[Rhododendron maximum]
Rhododendron periclymenoides
Rhododendron viscosum—Rare in PBPK
Vaccinium corymbosum
Vaccinium palidulum

Family EBENACEAE
Diospyros virginiana—Rare in PBPK; NYS Threatened S2

Family PRIMULACEAE
Anagallis arvensis—Extirpated in PBPK
+Lysimachia ciliata
Lysimachia nummularia
Lysimachia quadrifolia
Lysimachia terrestris
Samolus valerandi ssp. parviflorus—Rare in PBPK

Family HYDRANGEACEAE
Philadelphus coronarius

Family GROSSULARIACEAE
Ribes rubrum

Family CRASSULACEAE
+Penthorum sedoides—Uncommon in PBPK
Sedum album—Rare in PBPK
Sedum sarmentosum
Sedum telephium

Family SAXIFRAGACEAE
Crassula ovata
Saxifraga fortunei

Family ROSACEAE
Agrimonia eupatoria
Agrimonia pubescens—Uncommon in PBPK
Amelanchier arborea
Amelanchier canadensis—Rare in PBPK
Amelanchier laevis

*—Erysimum repandum
*Hesperis matronalis
*Lepidium campestre
*Lepidium ruderale
Lepidium virginicum
*Raphanus raphanistrum
*Rorippa nasturtium-aquaticum
*Rorippa palustris
*Rorippa sylvestris
+Sinapis alba—Extirpated in PBPK
+Sisymbrium altissimum
*Sisymbrium officinale
*Thlaspi arvense—Rare in PBPK

Amelanchier stolonifera Aronia x prunifolia
*+Aruncus dioicus var. acuminatus
[Crataegus monogyna]
*Duchesnea indica
Fragaria virginiana
Geum canadense
*Malus pumila
+Potentilla argentea
–Potentilla canadensis
Potentilla norvegica ssp. monspeliensis
+Potentilla recta
Potentilla simplex
Prunus americana
*Prunus avium
+Prunus maritima—Rare in PBPK
+Prunus persica
–Prunus pumila var. depressa—NYS Endangered S1
Prunus serotina

[Rubus sp.

*Rubus laciniatus—Rare in PBPK
Rubus occidentalis
*Rubus phoenicolasius
–Rubus setosus
+Spiraea alba var. latifolia—Rare in PBPK
–Spiraea tomentosa

Family FABACEAE
Albizia julibrissin—Rare in PBPK
+Amorpha fruticosa—Rare in PBPK
Amphicarpaea bracteata—Uncommon in PBPK
Apios americana
Baptisia tinctoria

[Cercis canadensis]
Chamaecrista fasciculata

*+Coronilla varia
–Crotolaria sagittalis—NYS Endangered S1
Desmodium canadense—Rare in PBPK
+Desmodium cuspidatum—Extirpated in PBPK
–Desmodium humifusum—NYS: Extirpated
Desmodium paniculatum
+Genista tinctoria

[Gleditsia triacanthos]
+Gymnocladus dioica
–Lathyrus japonicus var. maritimus

[Lathyrus latifolius]
Lespedeza capitata
Lespedeza hirta
+Lespedeza intermedia—Rare in PBPK
+Lespedeza procumbens—Uncommon in PBPK
–Lespedeza violacea—NYS Rare S3
Lespedeza virginica

Lotus corniculata
Medicago lupulina
Medicago sativa
Melilotus albus
Melilotus officinalis
Phaseolus polystachios—Rare in PBPK
*+Puereria lobata
*Robinia pseudo-acacia
+Strophanthus helvula
*Trifolium arvense—Uncommon in PBPK
*+Trifolium aureum
*+Trifolium campestre
*Trifolium hybridum
*Trifolium pratense
*Trifolium repens
*Vicia cracca ssp. tenuifolia
*Vicia sativa ssp. nigra
*+Vicia tetrasperma
*+Vicia villosa
+Vicia tetrasperma—Rare in PBPK
*+Wisteria sinensis

Family ELAEAGNACEAE
[+Elaeagnus angustifolia]—Extirpated in PBPK
*Elaeagnus umbellata

Family LYTHRACEAE
+Lythrum alatum—Rare in PBPK
*Lythrum salicaria

Family ONAGRACEAE
Circaea lutetiana ssp. canadensis
Epilobium coloratum
*Epilobium hirsutum—Rare in PBPK
+Ludwigia alternifolia + Ludwigia palustris Oenothera biennis
+ Oenothera laciniata—Extirpated; NYS Endangered
S1 +Oenothera parviflora var. oakesiana—Rare; NYS Threatened S2
Oenothera perennis

Family NYSSACEAE
Nyssa sylvatica

Family CORNACEAE
+ Cornus alternifolia—Rare in PBPK
Cornus amomum
Cornus florida
Cornus foemina ssp. racemosa
[+Cornus mas]
[+Cornus sericea]

Family SANTALACEAE
–Comandra umbellata

Family CELASTRACEAE
*+Celastrus orbiculata
Celastrus scandens—Rare in PBPK
[+Euonymus alata]
[+Euonymus europaeus]
[+Euonymus fortunei var. radicans]

Family AQUIFOLIACEAE
[+Ilex opaca]
+Ilex verticillata

Family BUXACEAE
+[Buxus sempervirens]
*+Pachysandra terminalis

Family EUPHORBIACEAE
–Acalypha gracilens
Acalypha virginica var. rhomboidea
Chamaesyce maculata
+Chamaesyce polygonifolia—Rare in PBPK
*Euphorbia cyparissias

Family RHAMNACEAE
Ceanothus americanus—Rare in PBPK
*+Rhamnus cathartica
*Rhamnus frangula

Family VITACEAE
*+Ampelopsis brevipedunculata
Parthenocissus quinquefolia
*+Parthenocissus tricuspidata—Rare in PBPK
+Vitis aestivalis
Vitis labrusca

Family LINACEAE
*+Linum usitatissimum—Extirpated in PBPK
–Linum virginianum

Family POLYGALACEAE
–Polygala sanguinea
–Polygala verticillata var. ambigua
Polygala verticillata var. isocycla

Family HIPPOCASTANACEAE
[+Aesculus flava]—Rare in PBPK
[+Aesculus hippocastanum]

Family ACERACEAE
*+Acer campestre
*+Acer ginnala
*+Acer negundo
*+Acer platanoides
*+Acer pseudoplatanus
Acer rubrum
Acer saccharinum
[+Acer saccharum]

Family ANACARDIACEAE
Rhus copalpinum
Rhus glabra
Rhus hirta—Rare in PBPK
Toxicodendron radicans
–Toxicodendron vernix

Family SIMAROUBACEAE
*+Ailanthus altissima

Family RUTACEAE
Ptelea trifoliata—Rare in PBPK; NYS Endangered
S1-S2

Family OXALIDACEAE
Oxalis stricta
–Oxalis violacea—NYS Threatened S2-S3

Family GERANIACEAE
*+Erodium cicutarium
Geranium carolinianum—Rare in PBPK
Geranium maculatum

**Family BALSAMINACEAE**
Impatiens capensis

**Family ARALIACEAE**
Aralia nudicaulis
–Aralia racemosa
*+Aralia elata
*+Hedera helix
–Panax trifolius

**Family APIACEAE**
*+Aegopodium podagraria
*+Aethusa cynapium
Angelica venenosa—Rare in PBPK
Cicuta maculata
*+Conium maculatum—Rare in PBPK
Cryptotaenia canadensis
*Daucus carota
Heracleum maximum
Osmorhiza longistylis
*Pasinaca sativa
Sanicula odorata
Sanicula marilandica
–Zizia aptera
–Zizia aurea

**Family GENTIANACEAE**
–Bartonia virginica

**Family APOCYNACEAE**
Apocynum androsaemifolium
Apocynum cannabinum
*Vinca minor

**Family ASCLEPIADACEAE**
Asclepias incarnata var. pulchra
Asclepias purpurascens—Rare in PBPK; NYS Uncommon S2-S3
Asclepias syriaca
Asclepias tuberosa var interior—Rare in PBPK
*Cynanchum loiseae

**Family SOLANACEAE**
*+Datura stramonium
*Lycium barbarum
*+Lycopersicon esculentum
–Physalis heterophylla
Solanum carolinense
*Solanum dulcamara
Solanum pycanthum

**Family CONVOLVULACEAE**
*Calystegia sepium
*Convolvulus arvensis
*+Ipomoea nil—Extirpated in PBPK
*+Ipomoea purpurea

**Family CUSCUTACEAE**
–Cuscuta gronovii
Cuscuta pentagona—NYS Uncommon S-3

**Family POLEMONIACEAE**
*Phlox paniculata

**Family HYDROPHYLLACEAE**
Hydrophylllum virginianum

**Family BORAGINACEAE**
*+Echium vulgare—Extirpated in PBPK
[+Mertensia virginica]—Extirpated in PBPK
+Myosotis laxa
+Myosotis verna—Rare in PBPK
*+Pulmonaria saccharata—Rare in PBPK
*+Symphytum officinale—Rare in PBPK

**Family VERBENACEAE**
+Phryma leptostachya—Rare in PBPK
Verbena hastata—Uncommon in PBPK
Verbena ursicola

**Family LAMIACEAE**
Agastache nepetoides—Rare in PBPK; NYS Threatened S2-S3
Collinsonia canadensis
*Glechoma hederacea
Hedeoma pulegioides—Rare in PBPK
*+Lamium purpureum
*Leonurus cardiaca
Lyccopus americanus
Lyccopus uniflorus
+Lyccopus virginicus
*–Mentha arvensis
–Monarda fistulosa
–Physostegia virginiana
*Prunella vulgaris
Pycnanthemum tenuifolium
Pycnanthemum virginianum
Scutellaria lateriflora
Teucrium canadense
Trichostema dichotomum

**Family PLANTAGINACEAE**
*Plantago lanceolata
*Plantago major
–Plantago maritima ssp. juncoidea—NYS Threatened S2-S3
Plantago rugelii
–Plantago virginica

**Family OLEACEAE**
[+Chionanthus virginicus]—Extirpated in PBPK
[+Forsythia viridissima]
Fraxinus americana
[+Fraxinus nigra]
Fraxinus pennsylvanica
*+Ligustrum vulgare
*+Syringa vulgaris

**Family SCROPHULARIACEAE**
–Agalinis maritima
–Agalinis purpurea
–Agalinis tenuifolia
Aureolaria flava
–Aureolaria virginica
*+Chaenorrhinum minus—Rare in PBPK
Chelone glabra—Uncommon in PBPK
Gratiola neglecta
Linaria canadensis
*Linaria vulgaris
-Lindernia dubia
*+Mazus pumilus
+Mimulus alatus—Uncommon in PBPK; NYS Rare S-3
+Mimulus ringsen
Pedicularis canadensis
*+Penstemon digitalis—Uncommon in PBPK
Scrophularia lanceolata
+Scrophularia marilandica
*Verbascum blatteria
*Verbascum thapsus
*Veronica arvensis
*+Veronica chamaedrys
*+Veronica hederifolia
*Veronica officinalis
Veronica peregrina
*+Veronica persica
*+Veronica serpyllifolia
Veronicastrum virginicum—NYS Threatened S-2
Family OROBANCHACEAE
-Epipagus virginiana
Orobanche uniflora
Family BIGNONIACEAE
*Campsis radicans—Rare in PBPK
*+Catalpa speciosa—Rare in PBPK
*Paulownia tomentosa
Family CAMPANULACEAE
*+Campanula rapunculoides—Extirpated in PBPK
*+Campanula lactiflora
-Lobelia perennis
+Lobelia spicata
+Lobelia siphilitica
*+Triodanis perfoliata var. biflora—Rare in PBPK
Triodanis perfoliata var. perfoliata
Family RUBIACEAE
Cephalanthus occidentalis—Rare in PBPK
Galium aparine
+Galium circæae—Uncommon in PBPK
*Galium mollugo
+Galium palustre—Rare in PBPK
-Galium tincctorum
+Galium triflorum
+Mitchella repens—Rare in PBPK
Family CAPRIFOLIACEAE
+Diervilla lonicera—Rare in PBPK
[Lonicera fragrantissima]
*Lonicera japonica
*Lonicera morrowii
*Lonicera x bella
Lonicera sempervirens—Rare in PBPK
Sambucus canadensis
[Symphoricarpos albus var. laevigatus]—Extirpated in PBPK
Triosteum perfoliatum
Viburnum acerifolium
Viburnum dentatum var. lucidum
Viburnum dentatum var. venosum—Uncommon in PBPK; NYS Threatened S2
*Viburnum dilatatum
Viburnum lentago
*+Viburnum opulus—Uncommon in PBPK
Viburnum prunifolium
*+Viburnum sieboldii

Family ASTERACEAE
*Achillea millefolium var. lanulosa
Ambrosia artemisiifolia
Ambrosia trifida
-Anaphalis margaritacea
Antennaria plantaginifolia
*+Anthemis arvensis—Rare in PBPK
+Anthemis cotula
*Arctium minus
*+Artemisia annua
*Artemisia vulgaris
Aster cordifolius
Aster divaricatus
Aster ericoides
Aster laevis
*+Aster lanceolatus var. simplex
Aster lateriflorus
+Aster lowrieanus
Aster macrophyllus
Aster novae-angliae
Aster patens—Extirpated in PBPK
Aster patens
+Aster pilosus
+Aster schreberi
-Aster puniceus
Aster subulatus—Uncommon in PBPK; NYS Threatened S2
Aster tenuifolius—NYS Uncommon S3
Aster umbellatus—Rare in PBPK
-Aster undulatus
Baccharis halimifolia
Bidens bipinnata—Rare in PBPK
Bidens frondosa
*+Bidens polylepis—Rare in PBPK
+Bidens vulgaris
*+Carduus nutans—Rare in PBPK
*+Centella asiatica
*+Centarea maculosa
-Centarea nigra
*Centarea nigrescens
*Cichorium intybus
*Cirsium arvense
Cirsium discolor
*Cirsium horridulum—Uncommon in PBPK
*Cirsium vulgare
Conyza canadensis
*Coreopsis lanceolata—Extirpated in PBPK
[+Echinacea purpurea]—Extirpated in PBPK
Erechtites hieracifolia
Erigeron annuus
Erigeron philadelphicus
-Erigeron pulchellus
+Erigeron strigosus
+Eupatorium dubium
+Eupatorium fistulosum
+Eupatorium hyssopifolium var. laciniatum—Uncommon in PBPK; NYS Threatened S2
-Eupatorium maculatum
Eupatorium perfoliatum
-Eupatorium pilosum
Eupatorium purpureum
Eupatorium rugosum
+Eupatorium serotinum—NYS Endangered S1
Eupatorium sessilifolium—Rare in PBPK
Euthamia graminifolia
+ Euthamia tenuifolia
**+ Gaillardia aristata—Extirpated in PBPK
* Galinsoga parviflora
* Galinsoga quadriradiata
Gnaphalium obtusifolium
** + Gnaphalium uliginosum—Rare in PBPK
– Helianthus flexuosus
** + Helianthus annuus—Rare in PBPK
Helianthus divaricatus
Helianthus giganteus
– Helianthus strumosus
* Helianthus tuberosus
– Heliopsis helianthoides
** + Heterotheca subaxillaris—Uncommon in PBPK
* Hieracium aurantiacum—Extirpated in PBPK
* Hieracium caespitosum
** + Hieracium floribundum—Rare in PBPK
+ Hieracium kalmii
* + Hieracium piloselloides
– Hieracium venosum
* Hypochaeris radicata
Iva frutescens ssp. oraria
– Krigia biflora
Krigia virginica
Lactuca biennis
Lactuca canadensis
+ Lactuca floridana—Rare in PBPK; NYS Endangered S1
* Lactuca serriola
** + Lapsona communis—Uncommon in PBPK
* Leucanthemum vulgare
* Matricaria discoidea
Mikania scandens
Pluchea odorata var. succulenta
Prenanthes trifoliolata—Uncommon in PBPK
* Rudbeckia hirta var. pulcherrima
– Rudbeckia laciniata
** + Senecio vulgaris
Solidago bicolor
Solidago caesia
Solidago canadensis var. scabra
Solidago juncea
– Solidago nemoralis
Solidago odora
Solidago rugosa
– Solidago sempervirens var. mexicana—NYS Endangered S1
+ Solidago sempervirens var. sempervirens
Solidago speciosa
– Solidago ulmifolia
* – Sonchus arvensis
* Sonchus oleraceus
[ + Tagetes patula]
* Tanacetum vulgare
* Taraxacum officinale
* Tragopogon pratensis
* Tussilago farfara
Vernonia noveboracensis
Xanthium strumarium var. canadense

CLASS: LILIOPSIDA

Family ALISMATACEAE
Alisma subcordatum
Sagittaria latifolia—Rare in PBPK

Family ARACEAE
Acorus americanus—Rare in PBPK
Arisaema triphyllum
Symlocarpus foetidus

Family LEMNACEAE
Leum minor

Family COMMELINACEAE
* Commelina communis var. ludens
** + Tradescantia virginiana—Rare in PBPK

Family JUNCACEAE
Juncus acuminatus
– Juncus articulatus
+ Juncus brachycarpus
– Juncus bufonius
– Juncus dudleyi
Juncus effusus var. pylaei
Juncus gerardii
– Juncus scirpoides—NYS Endangered S1
Juncus tenuis
Luzula campestris var. multiflora

Family CYPERACEAE
Bulbostylis capillaris
– Carex alata
– Carex amphibola var. turgida
Carex annectens
– Carex aquatilis
– Carex bebbii
Carex blanda
– Carex bushii—NYS Uncommon S3
– Carex buxbaumii—NYS Threatened S2
Carex cephalophora
– Carex conoidea
Carex crinita
– Carex digitalis
Carex festucacea
– Carex granularis
– Carex gynandra
– Carex hirtifolia
+ Carex intumescens
+ Carex laxiflora
Carex lurida
– Carex normalis
– Carex pallescens
Carex pellita
Carex pensylvanica
– Carex polymorpha—NYS: Extirpated
– Carex projecta
– Carex rosea
– Carex scoparia
– Carex seorsa—NYS Threatened S3
Carex squarrosa
Carex stipata
Carex stricta
Carex swanii
Carex tribuloides
– Carex trisperma
Carex vulpinoides
+ Cyperus diandrus
Cyperus echinatus—Rare in PBPK; NYS Endangered S1
** + Cyperus esculentus var. macrostachyus
- *Cyperus lupulinus* ssp. *lupulinus*—NYS Threatened S2

*Cyperus lupulinus* ssp. *macilentus*
*Cyperus strigosus*
- *Eleocharis elliptica* var. *elliptica*
*Eleocharis elliptica* var. *pseudopogon*
- *Eleocharis halophila* - NYS Threatened S2
*Eleocharis obtusa*
- *Fimbristylis autumnalis*
*Scirpus cyperinus* + *Scirpus pendulus*
*Scirpus pungens*
*Scirpus robustus*

**Family POACEAE**

*Agrostis gigantea*
*Agrostis hyemalis*
+ *Agrostis perennans*
+ *Aira carophyllea*
+ *Aira prae cox*
+ *Allopecurus pratensis*
*Andropogon gerardii*
*Andropogon virginicus*
*Anthoxanthum nitens*
+ *Anthoxanthum odoratum*
*Aristida dichotoma*—Rare in PBPK
+ *Aristida longespica*
*Ar rhenatherum elatius*
+ *Avena fatua* ssp. *sativa*
+ *Bromus commutatus*
+ *Bromus hordeaceus*
*Bromus inermis*
+ *Bromus sterilis*
+ *Bromus teucrium*
*Calamagrostis canadensis*
- *Calamagrostis cinoideae*
+ *Cenchrus tribuloides*—Rare in PBPK; NYS Threatened S2
*Cinna arundinacea*
- *Cinna latifolia*
+ *Dactylis glomerata*
+ *Danthonia compressa*
+ *Danthonia spicata*
+ *Deschampsia flexuosa*
+ *Digitaria ischaemum*
+ *Digitaria sanguinalis*
*Distichlis spicata*
+ *Echinochloa crusgalli*
+ *Echinochloa muricata* var. *microstachya*
- *Echinochloa muricata* var. *muricata*
+ *Eleusine indica*
- *Elymus canadensis*
- *Elymus villosus* var. *arkansanus*
*Elymus virginicus*
+ *Elytrigia repens*
- *Eragrostis capillaris*
+ *Eragrostis ciliianensis*
+ *Eragrostis minor*
*Eragrostis pectinacea*
*Eragrostis spectabilis*
*Festuca rubra*
- *Festuca trachyphylla*
*Glyceria striata*
*Holcus lanatus*
+ *Hordeum jubatum*
+ *Hordeum murinum* ssp. *leporinum*
+ *Hordeum pusillum*
*Leersia ozyroides*
*Leersia virginica*
+ *Lolium perenne* var. *aristatum*
+ *Lolium perenne* var. *perenne*
+ *Lolium pratense*
- *Muhlenbergia mexicana*
*Muhlenbergia schreberi*
- *Panicum acuminatum*
- *Panicum boscii*
*Panicum capillare*
*Panicum clandestinum*
*Panicum dichotomiflorum*
*Panicum dichotomum*
- *Panicum latifolium*
- *Panicum oligosanthes* var. *scribnerianum*
*Panicum rigidulum* var. *pubescens*
- *Panicum sabulorum* var. *thinum*
- *Panicum scabriusculum*—NYS Endangered S1
*Panicum sphaerocarpum*
- *Panicum verrucosum*
*Panicum virgatum* var. *spissum*
- *Panicum virgatum* var. *virgatum*
*Paspalum setaceum* var. *muhlenbergii*
*Paspalum setaceum* var. *setaceum*—NYS Threatened S2
+ *Phalaris arundinacea*
+ *Phleum pratense*
*Phragmites australis*
*Piptochnaetium avenaceum*—Rare in PBPK
*Poa annua*
+ *Poa bulbosa*
*Poa compressa*
+ *Poa nemoralis*
+ *Poa pratensis*
+ *Poa trivialis*
+ *Puccinellia distans*
*Schizachyrium scoparium* ssp. *scoparium*
+ *Secale cereale*
+ *Setaria faberi*
+ *Setaria italica*
+ *Setaria parviflora*—Rare in PBPK
*Setaria pumila*
+ *Setaria viridis*
*Sorghastrum nutans*
+ *Spartina alterniflora*
*Spartina cynosuroides*—Rare in PBPK
*Spartina patens*
*Spartina pectinata*—Rare in PBPK
*Sporobolus asper*—Rare in PBPK
*Tripsacum dactyloides*—NYS Threatened S2
*Trisetum spicatum*—Rare in PBPK
-Vulpia octoflora
+ *Vulpia myuros*
[+ Zea mays]

**Family SPARGANIACEAE**

- *Sparganium americanum*
*Sparganium eurycarpum*—Rare in PBPK

**Family TYPHACEAE**

*Typha angustifolia*
*Typha latifolia*
Family LILIACEAE

Allium canadense
*—Allium schoenoprasum
*Allium vineale
*Asparagus officinalis
*+Convallaria majalis
*+Chionodoxa lucilae
Erythronium americanum
*+Galanthus nivalis
*Hemerocallis fulva
*Hosta ventricosa
*+Hyacinthoides nonscripta
Hypoxis hirsuta
Lilium canadense—Rare in PBPK
Lilium superbum—Rare in PBPK
Maianthemum canadense
Maianthemum racemosum
—Medeola virginiana
*Muscari botryoides
*+Narcissus pseudo-narcissus
*+Ornithogalum umbellatum
Polygonatum biflorum
Polygonatum commutatum—Uncommon in PBPK
*+Scilla siberica
+[Trillium grandiflorum]—Extirpated in PBPK
+[Trillium cernuum]
Uvularia perfoliata—Rare in PBPK
Uvularia sessilifolia
Veratrum viride

Family IRIDACEAE

*+Crocus sp.
Iris prismatica—Uncommon in PBPK; NYS Threatened S2
*+Iris pseudacorus
Iris versicolor—Uncommon in PBPK
Sisyrinchium angustifolium
—Sisyrinchium atlanticum
+Sisyrinchium montanum

Family AGAVACEAE

*+Yucca filamentosa

Family SMILACACEAE

Smilax glauca
Smilax herbacea
Smilax rotundifolia

Family DIOSCOREACEAE

Dioscorea villosa—Rare in PBPK

Family ORCHIDACEAE

*+Epipactis helleborine
—Plantanthera lacera
Spiranthes cernua—No specimen collected; Extirpated in PBPK
—Spiranthes vernalis - NYS Endangered S1