Fairmount Park System

Natural Lands Restoration Master Plan

V O L U M E I I I

Appendices

Tacony Meadow

For more information about the Fairmount Park System Natural Lands Restoration Master Plan,
please contact the offices of the
Natural Lands Restoration and Environmental Education Program
at 215.685.0274.

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APPENDIX A

Floral/Faunal Assessments

Fairmount Park System

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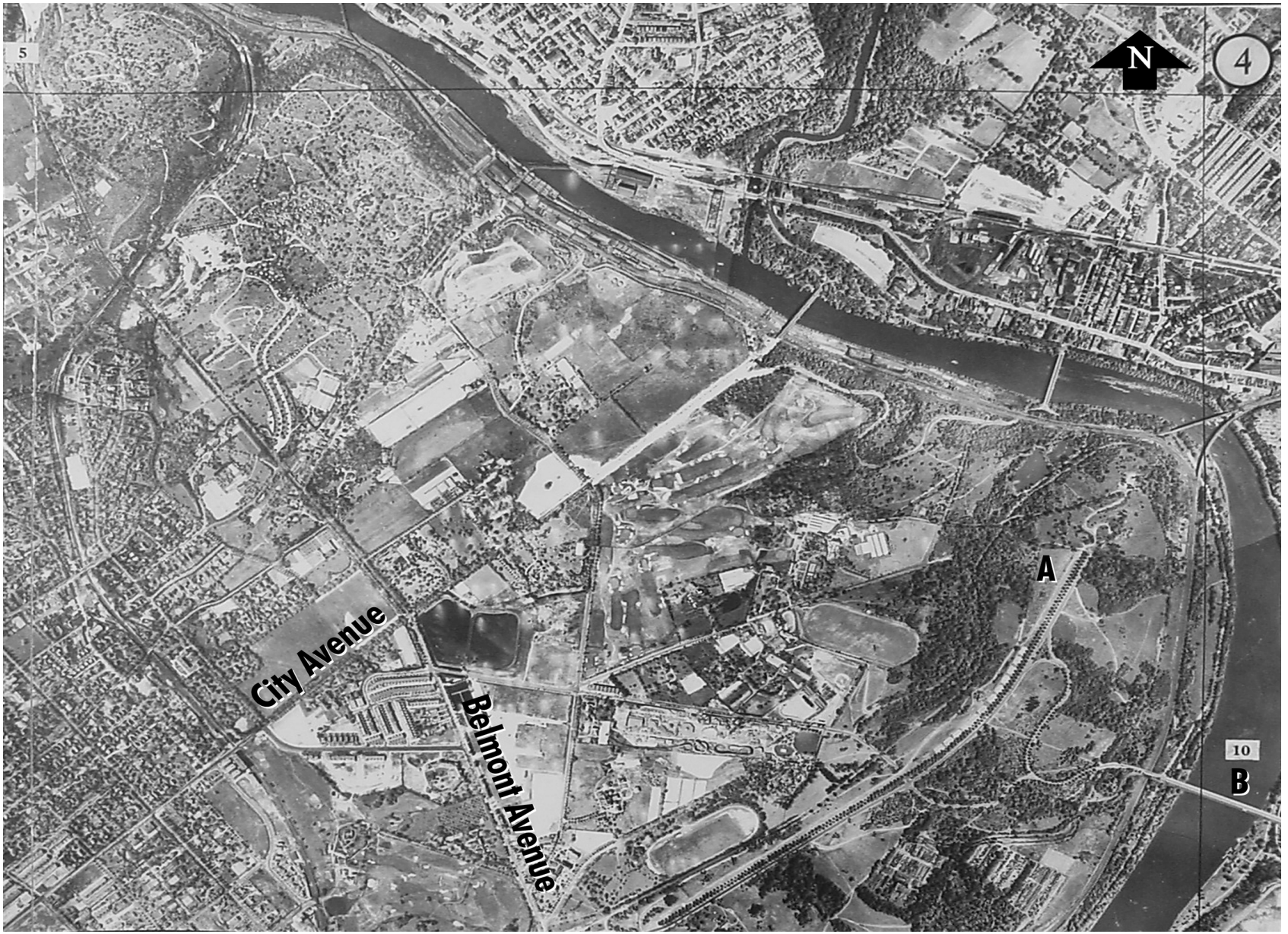
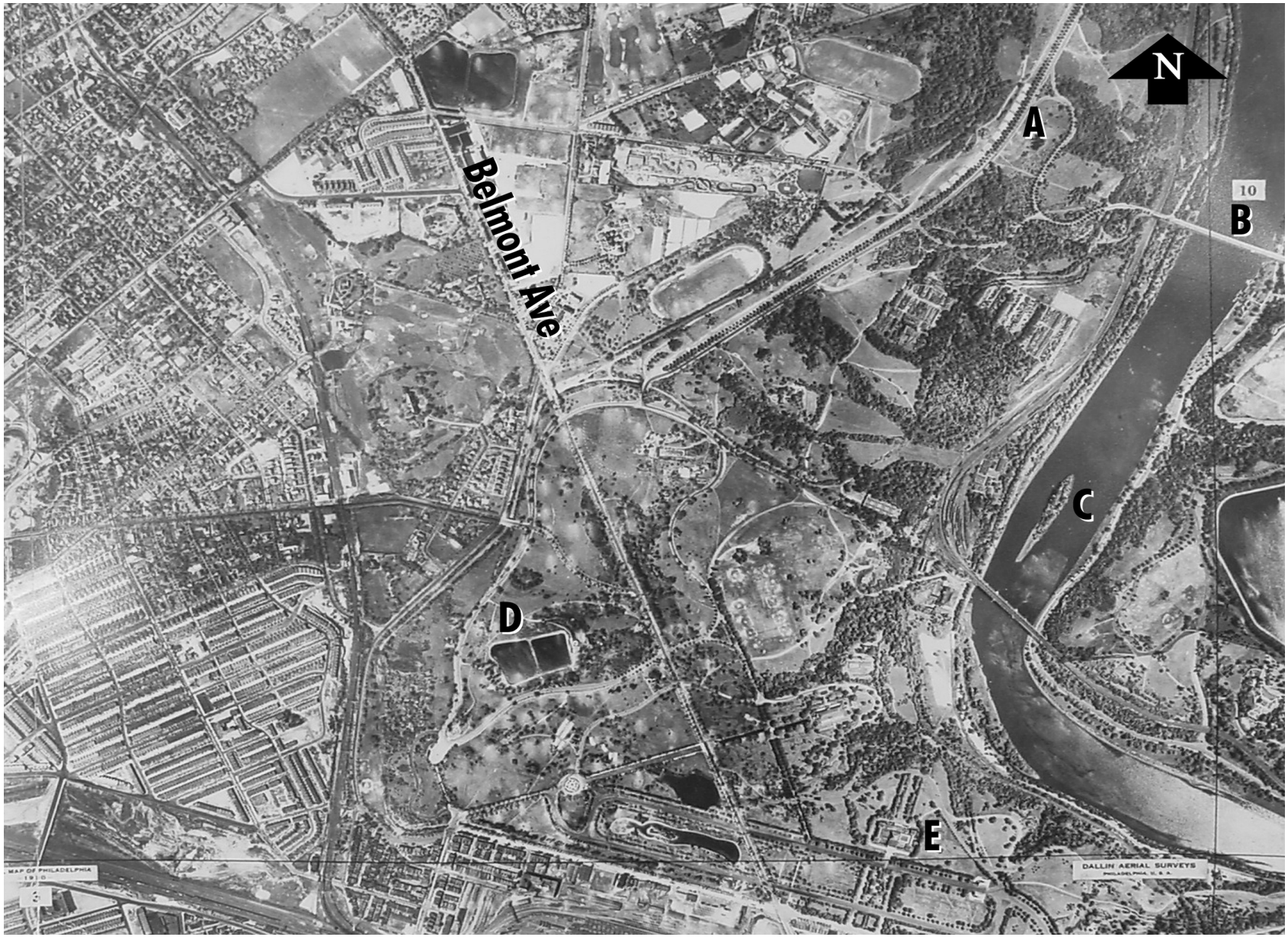
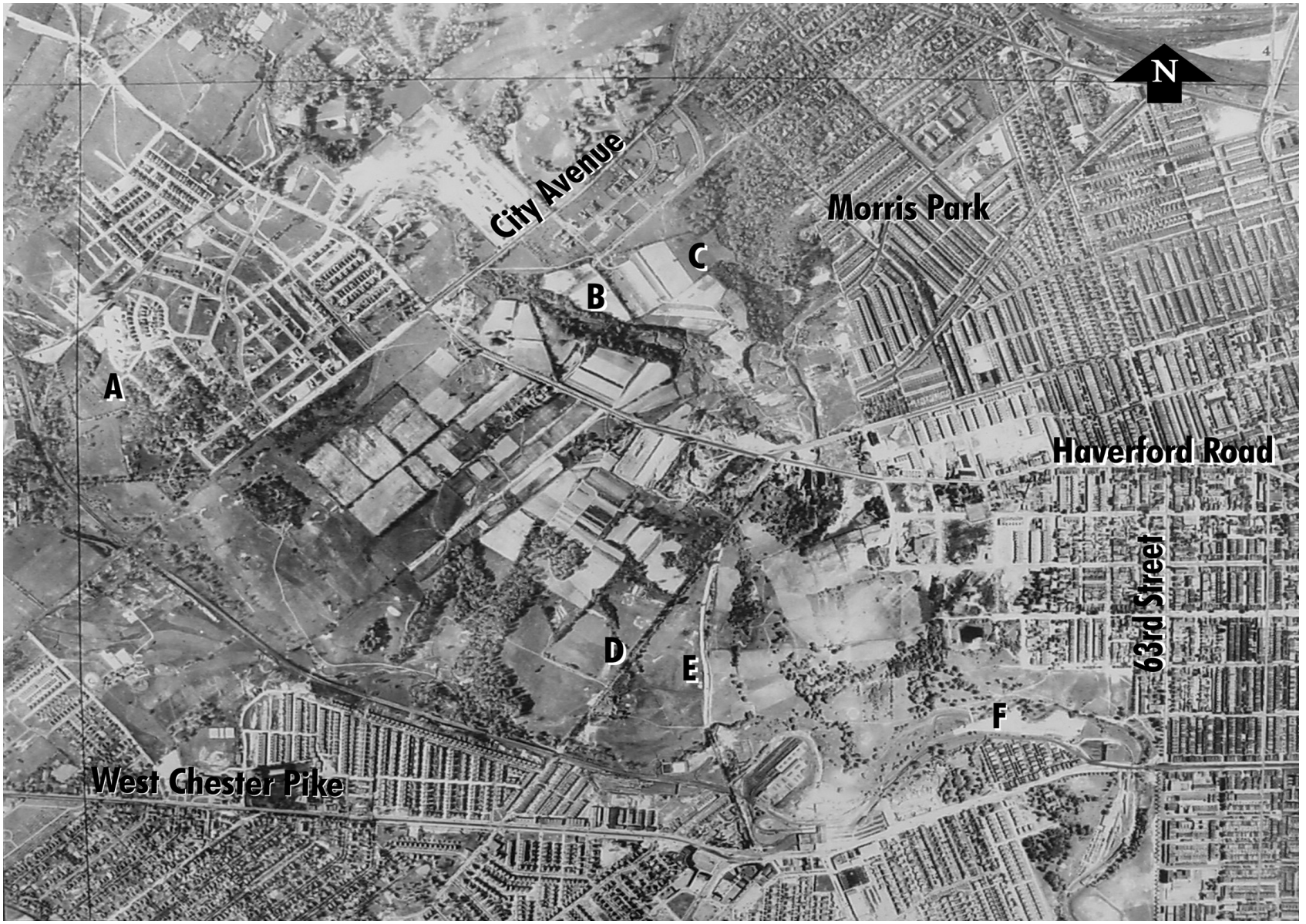


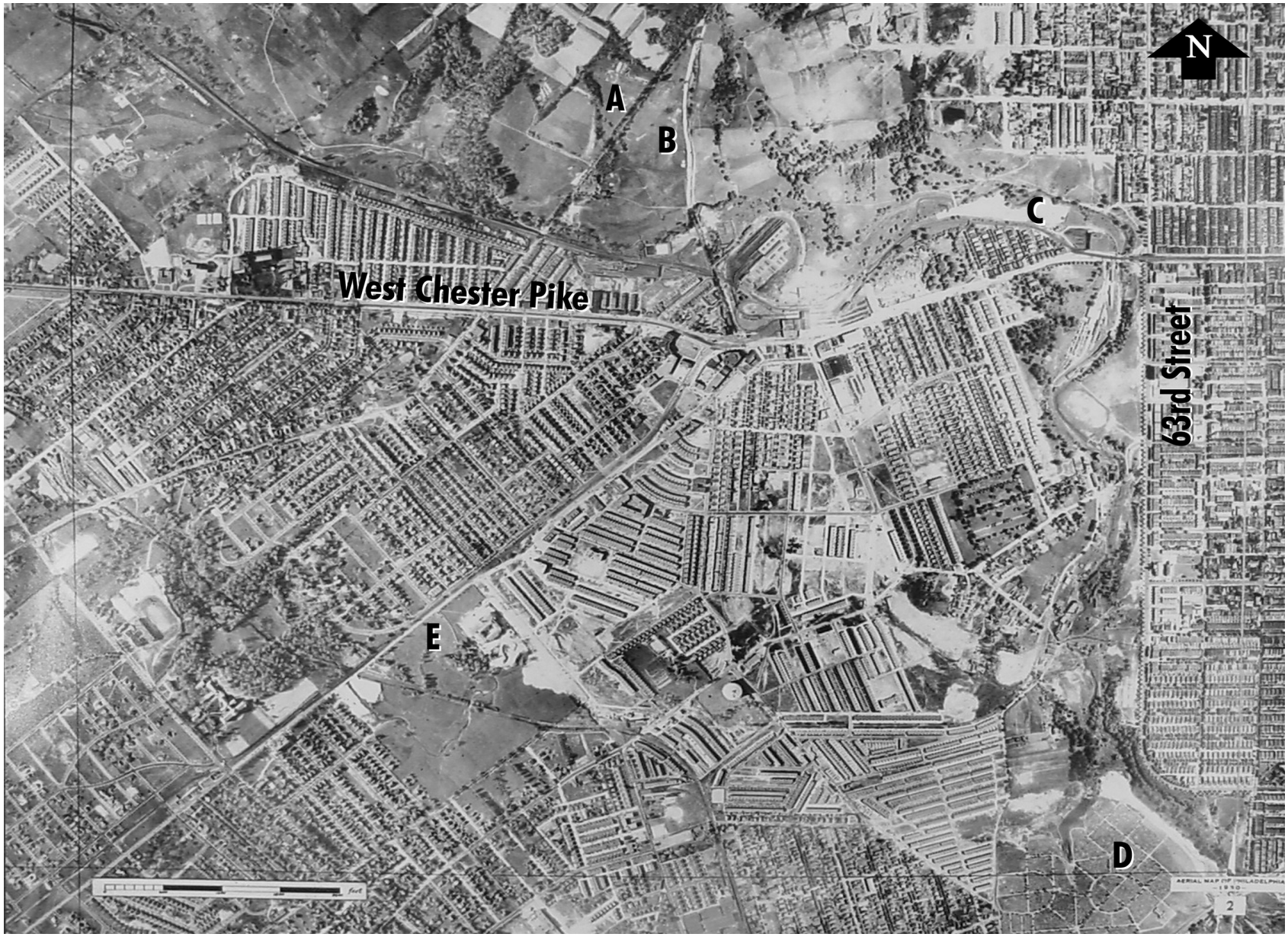
Aerial photograph of portions of West Park, taken by Victor Dallin in 1930. Labeled sites are Chamounix Drive (A) and Strawberry Mansion Bridge (B).



Aerial photograph of portions of West Park, taken by Victor Dallin in 1930. Labeled sites are Chamounix Drive (A), Strawberry Mansion Bridge (B), Peters Island (C), George's Hill Reservoir (D), and Memorial Hall (E).



Aerial photograph of portions of West Philadelphia, Overbrook and Upper Darby including the northern part Cobbs Creek Park, taken by Victor Dallin in 1930. Labeled sites are Carroll Park (A), Indian Run (West Branch Indian Creek, B), Indian Creek (C), Lansdowne Avenue (D), Cardington Road (E), and Millbourne Dam (F).



Aerial photograph of portions of Upper Darby and West Philadelphia, including central Cobbs Creek Park, taken by Victor Dallin in 1930. Labeled sites are Lansdowne Avenue (A), Cardington Road (B), Millbourne Dam (C), Fernwood Cemetary (D) and Naylors Run (E).

Appendix A-1.1. Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Acalypha rhomboidea	Three-seeded mercury	Euphorbiaceae	N			X			X	
Acanthopanax sieboldianus	Fiveleaf aralia	Araliaceae	I	X			X			
Acer ginnala	Amur maple	Aceraceae	I							X
Acer negundo	Box elder	Aceraceae	N	X	X	X	X	X	X	X
Acer palmatum	Japanese maple	Aceraceae	I	X				X		X
Acer platanoides	Norway maple	Aceraceae	I	X	X		X	X	X	X
Acer pseudoplatanus	Sycamore maple	Aceraceae	I	X	X		X		X	X
Acer rubrum	Red maple	Aceraceae	N	X	X	X	X	X	X	X
Acer saccharinum	Silver maple	Aceraceae	N	X	X		X	X	X	X
Acer saccharum	Sugar maple	Aceraceae	N		X		X	X	X	X
Achillea millefolium	Common yarrow	Asteraceae	I		X		X	X	X	
Acorus calamus	Sweet flag	Acoraceae	I				X			
Actaea pachypoda	Doll's eyes	Ranunculaceae	N				X			X
Actinidia arguta	Tara vine	Actinidiaceae	I							X
Aegopodium podagraria	Goutweed	Apiaceae	I	X	X		X		X	X
Aesculus hippocastanum	Horsechesnut	Hippocastanaceae	I	X	X					X
Aesculus parviflora	Bottlebrush buckeye	Hippocastanaceae	I							X
Aesculus pavia	Buckeye	Hippocastanaceae	A		X					
Agrimonia parviflora	Southern agrimony	Rosaceae	N					X		
Agrostis gigantea	Redtop	Poaceae	I						X	
Agrostis hyemalis	Hairgrass	Poaceae	N						X	
Agrostis perennans	Autumn bentgrass	Poaceae	N		X				X	
Ailanthus altissima	Tree-of-heaven	Simaroubaceae	I	X	X	X	X	X	X	X
Ajuga reptans	Carpet bugleweed	Lamiaceae	I		X					
Akebia quinata	Akebia	Lardizabalaceae	I	X	X					X
Albizia julibrissin	Silk-tree	Mimosaceae	I		X					
Alliaria petiolata	Garlic-mustard	Brassicaceae	I	X	X	X	X	X	X	X
Allium canadense	Wild onion	Liliaceae	N							X
Allium tricoccum	Ramps	Liliaceae	N							X
Allium vineale	Field garlic	Liliaceae	I	X	X		X		X	X
Alnus glutinosa	Black alder	Betulaceae	I	X		X				

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Ambrosia artemisiifolia	Common ragweed	Asteraceae	N					X		
Ambrosia species	Ambrosia species	Asteraceae	N				X			
Ambrosia trifida	Giant ragweed	Asteraceae	N	X	X			X	X	
Amelanchier arborea	Juneberry	Rosaceae	N							X
Amorpha fruticosa	False-indigo	Fabaceae	A		X		X			X
Ampelopsis brevipedunculata	Porcelein berry	Vitaceae	I	X	X			X	X	X
Amphicarpaea bracteata	Hog-peanut	Fabaceae	N	X				X	X	X
Andropogon virginicus	Broom-sedge	Poaceae	N						X	X
Andropogon/Schiz. species	bluestem species	Poaceae	N				X			
Anemone quinquefolia	Wood anemone	Ranunculaceae	N						X	X
Angelica venenosa	Deadly angelica	Apiaceae	N	X						
Anthoxanthum odoratum	Sweet vernal grass	Poaceae	I	X	X		X			
Apocynum androsaemifolium	Pink dogbane	Apocynaceae	N							X
Apocynum cannabinum	Indian hemp	Apocynaceae	N	X	X	X	X	X	X	X
Aralia elata	Japanese angelica-tree	Araliaceae	I	X	X				X	X
Aralia nudicaulis	Wild sarsaparilla	Araliaceae	N						X	X
Aralia racemosa	Spikenard	Araliaceae	N						X	X
Arctium lappa	Great burdock	Asteraceae	I		X					
Arctium minus	Common burdock	Asteraceae	I	X	X		X	X	X	X
Arisaema triphyllum	Jack-in-the-pulpit	Araceae	N	X	X		X	X	X	X
Artemisia annua	Sweet wormwood	Asteraceae	I		X	X		X		
Artemisia vulgaris	Common mugwort	Asteraceae	I	X	X	X	X	X	X	X
Asarum canadense	Wild ginger	Aristolochiaceae	N	X			X			X
Asclepias incarnata	Swamp milkweed	Asclepiadaceae	N	X		X		X		
Asclepias purpurascens	Purple milkweed	Asclepiadaceae	N		X					
Asclepias syriaca	Common milkweed	Asclepiadaceae	N	P	X	X	P		X	P
Asimina triloba	Pawpaw	Annonaceae	N		X		X			
Asparagus officinalis	Asparagus	Liliaceae	I				X		X	
Asplenium platyneuron	Ebony spleenwort	Aspleniaceae	N		X				X	X
Aster acuminatus	Aster acuminatus	Asteraceae	N			X				
Aster cordifolius	Blue wood aster	Asteraceae	N	X						X
Aster divaricatus	White wood aster	Asteraceae	N	X	X		X	X	X	X

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

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Aster macrophyllus	Bigleaf aster	Asteraceae	N							X
Aster pilosus	Heath aster	Asteraceae	N				X		X	
Athyrium filix-femina	Lady fern	Dryopteridaceae	N	X	X		X	X	X	X
Athyrium filix-femina	Northern lady fern	Dryopteridaceae	N	X	X		X	X	X	X
Athyrium filix-femina	Southern lady fern	Dryopteridaceae	N	X	X		X	X	X	X
Athyrium filix-mas	Lady fern	Dryopteridaceae						X		
Barbarea vulgaris	Yellow-rocket	Brassicaceae	I			X	X			
Berberis thunbergii	Japanese barberry	Berberidaceae	I		X		X	X	X	X
Betula lenta	Black birch	Betulaceae	N		X					X
Betula nigra	River birch	Betulaceae	N	X		X	X	X		X
Betula papyrifera	Paper birch	Betulaceae	I	X						
Betula populifolia	Gray birch	Betulaceae	N		X					
Bidens connata	Beggar-ticks	Asteraceae	N		X					
Bidens frondosa	Stick-tight	Asteraceae	N	X			X	X	X	
Bidens laevis	Beggar-ticks	Asteraceae	N					X		
Bidens polylepis	Tickseed-sunflower	Asteraceae	I						X	
Boehmeria cylindrica	False nettle	Urticaceae	N	X	X		X	X	X	X
Botrychium virginianum	Rattlesnake fern	Ophioglossaceae	N	X					P	X
Bromus altissimus	Brome grass	Poaceae	N	X						
Bromus hordeaceus	Soft chess	Poaceae	I		X					
Bromus inermis	Smooth brome	Poaceae	I		X		X		X	
Bromus japonicus	Japanese chess	Poaceae	I		X					
Bromus secalinus	Cheat	Poaceae	I						X	
Bromus tectorum	Downy chess	Poaceae	I		X	X				
Broussonetia papyrifera	Paper mulberry	Moraceae	I	X	X		X	X	X	X
Cabomba caroliniana	Fanwort	Cabombaceae	I		X					
Callitriche heterophylla	Water-starwort	Callitrichaceae	N		X		X		X	
Callitriche species	Water-starwort species	Callitrichaceae					X			
Callitriche stagnalis	Water-starwort	Callitrichaceae	I	X	X					
Callitriche terrestris	Water chickweed	Callitrichaceae	N					X		
Calystegia sepium	Hedge bindweed	Convolvulaceae	N				X			
Capsella bursa-pastoris	Shepherd's-purse	Brassicaceae	I		X					

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Cardamine bulbosa	Spring cress	Brassicaceae	N				X			
Cardamine concatenata	Cut-leaved toothwort	Brassicaceae	N				X		X	X
Cardamine hirsuta	Hairy bitter-cress	Brassicaceae	I				X		X	X
Cardamine impatiens	Bitter-cress	Brassicaceae	I				X		X	X
Cardamine pensylvanica	Bitter cress	Brassicaceae	N				X			
Carduus nutans	Nodding thistle	Asteraceae	I		X					
Carex albicans	Sedge	Cyperaceae	N		X					X
Carex amphibola	Sedge	Cyperaceae	N		X		X		X	X
Carex annectens	Sedge	Cyperaceae	N		X		X		X	X
Carex argyrantha	Sedge	Cyperaceae	N							X
Carex blanda	Sedge	Cyperaceae	N	X	X		X		X	X
Carex caroliniana	Sedge	Cyperaceae	N		X					X
Carex cephalophora	Sedge	Cyperaceae	N							X
Carex conjuncta	Sedge	Cyperaceae	N							X
Carex crinita	Short hair sedge	Cyperaceae	N	X				X		
Carex debilis	Sedge	Cyperaceae	N				X			
Carex digitalis	Sedge	Cyperaceae	N				X			X
Carex festucacea	Sedge	Cyperaceae	N							X
Carex frankii	Sedge	Cyperaceae	N							X
Carex glaucodea	Sedge	Cyperaceae	N							X
Carex gracillima	Sedge	Cyperaceae	N							X
Carex grisea	Sedge	Cyperaceae	N							X
Carex hirtifolia	Sedge	Cyperaceae	N							X
Carex laxiculmis	Sedge	Cyperaceae	N				X		X	X
Carex laxiflora	Sedge	Cyperaceae	N						X	X
Carex lupulina	Sedge	Cyperaceae	N	X						
Carex lurida	Shallow sedge	Cyperaceae	N	X	X		X		X	X
Carex normalis	Sedge	Cyperaceae	N							X
Carex pensylvanica	Sedge	Cyperaceae	N				X		X	X
Carex prasina	Sedge	Cyperaceae	N							X
Carex projecta	Sedge	Cyperaceae								X
Carex radiata	Sedge	Cyperaceae	N	X	X		X		X	X

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

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Carex rosea	Sedge	Cyperaceae	N							X
Carex sparganioides	Sedge	Cyperaceae	N							X
Carex squarrosa	Sedge	Cyperaceae	N							X
Carex stipata	Sedge	Cyperaceae	N	X			X		X	X
Carex stricta	Sedge	Cyperaceae	N				X			
Carex swanii	Sedge	Cyperaceae	N	X	X				X	X
Carex tribuloides	Blunt broom sedge	Cyperaceae	N		X		X			
Carex virescens	Sedge	Cyperaceae	N							X
Carex vulpinoidea	Fox sedge	Cyperaceae	N	X	X	X			X	X
Carpinus caroliniana	Hornbeam	Betulaceae	N	X	X		X	X	X	X
Carya cordiformis	Bitternut hickory	Juglandaceae	N	X	X		X		X	X
Carya glabra	Pignut hickory	Juglandaceae	N	X	X		X	X	X	X
Carya ovata	Shagbark hickory	Juglandaceae	N	X	X		X	X	X	
Carya tomentosa	Mockernut hickory	Juglandaceae	N	X	X		X		X	X
Castanea dentata	American chesnut	Fagaceae	N	X			X		X	X
Catalpa bignonioides	Catalpa	Bignoniaceae	I	X	X	X		X		X
Catalpa speciosa	Cigar tree	Bignoniaceae	I					X	X	
Caulophyllum thalictroides	Squaw-root	Berberidaceae	N							X
Celastrus orbiculatus	Oriental bittersweet	Celastraceae	I	X	X	X	X	X	X	X
Celtis occidentalis	American hackberry	Ulmaceae	N	X	X	X	X		X	
Cephalanthus occidentalis	Buttonbush	Rubiaceae	N				X			
Ceratophyllum demersum	Coontail; hornwort	Ceratophyllaceae	N			X				
Cercidiphyllum japonicum	Katsura tree	Cercidiphyllaceae	I	X			X			X
Cercis canadensis	Redbud	Caesalpiniaceae	N or A		X					X
Chamaesyce maculata	Wartweed; spotted spurge	Euphorbiaceae	N		X					
Chelidonium majus	Greater celandine	Papaveraceae	I	X	X		X			X
Chelone glabra	Turtlehead	Scrophulariaceae	N	X						
Chenopodium album	Lamb's quarters	Chenopodiaceae	I		X				X	
Chenopodium ambrosioides	Mexican-tea	Chenopodiaceae	I				X			
Chimaphila maculata	Pipsissewa	Pyrolaceae	N		X					X
Chionanthus virginicus	Fringe-tree	Oleaceae	N	X						
Chrysanthemum parthenium	Feverfew	Asteraceae	I						X	

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Cichorium intybus	Blue chicory	Asteraceae	I		X				X	
Cimicifuga racemosa	Black snakeroot	Ranunculaceae	N	X			X		X	X
Cinna arundinacea	Wood reedgrass	Poaceae	N	X					X	
Circaea lutetiana	Common enchanter's nightshade	Onagraceae	N	X	X		X	X	X	X
Cirsium arvense	Canada thistle	Asteraceae	I		X	X	X	X	X	
Cirsium vulgare	Bull-thistle	Asteraceae	I						X	
Claytonia virginica	Spring beauty	Portulacaceae	N	X	X		X		X	X
Clematis terniflora	Sweet autumn clematis	Ranunculaceae	I							X
Cleome hasslerana	Spider-flower	Capparaceae	I	X						
Collinsonia canadensis	Horse-balm	Lamiaceae	N	X	X				X	X
Commelina communis	Dayflower	Commelinaceae	I		X			P	X	
Convallaria majalis	Lily-of-the-valley	Liliaceae	I		X				X	
Conyza canadensis	Horseweed	Asteraceae	N		X				X	
Cornus alternifolia	Alternate-leaved dogwood	Cornaceae	N							X
Cornus amomum	Silky dogwood	Cornaceae	N	X	X	X	X	X		
Cornus florida	Flowering dogwood	Cornaceae	N	X	X		X	X	X	X
Coronilla varia	Crown-vetch	Fabaceae	I		X					
Corylus americana	Hazlenut	Betulaceae	N						X	
Crataegus intricata	Hawthorn	Rosaceae	N		X					
Crataegus species	Hawthorn species	Rosaceae	NI	X	X		X		X	X
Crypsis schoenoides	Grass	Poaceae	I				X			
Cryptotaenia canadensis	Honewort	Apiaceae	N	X	X		X	X	X	X
Cucumis species	Cucumber species	Cucurbitaceae	I						X	
Cucurbita species	Pumpkin species	Cucurbitaceae	I		X					
Cuscuta campestris	Dodder	Cuscutaceae	N					X		
Cymbalaria muralis	Kenilworth-ivy	Scrophulariaceae	I		X					X
Cyperus brevifolioides	Sedge	Cyperaceae	I	X		X				
Cyperus cf. Retrofractus	Rough flatsedge	Cyperaceae	N					X		
Cyperus engelmannii	Sedge	Cyperaceae	N					X		
Cyperus esculentus	Sedge	Cyperaceae	N						X	
Cyperus iria	Sedge	Cyperaceae	I				X			

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Cyperus lupulinus	Umbrella-sedge	Cyperaceae	N		X					
Cyperus odoratus	Sedge	Cyperaceae	N			X				
Cyperus strigosus	Sedge	Cyperaceae	N	X		X	X			
Cypripedium calceolus	Yellow lady's slipper	Orchidaceae	N						X	
Cystopteris fragilis	Brittle bladder-fern	Dryopteridaceae	N		X					
Cystopteris tenuis	Fragile fern	Dryopteridaceae	N							X
Dactylis glomerata	Orchard grass	Poaceae	I		X		X		X	
Danthonia spicata	Poverty grass	Poaceae	N		X				X	X
Daucus carota	Queen-anne's lace	Apiaceae	I		X			X		
Dendrocalamus strictus	Bamboo	Poaceae	I		X					
Dennstaedtia punctilobula	Hay-scented fern	Dennstaedtiaceae	N		X		X	X	X	X
Deparia acrostichoides	Silvery glade fern	Dryopteridaceae	N							X
Desmodium canescens	Hoary tick-trefoil	Fabaceae	N	X					X	
Desmodium humifusum	Tick foil	Fabaceae	N					X		
Desmodium paniculatum	Beggar-tick	Fabaceae	N						X	
Desmodium perplexum	Tick-clover	Fabaceae	N						X	
Desmodium species	Desmodium species	Fabaceae	N		X				X	
Deutzia scabra	Deutzia	Hydrangeaceae	I	X						X
Dicentra cucullaria	Dutchman's breeches	Fumariaceae	N						X	
Digitaria ischaemum	Smooth crabgrass	Poaceae	I						X	
Dioscorea batatas	Chinese yam	Dioscoreaceae	I						X	
Dioscorea villosa	Wild yamroot	Dioscoreaceae	N	X				X	X	X
Diospyros virginiana	Persimmon	Ebenaceae	N				X			
Dryopteris carthusiana	Toothed wood fern	Dryopteridaceae	N		X		X		X	
Dryopteris intermedia	Fancy fern	Dryopteridaceae	N				X			X
Dryopteris marginalis	Marginal wood fern	Dryopteridaceae	N		X					X
Duchesnea indica	Indian strawberry	Rosaceae	I	X	X		X	X	X	X
Echinochloa crusgalli	Barnyard grass	Poaceae	I				X	X		
Echinochloa walteri	Barnyard grass	Poaceae	N			X				
Echinocystis lobata	Prickly cucumber	Cucurbitaceae	N	X		X			X	
Eleocharis obtusa	Spike rush	Cyperaceae	N				X			
Eleocharis parvula	Dwarf spike-rush	Cyperaceae	N				X			

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

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Elephantopus carolinianus	Elephant's foot	Asteraceae	N	X						
Elodea nuttallii	Waterweed	Hydrocharitaceae	N	X	X	X	X	X		X
Elymus canadensis	Canada wild-rye	Poaceae	N	X				X		
Elymus hystrix	Bottlebrush grass	Poaceae	N				X	X	X	
Elytrigia repens	Quackgrass	Poaceae	I		X					
Epifagus virginiana	Beechdrops	Orobanchaceae	N	X			X			X
Epigaea repens	Trailing arbutus	Ericaceae	N							X
Epilobium coloratum	Purple leaved willow herb	Onagraceae	N						X	
Equisetum arvense	Field horsetail	Equisetaceae	N	X			X		X	
Erechtites hieraciifolia	Fireweed; pilewort	Asteraceae	N	X	X					
Erigeron annuus	Daisy fleabane	Asteraceae	N		X					
Erigeron philadelphicus	Philadelphia daisy	Asteraceae	N	X	X	X			X	X
Erigeron strigosus	Daisy fleabane	Asteraceae	N		X		X			
Erythronium americanum	Yellow-flowered trout lily	Liliaceae	N	X	X		X		X	X
Euodia hupehensis	Bee-bee tree	Rutaceae	I		X				X	X
Euonymous fortunei	Wintercreeper	Celastraceae	I				X	X		X
Euonymus alatus	Winged euonymus	Celastraceae	I	X	X		X	X		X
Euonymus americanus	Strawberry-bush	Celastraceae	N							X
Euonymus atropurpureus	Burning bush	Celastraceae	N							X
Eupatorium fistulosum	Joe-pye-weed	Asteraceae	N	X				X	X	
Eupatorium hyssopifolium	Hyssop-leaved eupatorium	Asteraceae	N	X					X	
Eupatorium purpureum	Joe-pye-weed	Asteraceae	N		X					X
Eupatorium rotundifolium	Round-leaved boneset	Asteraceae	N						X	X
Eupatorium rugosum	White snakeroot	Asteraceae	N	X	X	X	X	X	X	X
Eupatorium serotinum	Late-flowering thoroughwort	Asteraceae	I	X	X	X	X	X	X	
Euthamia graminifolia	Grass-leaved goldenrod	Asteraceae	N	X			X	X		
Fagus grandifolia	American beech	Fagaceae	N	X	X		X	X	X	X
Fagus sylvatica	Copper beech	Fagaceae	I		X					
Festuca elatior	Fescue	Poaceae	I		X		X		X	
Festuca obtusa	Nodding fescue	Poaceae	N		X				X	X
Festuca rubra	Red fescue	Poaceae	I		X		X			
Floerkea proserpinacoides	Mermaid weed	Limnanthaceae	N				X			

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Forsythia x	Forsythia	Oleaceae	I							X
Fragaria virginiana	Wild strawberry	Rosaceae	N		X			P		
Fraxinus americana	Biltmore ash	Oleaceae	N						X	X
Fraxinus americana	White ash	Oleaceae	N	X	X		X	X	X	X
Fraxinus pennsylvanica	Red ash	Oleaceae	N	X	X	X	X			
Galanthus nivalis	Snowdrop	Liliaceae	I	X						
Galium aparine	Cleavers	Rubiaceae	N	X	X	X	X		X	X
Galium triflorum	Sweet scented bedstraw	Rubiaceae	N					X		
Gaura biennis	Biennial gaura	Onagraceae	N	X						
Gaylussacia frondosa	Dangleberry	Ericaceae	N							X
Geranium carolinianum	Cranesbill; wild geranium	Geraniaceae	N						X	
Geranium maculatum	Wild geranium	Geraniaceae	N	X	X				X	X
Geum aleppicum	Yellow avens	Rosaceae	I	X						
Geum canadense	White avens	Rosaceae	N	X	X	X	X	X	X	X
Geum virginianum	Cream-colored avens	Rosaceae	N		X					
Ginkgo biloba	Ginkgo	Ginkgoaceae	I		X	X				
Glechoma hederacea	Gill-over-the-ground	Lamiaceae	I	X	X		X	X	X	X
Gleditsia triacanthos	Honey-locust	Caesalpiniaceae	N		X	X	X	X	X	X
Glyceria striata	Fowl mannagrass	Poaceae	N		X		X	X	X	
Gnaphalium obtusifolium	Fragrant cudweed	Asteraceae	N				X			
Gratiola species	Gratiola species	Scrophulariaceae	N				X			
Gymnocarpium dryopteris	Oak fern	Dryopteridaceae	N				X			
Gymnocladus dioica	Kentucky coffee-tree	Caesalpiniaceae	N	X	X			X		X
Hackelia virginiana	Beggar's-lice	Boraginaceae	N							X
Halesia carolina	Carolina silverbells	Styracaceae	A	X					X	X
Hamamelis virginiana	Witch hazel	Hamamelidaceae	N	X	X		X	X	X	X
Hedera helix	English ivy	Araliaceae	I	X	X			X	X	X
Helianthus decapetalus	Thin-leaved sunflower	Asteraceae	N	X					X	
Helianthus divaricatus	Rough sunflowe	Asteraceae	N	X						
Helianthus species	Sunflower species	Asteraceae	NI					X	X	
Helianthus tuberosus	Jerusalem artichoke	Asteraceae	A	X				X		
Hemerocallis fulva	Orange day-lily	Liliaceae	I		X		X	X	X	X

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Heracleum lanatum	Cow-parsnip	Apiaceae	N			X			X	
Hesperis matronalis	Dame's-rocket	Brassicaceae	I		X		X			X
Heteranthera multiflora	Mud-plantain	Pontederiaceae	N			X		X		
Heternathera reniformis	Mud-plantain	Pontederiaceae	N	X						
Heuchera americana	Alum-root	Saxifragaceae	N						X	
Hibiscus moscheutos	Rose-mallow	Malvaceae	N				X			
Hibiscus syriacus	Rose-of-sharon	Malvaceae	I	X				X		
Hieracium flagellare	Hawkweed	Asteraceae	I		X					
Hieracium paniculatum	Hawkweed	Asteraceae	N						X	
Hieracium venosum	Rattlesnake-weed	Asteraceae	N							X
Holcus lanatus	Velvet grass	Poaceae	I		X					
Hosta ventricosa	Blue plantain-lily	Liliaceae	I	X	X				X	X
Houstonia caerulea	Bluets; quaker-ladies	Rubiaceae	N							X
Humulus japonicus	Japanese hops	Cannabaceae	I	X	X		X	X	X	X
Hydrangea quercifolia	Oak-leaved hydrangea	Hydrangeaceae	I							X
Hydrilla verticillata	Hydrilla	Hydrocharitaceae	I		X					
Hydrophyllum canadense	Broad-leaved waterleaf	Hydrophyllaceae	N	X						X
Hydrophyllum virginianum	Virginia waterleaf	Hydrophyllaceae	N				X			X
Hypericum perforatum	St. john's wort	Clusiaceae	I	X	X					
Hypoecheris radicata	Cat's-ear	Asteraceae	I		X					
Hypoxis hirsuta	Yellow star-grass	Liliaceae	N							X
Ilex crenata	Japanese holly	Aquifoliaceae	I		X				X	X
Ilex opaca	American holly	Aquifoliaceae	N	X	X		X			X
Ilex verticillata	Winterberry	Aquifoliaceae	N				X	X		
Impatiens capensis	Jewelweed	Balsaminaceae	N	X	X		X	X	X	X
Impatiens pallida	Pale-jewelweed	Balsaminaceae	N		X		X		X	X
Iris pseudoacorus	Water flag; yellow iris	Iridaceae	I		X		X			
Juglans cinerea	Butternut	Juglandaceae	N	X						
Juglans nigra	Black walnut	Juglandaceae	N	X	X		X	X	X	X
Juncus acuminatus	Tapertip rush	Juncaceae	N		X		X			
Juncus dichotomus	Forked rush	Juncaceae	N				X			
Juncus effusus	Soft rush	Juncaceae	N	X	X	X	X			

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Juncus tenuis	Poverty rush	Juncaceae	N	X	X	X	X		X	X
Juniperus communis	Common juniper	Cupressaceae	N				X			
Juniperus virginiana	Red cedar	Cupressaceae	N				X			
Jusseia repens	Water primrose	Onagraceae			X					
Kalmia latifolia	Mountain laurel	Ericaceae	N							X
Kalopanax pictus	Kalopanax	Araliaceae	I							X
Lactuca biennis	Blue lettuce	Asteraceae	N	X	X					
Lactuca canadensis	Wild lettuce	Asteraceae	N	X	X				X	
Lamium purpureum	Purple dead-nettle	Lamiaceae	I			X				
Laportea canadensis	Wood nettle	Urticaceae	N	X	X		X	X	X	X
Lappula squarrosa	Beggar's-lice	Boraginaceae	I	X						
Lathyrus latifolius	Perennial sweetpea	Fabaceae	I	X						
Leersia oryzoides	Rice cutgrass	Poaceae	N			X				
Leersia virginica	Whitegrass	Poaceae	N		X		X		X	X
Legousia speculum-veneris	Venus's-looking-glass	Campanulaceae	I						X	
Lemna minor	Duckweed; water lentils	Lemnaceae	N		X					
Leonurus cardiaca	Common motherwort	Lamiaceae	I						X	
Lepidium virginicum	Poor man's pepper	Brassicaceae	N		X				X	
Ligustrum obtusifolium	Privet	Oleaceae	I	X	X	X	X	X	X	X
Ligustrum vulgare	Common privet	Oleaceae	I		X					
Linaria canadensis	Old-field toadflax	Scrophulariaceae	N						X	
Linaria vulgaris	Butter-and-eggs	Scrophulariaceae	I		X		X			
Lindera benzoin	Spicebush	Lauraceae	N	X	X		X	X	X	X
Lindernia dubia	False pimpernel	Scrophulariaceae	N				X		X	
Liquidambar styraciflua	Sweet gum	Hamamelidaceae	N	X	X	X	X	X		
Liriodendron tulipifera	Tulip poplar	Magnoliaceae	N	X	X		X	X	X	X
Lobelia chinensis	Chinese lobelia	Campanulaceae	I					X		
Lobelia inflata	Indian-tobacco	Campanulaceae	N	X				X		
Lolium perenne	Perenniel ryegrass	Poaceae	I		X					
Lonicera japonica	Japanese honeysuckle	Caprifoliaceae	I	X	X	X	X	X	X	X
Lonicera maackii	Amur honeysuckle	Caprifoliaceae	I	X	X		X	X		X
Lonicera morrowii	Morrow's honeysuckle	Caprifoliaceae	I		X					X

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Lonicera sempervirens	Trumpet honeysuckle	Caprifoliaceae	N					X	X	X
Ludwigia palustris	Water purslane	Onagraceae	I				X	X		
Ludwigia peploides	Primrose-willow	Onagraceae	N			X				
Luzula multiflora	Field wood-rush	Juncaceae	N		P		P		X	X
Lycopus europaeus	European water-horehound	Lamiaceae	I	X		X	X			
Lycopus species	Bugleweed species	Lamiaceae	NI		X					X
Lysimachia ciliata	Fringed loosestrife	Primulaceae	N		X		X	X	X	
Lysimachia nummularia	Moneywort	Primulaceae	I				X			
Lysimachia quadrifolia	Whorled loosestrife	Primulaceae	N		X				X	X
Lythrum salicaria	Purple loosestrife	Lythraceae	I		X	X	X	X	X	
Magnolia tripetala	Umbrella magnolia	Magnoliaceae	A	X	X		X		X	X
Maianthemum canadense	Canada mayflower	Liliaceae	N							X
Malus species	Apple species	Rosaceae	I					X		X
Matricaria matricarioides	Pineappple-weed	Asteraceae	I		X					
Matteuccia struthiopteris	Ostrich fern	Dryopteridaceae	N							X
Mazus species	Mazus species	Scrophulariaceae	I				X			
Medeola virginiana	Indian cucumber-root	Liliaceae	N				X			X
Melilotus alba	White sweet-clover	Fabaceae	I		X					
Melilotus officinalis	Yellow sweet-clover	Fabaceae	I	X	X					
Menispermum canadense	Moonseed	Menispermaceae	N		X					
Mertensia virginica	Virginia bluebells	Boraginaceae	N							X
Microstegium vimineum	Stilt grass	Poaceae	I	X	X		X	X	X	X
Mimulus alatus	Winged monkey-flower	Scrophulariaceae	N				X			
Mirabilis nyctaginea	Heart-leaved umbrella-wort	Nyctaginaceae	I		X					
Miscanthus sinensis	Japanese plumegrass	Poaceae	I					X		
Mitchella repens	Partridge-berry	Rubiaceae	N				X			X
Mollugo verticillata	Carpet-weed	Molluginaceae	I					X		
Monotropa uniflora	Indian-pipe	Monotropaceae	N						X	X
Morus alba	White mulberry	Moraceae	I	X	X	X	X	X	X	X
Morus rubra	Red mulberry	Moraceae	N		X		X			
Muhlenbergia schreberi	Dropseed	Poaceae	N		X				X	
Myosotis laxa	Wild forget-me-not	Boraginaceae	N		X					

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Myosotis scorpioides	Water scorpion-grass	Boraginaceae	I		X					
Myosoton aquatica	Giant chickweed	Caryophyllaceae	I				X			
Myriophyllum spicatum	Eurasian wataer milfoil	Haloragaceae	I		X					
Narcissus pseudonarcissus	Daffodil	Liliaceae	I	X			X			X
Nasturtium officinale	Watercress	Brassicaceae	I				X		X	X
Nuphar lutea	Spatterdock	Nymphaeaceae	N		X			X		
Nymphaea odorata	Fragrant water-lily	Nymphaeaceae	N		X					
Nyssa sylvatica	Sour gum	Nyssaceae	N	X	X		X	X	X	X
Oenothera biennis	Common evening-primrose	Onagraceae	N		X	X		X		
Onoclea sensibilis	Sensitive fern	Dryopteridaceae	N	X	X		X	X	X	X
Ornithogalum umbellatum	Star-of-bethleham	Liliaceae	I		X		X		X	X
Orobanche uniflora	Broom-rape; cancer root	Orobanchaceae	N				X			
Osmorhiza claytonii	Sweet cicely	Apiaceae	N	X					X	X
Osmorhiza longistylis	Anise-root	Apiaceae	N	X	X			X	X	X
Osmunda cinnamomea	Cinnamon fern	Osmundaceae	N		X		X	X		X
Ostrya virginiana	Hop-hornbeam	Betulaceae	N	X			X			
Oxalis stricta	Yellow wood -sorrel	Oxalidaceae	N		X		X		X	X
Pachysandra terminalis	Japanese spurge	Buxaceae	I	X						X
Panax trifolius	Dwarf ginseng	Araliaceae	N	X			X			X
Panicum acuminatum	Panic-grass	Poaceae	N		X					X
Panicum anceps	Beaked panicum	Poaceae	N		X					
Panicum clandestinum	Deer-tongue grass	Poaceae	N		X		X		X	X
Panicum dichotomiflorum	Smooth panic-grass	Poaceae	N						X	
Panicum dichotomum	Panic-grass	Poaceae	N							X
Panicum microcarpon	Panic-grass	Poaceae	N						X	
Panicum virgatum	Switch grass	Poaceae	N				X			
Paronychia canadensis	Forked chickweed	Caryophyllaceae	N						X	X
Parthenocissus quinquefolia	Virginia creeper	Vitaceae	N	X	X	X	X	X	X	X
Pastinaca sativa	Wild parsnip	Apiaceae	I			X				
Paulownia tomentosa	Princess-tree	Bignoniaceae	I	X	X		X	X	X	X
Pellaea atropurpurea	Purple cliff-brake	Adiantaceae	N					X		
Peltandra virginica	Arrow-arum	Araceae	N			X	X	X		

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Penstemon digitalis	Beard-tongue	Scrophulariaceae	N				X			
Penthorum sedoides	Ditch stonecrop	Saxifragaceae	N					X		
Phalaris arundinacea	Reed canary-grass	Poaceae	N			X	X		X	X
Phalaris canariensis	Canary-grass	Poaceae	I	X						
Phegopteris hexagonoptera	Broad beech fern	Thelypteridaceae	N				X		X	X
Phellodendron lavallei	Corktree	Rutaceae	I							X
Phellodendron species	Cork tree species	Rutaceae	I		X		X			X
Philadelphus coronarius	Mock-orange	Hydrangeaceae	I		X					X
Phleum pratense	Timothy	Poaceae	I		X					
Phlox paniculata	Summer pholx	Polemoniaceae	N					X		
Photinia parviflora	Photinia	Rosaceae	I							X
Photinia villosa	Photinia	Rosaceae	I							X
Phragmites australis	Common reed	Poaceae	N	X	X	X	X	X		X
Phytolacca americana	Pokeweed	Phytolaccaceae	N	X	X	X	X	X	X	X
Picea abies	Norway spruce	Pinaceae	I					X		X
Picea pungens	Blue spruce	Pinaceae						X		
Pilea pumila	Clearweed	Urticaceae	N	X	X		X	X	X	X
Pinus rigida	Pitch pine	Pinaceae	N		X		X			
Pinus strobus	White pine	Pinaceae	N	X	X	X	X	X		X
Pinus sylvestris	Scots pine	Pinaceae	I		X			X		X
Plantago lanceolata	English plantain; ribgrass	Plantaginaceae	I		X					
Plantago major	Broadleaf plantain	Plantaginaceae	I	X	X					
Plantago rugelii	Common plantain	Plantaginaceae	N				X			
Platanus occidentalis	Sycamore	Platanaceae	N	X	X		X	X	X	X
Poa compressa	Canada bluegrass	Poaceae	I	X						
Poa pratensis	Kentucky bluegrass	Poaceae	I	X	X		X			
Podophyllum peltatum	May-apple	Berberidaceae	N	X	X		X	X	X	X
Polemonium reptans	Greek valerian	Polemoniaceae	N				X			
Polygonatum biflorum	Solomon's seal	Liliaceae	N	X	X			X	X	
Polygonatum pubescens	Solomon's seal	Liliaceae	N		X					X
Polygonum arifolium	Halberd-leaved tearthumb	Polygonaceae	N					X		X
Polygonum aviculare	Knotweed	Polygonaceae	I		X		X	X		

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Polygonum caespitosum	Low smartweed	Polygonaceae	I	X	X	X	X	X	X	X
Polygonum convolvulus	Black bindweed	Polygonaceae	I						X	
Polygonum cuspidatum	Japanese knotweed	Polygonaceae	I	X	X	X	X	X	X	X
Polygonum hydropiper	Common smartweed	Polygonaceae	I				X			
Polygonum hydropiperoides	Mild water-pepper	Polygonaceae	N							X
Polygonum pensylvanicum	Smartweed	Polygonaceae	N		X			X		
Polygonum perfoliatum	Mile-a-minute	Polygonaceae	I	X	X		X			X
Polygonum punctatum	Dotted smartweed	Polygonaceae	N	X			X	X		
Polygonum sagittatum	Arrow-leaved tearthumb	Polygonaceae	N	X						
Polygonum scandens	Climbing false-buckwheat	Polygonaceae	N		X					
Polygonum virginianum	Jumpseed	Polygonaceae	N	X	X		X	X	X	X
Polypodium virginianum	Rock polypody	Polypodiaceae	N							X
Polystichum acrostichoides	Christmas fern	Dryopteridaceae	N				X	X	X	X
Poncirus trifoliata	Hardy orange	Rutaceae	I							X
Populus alba	White poplar	Salicaceae	I			X				
Populus deltoides	Cottonwood	Salicaceae	N		X	X	X		X	
Populus grandidentata	Large-toothed aspen	Salicaceae	N	X						
Populus x	Carolina poplar	Salicaceae						X		
Portulaca oleracea	Purslane	Portulacaceae	N		X			X		
Potamogeton crispus	Curly pondweed	Potamogetonaceae	I	X						
Potentilla canadensis	Cinquefoil	Rosaceae	N				X			
Potentilla recta	Sulfur cinquefoil	Rosaceae	I		X					
Potentilla simplex	Old-field cinquefoil	Rosaceae	N		X					X
Prenanthes altissima	Tall white lettuce	Asteraceae	N	X	X		X		X	
Prenanthes serpentaria	Lion's foot	Asteraceae	N	X						
Prenanthes species	Prenanthes species	Asteraceae	N						X	
Prenanthes trifoliolata	Gall-of-the-earth	Asteraceae	N	X			X			X
Prunella vulgaris	Heal-all	Lamiaceae	N					X		
Prunus avium	Bird cherry	Rosaceae	I	X	X		X		X	X
Prunus serotina	Wild black cherry	Rosaceae	N	X	X	X	X	X	X	X
Prunus subhirtella	Cherry	Rosaceae			X					X
Prunus virginiana	Choke-cherry	Rosaceae	N		X	X				

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Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Pseudosasa japonica	Bamboo	Poaceae	I							X
Pteridium aquilinum	Bracken fern	Dennstaedtiaceae	N							X
Pycnanthemum tenuifolium	Mountain-mint	Lamiaceae	N					X		X
Pyrus coronaria	Crabapple	Rosaceae		X						
Quercus alba	White oak	Fagaceae	N	X	X	X	X	X	X	X
Quercus bicolor	Swamp oak	Fagaceae	N					X		X
Quercus coccinea	Scarlet oak	Fagaceae	N	X	X	X			X	
Quercus falcata	Spanish oak	Fagaceae	N		X				X	
Quercus montana	Chestnut oak	Fagaceae	N							X
Quercus palustris	Pin oak	Fagaceae	N	X	X	X	X	X	X	
Quercus phellos	Willow oak	Fagaceae	N						X	
Quercus rubra	Red oak	Fagaceae	N	X	X	X	X	X	X	X
Quercus velutina	Black oak	Fagaceae	N	X	X		X	X	X	X
Ranunculus abortivus	Small flowered crowfoot	Ranunculaceae	N	X	X		X			X
Ranunculus bulbosus	Bulbous buttercup	Ranunculaceae	I				X			
Ranunculus ficaria	Lesser celandine	Ranunculaceae	I	X	X		X		X	X
Ranunculus hispidus	Hairy buttercup	Ranunculaceae	N				X			
Ranunculus recurvatus	Hooked crowfoot	Ranunculaceae	N				X			X
Ranunculus sceleratus	Cursed crowfoot	Ranunculaceae	I				X			
Rhododendron maximum	Great rhododendron	Ericaceae	N							X
Rhododendron periclymenoides	Pinxter-flower	Ericaceae	N	X	X				X	X
Rhododendron species	Rhododendron species	Ericaceae	NI	X						X
Rhodotypos scandens	Jetbead	Rosaceae	I	X	X		X		X	X
Rhus copallina	Shining sumac	Anacardiaceae	N		X				X	
Rhus glabra	Smooth sumac	Anacardiaceae	N	X					X	
Rhus typhina	Staghorn sumac	Anacardiaceae	N		X			X	X	
Robinia hispida	Bristly locust	Fabaceae	A	X						
Robinia pseudoacacia	Black locust	Fabaceae	A	X	X	X	X	X	X	X
Rorippa palustris	Marsh watercress	Brassicaceae	N				X		X	
Rosa multiflora	Multiflora rose	Rosaceae	I	X	X	X	X	X	X	X
Rubus allegheniensis	Common blackberry	Rosaceae	N	X	X	X	X	X	X	X
Rubus flagellaris	Prickly dewberry	Rosaceae	N		X					X

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Rubus laciniatus	Cut-leaved blackberry	Rosaceae	I			X				
Rubus occidentalis	Black raspberry	Rosaceae	N		X		X		X	
Rubus phoenicolasius	Wineberry	Rosaceae	I	X	X		X	X	X	X
Rudbeckia hirta	Black-eyed susan	Asteraceae	N					X	X	
Rudbeckia laciniata	Tall coneflower	Asteraceae	N	X				X	X	
Rudbeckia triloba	Coneflower	Asteraceae	N						X	
Rumex acetosa	Garden sorrel	Polygonaceae	I				X			
Rumex crispus	Curly dock	Polygonaceae	I		X	X	X			
Rumex obtusifolius	Bitter dock	Polygonaceae	I		X		X			X
Rumex patientia	Patience dock	Polygonaceae	I	X	X	X	X			
Rumex species	Dock species	Polygonaceae							X	
Sagina procumbens	Bird's-eye	Caryophyllaceae	N		X					
Sagittaria graminea	Grass-leaved arrowhead	Alismataceae						X		
Sagittaria latifolia	Common arrow-head	Alismataceae	N	P	X		X	P	P	
Sagittaria subulata	Strap-leaf arrowhead	Alismataceae	N					X		
Salix babylonica	Weeping willow	Salicaceae	I	X		X		X	X	
Salix nigra	Black willow	Salicaceae	N	X	X	X	X	P	X	
Salvia lyrata	Lyre-leaved sage	Lamiaceae	N		X					
Sambucus canadensis	American elder	Caprifoliaceae	N	X	X	X	X	X	X	X
Sanguinaria canadensis	Bloodroot	Papaveraceae	N	X	X		X		X	X
Sanicula canadensis	Snake-root	Apiaceae	N	X			X		X	
Sanicula marilandica	Black snake-root	Apiaceae	N						X	
Sanicula odorata	Fragrant snake-root	Apiaceae	N		X		X		X	X
Sassafras albidum	Sassafras	Lauraceae	N	X	X		X		X	X
Saururus cernuus	Lizard's tail	Saururaceae	N				X			
Saxifraga virginiensis	Early saxifrage	Saxifragaceae	N				X			
Schizachyrium scoparium	Little bluestem	Poaceae	N						X	
Schoenoplectus pungens	Chairmaker's rush; three square	Cyperaceae	N			X				
Scirpus cyperinus	Wool grass	Cyperaceae	N	X						
Scirpus georgianus	Georgia bulrush	Cyperaceae	N		X		X		X	
Scirpus hattorianus	Mosquito bulrush	Cyperaceae	N	X	X		X		X	
Scirpus polyphyllus	Bulrush	Cyperaceae	N				X			

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Scleranthus annuus	Knawel	Caryophyllaceae	I		X					
Scrophularia marilandica	Figwort	Scrophulariaceae	N					X		
Scutellaria elliptica	Hairy skullcap	Lamiaceae	N						X	
Scutellaria lateriflora	Mad-dog skullcap	Lamiaceae	N	X				X		
Senecio vulgaris	Common groundsel	Asteraceae	I		X	X				
Setaria faberi	Giant foxtail	Poaceae	I					X	X	
Setaria pumila	Yellow foxtail	Poaceae	I						X	
Sicyos angulatus	Bur cucumber	Cucurbitaceae	N	X				X		
Silene alba	White campion	Caryophyllaceae	I	X						
Silene antirrhina	Sleepy catchfly	Caryophyllaceae	N						X	
Silene latifolia	Bladder campion	Caryophyllaceae	I		X					
Silene stellata	Starry campion	Caryophyllaceae	N	X					X	X
Silphium perfoliatum	Cup-plant	Asteraceae	I	X						
Sisyrinchium angustifolium	Blue-eyed grass	Iridaceae	N		X		X		X	
Smilacina racemosa	False solomon's-seal	Liliaceae	N	X	X		X	X	X	X
Smilax glauca	Sawbrier	Smilacaceae	N					X	X	X
Smilax herbacea	Carrion flower	Smilacaceae	N	X					X	X
Smilax cf pulverulenta	Carrion flower	Smilacaceae	N						X	
Smilax rotundifolia	Common catbrier	Smilacaceae	N	X	X		X		X	X
Solanum carolinense	Horse-nettle	Solanaceae	N		X					
Solanum dulcamara	Trailing nightshade	Solanaceae	I		X	X			X	X
Solanum luteum	Nightshade	Solanaceae	I			X				
Solanum nigrum	Black nightshade	Solanaceae	I	X						
Solanum species	Solanum species	Solanaceae								X
Solanum tuberosum	Potato	Solanaceae	I						X	
Solidago arguta	Forest goldenrod	Asteraceae	N	X						
Solidago bicolor	Silverrod	Asteraceae	N	X						X
Solidago caesia	Blue-stemmed goldenrod	Asteraceae	N	X	X			X	X	X
Solidago canadensis	Canada goldenrod	Asteraceae	N		X		X	X	X	
Solidago flexicaulis	Zigzag goldenrod	Asteraceae	N							X
Solidago gigantea	Smooth goldenrod	Asteraceae	N		X					
Solidago juncea	Early goldenrod	Asteraceae	N					X		

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Solidago nemoralis	Wreath goldenrod	Asteraceae	N	X						X
Solidago rugosa	Rough goldenrod	Asteraceae	N	X	X				X	X
Solidago sempervirens	Seaside goldenrod	Asteraceae	I			X				
Sonchus oleraceus	Milk-thistle	Asteraceae	I		X	X				
Sophora japonica	Japanese pagoda	Fabaceae	I		X					X
Sorghastrum nutans	Indian grass	Poaceae	N						X	
Spirodela polyrhiza	Greater duckweed	Lemnaceae	N		X					
Staphylea trifolia	Bladdernut	Staphyleaceae	N		X		X			X
Stellaria alsine	Bog chickweed	Caryophyllaceae	I				X			
Stellaria media	Common chickweed	Caryophyllaceae	I		X		X			X
Stellaria pubera	Great chickweed	Caryophyllaceae	N		X					X
Symphoricarpos albus	Snowberry	Caprifoliaceae	I		X		X			
Symphoricarpos orbiculatus	Coralberry	Caprifoliaceae	N							X
Symplocarpus foetidus	Skunk cabbage	Araceae	N	X	X		X	X	X	X
Symplocos paniculatus	Sapphire-berry	Styracaceae	I							X
Taraxacum officinale	Common dandelion	Asteraceae	I		X		X		X	X
Thalictrum pubescens	Tall meadow rue	Ranunculaceae	N	P			X	X	X	
Thelypteris noveboracensis	New york fern	Thelypteridaceae	N		X		X	X	X	X
Thlaspi arvense	Field penny-cress	Brassicaceae	I			X				
Tilia americana	American basswood	Tiliaceae	N	X	X		X	X		X
Tipularia discolor	Cranefly orchid	Orchidaceae	N		X					
Toxicodendron radicans	Poison ivy	Anacardiaceae	N	X	X	X	X	X	X	X
Tradescantia ohiensis	Spiderwort	Commelinaceae	N	X					X	
Tradescantia virginiana	Spiderwort	Commelinaceae	N						X	
Trichomanes boschianum	Bristle-fern	Hymenophyllaceae							X	
Tridens flavus	Purple-top	Poaceae	N	X	X		X		X	
Trientalis borealis	Star-flower	Primulaceae	N	X						
Trifolium pratense	Red clover	Fabaceae	I						X	
Trifolium repens	Dutch clover	Fabaceae	I		X		X			
Trigonella procumbens	Fenugreek	Fabaceae	I		X					
Trillium cuneatum	Huger's trillium	Liliaceae	I							X
Triodanis perfoliata	Venus's-looking-glass	Campanulaceae	N		X					

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Tsuga canadensis	Hemlock	Pinaceae	N	X	X		X	X		X
Typha latifolia	Common cattail	Typhaceae	N	X	X	X	X		X	
Ulmus americana	American elm	Ulmaceae	N	X	X			X	X	X
Ulmus parvifolia	Chinese elm	Ulmaceae	I							X
Ulmus pumila	Siberian elm	Ulmaceae	I	X		X				
Ulmus rubra	Slippery elm	Ulmaceae	N	X	X				X	X
Urtica dioica	Stinging nettle	Urticaceae	I	X	X	X	X	P	X	X
Uvularia sessilifolia	Sessile-leaved bellwort	Liliaceae	N					X		X
Vaccinium corymbosum	Highbush blueberry	Ericaceae	N							X
Vaccinium pallidum	Lowbush blueberry	Ericaceae	N				X			X
Vaccinium stamineum	Deerberry	Ericaceae	N							X
Vallisneria americana	Eel grass	Hydrocharitaceae	N		X			X		
Veratrum viride	False hellebore	Liliaceae	N				X			
Verbascum blattaria	Moth mullein	Scrophulariaceae	I		X			X	X	
Verbascum thapsus	Common mullein	Scrophulariaceae	I		X				X	
Verbena urticifolia	White vervain	Verbenaceae	N					X		
Vernonia noveboracensis	New york ironweed	Asteraceae	N					X		
Veronica hederifolia	ivy-leaved speedwell	Scrophulariaceae	I	X	X					X
Veronica peregrina	Neckweed	Scrophulariaceae	N		X					
Veronica serpyllifolia	Thyme-leaved speedwell	Scrophulariaceae	I				X			
Veronicastrum viginicum	Culver's-root	Scrophulariaceae	N						X	
Viburnum acerifolium	Maple-leaved viburnum	Caprifoliaceae	N	X	X		X	X	X	X
Viburnum dentatum	Downy arrow-wood	Caprifoliaceae	N	X	X		X	X	X	X
Viburnum dilatatum	Linden viburnum	Caprifoliaceae	I							X
Viburnum plicatum	Doublefile viburnum	Caprifoliaceae	I	X	X				X	X
Viburnum prunifolium	Black-haw	Caprifoliaceae	N	X	X		X	X	X	X
Viburnum recognitum	Arrow-wood	Caprifoliaceae	N		X				X	X
Viburnum sieboldii	Siebold viburnum	Caprifoliaceae	I	X	X			X	X	X
Vicia species	Vetch species	Fabaceae	NI				X			
Vinca minor	Common periwinkle	Apocynaceae	I	X				X		X
Viola affinis	Leconte's violet	Violaceae	N				X			
Viola canadensis	Canada violet	Violaceae	N	X						

Appendix A-1.1 (continued). Inventory of plant occurrence in the Fairmount Park system during the 1998 survey ('X' = present; 'P' = probable). Status codes are 'I' = introduced; 'N' = native to Philadelphia; 'A' = native to US, not Philadelphia. Status taken from Rhoads and Klein (1993);'N' includes some eastern North American species introduced to the area.

Scientific Name	Common Name	FAMILY	Status	Cobbs Creek Park	Fairmount East and West Park	FDR Park	Pennypack Park	Poquessing Park	Tacony Creek Park	Wissahickon Creek Park
Viola cucullata	Blue marsh violet	Violaceae	N							X
Viola macloskeyi	Sweet white violet	Violaceae	N							X
Viola pubescens	Downy yellow violet	Violaceae	N	X			X		X	X
Viola rotundifolia	Round-leaved violet	Violaceae	N							X
Viola sororia	Common blue violet	Violaceae	N	X	X		X	X	X	X
Vitis aestivalis	Summer grape	Vitaceae	N						X	X
Vitis labrusca	Fox grape	Vitaceae	N						X	
Vitis riparia	Riverbank grape	Vitaceae	N		X		X	X	X	
Vitis vulpina	Frost grape	Vitaceae	N	X	X		X		X	X
Vulpia myuros	Foxtail fescue	Poaceae	I						X	
Waldsteinia fragarioides	Barren strawberry	Rosaceae	N						X	
Wisteria sinensis	Chinese wisteria	Fabaceae	I	X			P	P		X
Wolffia columbiana	Water-meal	Lemnaceae	N		X					
Xanthorhiza simplicissima	Shrub yellowroot	Berberidaceae	I							X
Zanthoxylum species	Prickly-ash species	Rutaceae	NI							X
Zosterella dubia	Water-stargrass	Pontederiaceae	N					X		

Elephantopus carolinianus in Cobbs Creek Park

The Pennsylvania endangered plant *Elephantopus carolianianus* (elephant's foot) was recorded from one site in Cobbs Creek Park during surveys for the 1983 Master Plan and in subsequent surveys. As part of preparation of the restoration master plan, elephant's foot was found at several sites in Cobbs Creek Park. Elephant's foot is located within polygon V67A; protection and enhancement of this area is recommended. Several patches of elephant's foot are near recommended restoration sites. No adverse impact due to restoration is expected, assuming care is taken to avoid disturbing the elephant's foot patches (e.g., as staging areas for restoration). Ultimately, restoration would be expected to benefit the species, by controlling invasive plants, improving hydrology, etc. The species could be propagated and planted in the park as part of restoration efforts. Control of invasive species (particularly Japanese knotweed) is recommended in various parts of Cobbs Creek, but elephant's foot was not found near these polygons.

Elephant's foot was found along Cobbs Creek at three locations in Carroll Park, one location in Cobbs Creek Golf Course, one location in Karakung Golf Course, and at a number of nearby sites in the forest east of Karakung Golf Course (i.e., near the Millbourne Dam). Some of this last group is within polygon V67a. This site is singled out for protection and enhancement and planting of native herbs in the understory of the woods north of the trail along which elephant's foot was found. These activities would not affect the elephant's foot. Elephant's foot was not located within any areas where other restoration activities are recommended, although it was found near restoration sites V84, V85, S21, S25.

While there were some differences among the various sites at which elephant's foot was found, a typical habitat for it in Cobbs Creek could be defined. It was generally found in moist areas near Cobbs Creek on or above the flood plain, but not on the lowest flood plain surface. While it often occurred near the mouths of small streams and seeps, it was not found farther upstream along these tributaries. Although it occurred within wooded areas, elephant's foot was almost always found at edges (the creek bank or trail edge). In fact, most plants were found at the immediate edge of trails. Although dense patches of Japanese knotweed or goutweed were often present in the general area, these species were usually absent or sparse from the patches where elephant's foot occurred.

Appendix A-1.2. List of species in the Philadelphia area, from Kalm (1770). The species are listed in his order, from most to least common. Entries are either from his annotated list (not in parentheses) or additional notes taken from other writings (in parentheses).

Presumptive Identification	**Name in Kalm (If Different from Current)**	**Current Species Name**	**Notes**
White oak		*Quercus alba*	good ground
Black oak		*Quercus velutina*	
Spanish oak	*Quercus hispanica*	*Quercus falcata*	
Hickory spp.	*Juglans alba*	*Carya* spp.	3-4 varieties
Allegheny blackberry		*Rubus occidentalis*	("grows everywhere in fields"; one of the first plants to grow on uncultivated fields)
Red maple		*Acer rubrum*	swamps (often with alder)
Smooth sumac		*Rhus glabra*	Woods, high glades and old corn fields
Fox and frost grapes		*Vitis labrusca* and *vulpina*	(Mainly at edges of woods, grain fields, and along fences; sometimes climbing to the tops of trees; very abundant in woods)
American elder		*Sambucus canadensis*	Hedges and on glades
Willow oak		*Q. phellos*, swamp oak	In morasses
Azalea sp.	*Azalea lutea*	*Rhododendron* spp.	Dry places in woods
Hawthorn	*Crataegus crus galli*, cockspur thorn	*Crataegus* spp.	Woods (planted as hedge; plentiful in Pennsylvania, both native and planted)
huckleberry/blueberry	*Vaccinium*, whortleberry shrub	*Gaylussacia/ Vaccinium*	
Chestnut oak		*Quercus michauxii*	"good ground"
Flowering dogwood		*Cornus florida*	All kinds of soil (abundant in woods)
Tulip poplar		*Liriodendron tulipifera*	Every kind of soil (high and low ground, all sorts of dry soil, everywhere in the woods, in fallow fields)
Choke cherry		*Prunus virginiana*	
Vaccinium sp. 2	*Frutex* swamp whortleberry		In good ground
Winterberry		*Ilex verticillata*	Swamps
Sycamore	Water-beech	*Platanus occidentalis*	(in plenty on shores of Delaware; low places, esp edge of rivers and brooks; planted on dikes in places, e.g., New Jersey)
Sour gum	*Nyssa*, tupelo	*Nyssa sylvatica*	on fields and mountains
Sweet gum		*Liquidambar styraciflua*	Near springs
Alder	*Betula alnus* (alder)		a shrub

Appendix A-1.2 (continued). List of species in the Philadelphia area, from Kalm (1770). The species are listed in his order, from most to least common. Entries are either from his annotated list (not in parentheses) or additional notes taken from other writings (in parentheses).

Presumptive Identification	Name in Kalm (If Different from Current)	Current Species Name	Notes
American chestnut	chestnut	*Castanea dentata*	Corn fields, pastures and on wooded hills (often left in fields)
Black walnut		*Juglans nigra*	Same places as American chestnut (most commonly in forests, also on hills and fields and along fences)
American elm		*Ulmus americana*	
Sassafras	*Prunus spinosa,* sloe shrub	*Sassafras albidum*	In low places Loose soil mixed with sand (abundant scattered up and down woods and near bushes and fences; one of the first to come on uncultivated land; left standing in places when cutting woods as shade for cattle)
Currant sp.	*Ribes nigrum*, currant tree	*Ribes* spp.	Low places and in marshes
Ash sp.	*Fraxinus excelsior* (ash)	*Fraxinus* sp.	Low places
Laurel-leaved geenbrier	rough bindweed with the bay leaf	*Smilax laurifolia*	In woods and near fences
Mountain laurel		*Kalmia latifolia*	On the northern side of hills
Red mulberry		*Morus rubra*	Fields, hills and near houses
Poison sumac	poison sumach	*Toxicodendron vernix*	Wet places
Red oak		*Quercus rubra*	
Witch hazel		*Hamamelis virginiana*	
Persimmon		*Diospyros virginiana*	(In marshy fields and about pools)
American crabapple	*Pyrus coronaria*, anchor tree	*Malus coronaria*	
Red juniper			Dry, poor soil (a few on road from Philadelphia to Wilmington west of Schuylkill River; rare near Philadelphia)
Spicebush		*Lindera benzoin*	Wet soil
Hop-hornbeam	*Carpinus ostrya*	*Ostrya virginiana*	Good soil
Hornbeam	*Carpinus betulus* hornbeam	*Carpinus caroliniana*	Same kind of soil as hornbeam
Beech		*Fagus grandifolia*	Good soil
Butternut	butternutstra, variety of walnut	*Juglans cinerea*	Hills near rivers
Hemlock	*Pinus americana*, Pennsylvania fir tree	*Tsuga canadensis*	In side of mountains and in valleys

Appendix A-1.2 (continued). List of species in the Philadelphia area, from Kalm (1770). The species are listed in his order, from most to least common. Entries are either from his annotated list (not in parentheses) or additional notes taken from other writings (in parentheses).

Presumptive Identification	Name in Kalm (If Different from Current)	Current Species Name	Notes
Black birch		*Betula lenta*	Banks of rivers
Buttonwood		*Cephalantus occidentalis*	Wet places
Redbud	Sallard tree	*Cercis canadensis*	Good soil
Black locust		*Robinia pseudoacacia*	Corn fields
Sweet bay	*Magnolia glauca*, laurel-leaved tulip tree	*Magnolia virginiana*	Marshy soil (as Magnolia virginiana, several parts of Pennsylvania and New Jersey)
Basswood	Lime tree	*Tilia americana*	Good soil
Honey-locust		*Gleditsia triacanthos*	Good soil
Hackberry	Nettle tree	*Celtis* spp.	In fields
Pawpaw	*Annona muricata*, custard apple	*Asimina triloba*	In fertile soil
Sweet bay	*Magnolia virginiana*		not in list, but mentioned in text

Appendix A-1.3. Herbaceous species noted in Kalm (1770). This table includes native and introduced species.

Observed Species (Common Name)	Species Name	Native or Introduced (N/I)	Notes
Pokeweed	*Phytolacca americana*	N	species which were invading fallow fields
Indian hemp	*Apocynum cannabinus*	N	species which were invading fallow fields
Cudweed	*Gnaphalium* spp.	N	species which were invading fallow fields
Strawberries	*Fragaria* spp.	N	abundant in woods and were labeled to be more sour than European forms
Hepatica	*Hepatica*	N	
Violets	*Viola* spp.	N	
Wake-Robin	*Arum virginicum*	N	
Partridge-pea	*Chamaecrista fasciculata*	N	On roads through woods and sometimes in uncultivated fields
Jimson-weed	*Datura stramonium*	N	
Horse-balm	*Collinsonia canadensis*	N	
American pennyroyal	*Hedeoma pulegioides*	N	
Lupine	*Lupinus perennis*	N	plentiful in dry soil on road near Bristol
Skunk Cabbage	*Symplocarpus foetidus*	N	abundant in marshes
Gentians	*Gentiana/ Gentianopsis* spp.	N	
Asters	*Aster* spp.	N	
Hawkweed	*Hieracium* spp.	N	
Wood-Sorrel	*Oxalis* spp.	N	
Broom-grass	*Andropogon* spp.	N	
Bloodroot	*Sanguinaria canadensis*	N	(Rich soil)
Trailing Arbutus	*Epigaea repens*	N	(poor soil)
Leatherwood	*Dirca palustris*	N	
Cattail	*Typha spp.*	N	
?	*Bartsia coccinea*		
Privet hedges		I	Planted in gardens
Hawthorns		I	Planted in gardens
English ivy	*Hedera helix*	I	Planted in gardens
Goosefoot	*Chenopodium album*	I	(common in gardens and rich soils
Wormseed	*Chenopodium ambrosioides*	I	plentiful on roads and river banks
Great White Mullein	*Verbascum lychnitis*	I	
Vervain	*Verbena officinalis*	I	(a patch near Bartram's house)

Appendix A-1.3 (continued). Herbaceous species noted in Kalm (1770). This table includes native and introduced species.

Observed Species (Common Name)	Species Name	Native or Introduced (N/I)	Notes
Broad Plantain	*Plantago major*	I	(abundant on roads, paths, meadows and gardens)
Dandelion	*Taraxacum officinale*	I	
Yarrow	*Achillea millefolium*	I	
Foxglove	*Digitalis* spp.	I	
Sheep Sorrel	*Rumex acetosella*	I	
Whitlow-grass	*Draba verna*	I	
Curly Dock	*Rumex crispus*	I	
Tansy	*Tanacetum* spp.	I	

Table A-1.4. Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Acalypha rhomboidea	Three-seeded Mercury	Euphorbiaceae	N	X	X					
Acalypha virginica	Three-seeded Mercury	Euphorbiaceae	N	X	X					
Acanthopanax sieboldianus	Fiveleaf aralia	Araliaceae	I		X					
Acer campestre	Hedge maple	Aceraceae	I	X						
Acer ginnala	Amur maple	Aceraceae	I	X				X		
Acer negundo	Box elder	Aceraceae	N	X	X	X		X	X	X
Acer palmatum	Japanese maple	Aceraceae	I					X	X	
Acer platanoides	Norway maple	Aceraceae	I	X	X	X		X	X	X
Acer pseudoplatanus	Sycamore maple	Aceraceae	I	X	X			X		
Acer rubrum	Red maple	Aceraceae	N	X	X	X		X	X	
Acer saccharinum	Silver maple	Aceraceae	N		X	X			X	
Acer saccharum	Sugar maple	Aceraceae	N		X			X		
Acer spicatum	Mountain maple	Aceraceae	N	X	X					
Achillea millefolium	Common yarrow	Asteraceae	I	X	X	X				
Acorus calamus	Sweet flag	Acoraceae	I		X					
Actaea pachypoda	Doll's eyes	Ranunculaceae	N	X	X			X		
Actinidia arguta	Tara vine	Actinidiaceae	I					X		
Adiantum pedatum	Maidenhair fern	Adiantaceae	N	X	X					
Aegopodium podagraria	Goutweed	Apiaceae	I	X	X	X		X	X	X
Aesculus glabra	Ohio buckeye	Hippocastanaceae	N	X	X					
Aesculus hippocastanum	Horsechesnut	Hippocastanaceae	I	X	X	X		X		
Aesculus parviflora	Bottlebrush buckeye	Hippocastanaceae	I					X		X
Agalinis tenuifolia	False-foxglove	Scrophulariaceae	N	X	X					
Agastache nepetoides	Yellow giant-hyssop	Lamiaceae	N	X	X					
Agastache scrophulariifolia	Purple giant-hysoop	Lamiaceae	N	X	X					
Agrimonia gryposepala	Agrimonia	Rosaceae	N	X	X	X				
Agrimonia parviflora	Southern agrimony	Rosaceae	N	X	X					
Agrimonia pubescens	Downy agrimony	Rosaceae	N	X	X					
Agrostis gigantea	Redtop	Poaceae	I	X						
Agrostis hyemalis	Hairgrass	Poaceae	N	X						
Agrostis perennans	Autumn bentgrass	Poaceae	N	X						
Ailanthus altissima	Tree-of-heaven	Simaroubaceae	I	X	X	X		X	X	X

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Akebia quinata	Akebia	Lardizabalaceae	I		X			X	X	
Alcea rosea	Hollyhock	Malvaceae	I		X					
Aletris farinosa	Colic-root	Liliaceae	N	X	X					
Alisma plantago-aquatica	Southern water plantain	Alismataceae	N	X						
Alliaria petiolata	Garlic-mustard	Brassicaceae	I	X	X	X		X	X	X
Allium canadense	Wild onion	Liliaceae	N	X				X		
Allium oleraceum	Field garlic	Liliaceae	I	X						
Allium tricoccum	Ramps	Liliaceae	N	X	X			X		
Allium vineale	Field garlic	Liliaceae	I	X	X	X		X		
Alnus glutinosa	Black alder	Betulaceae	I	X	X					
Alnus serrulata	Speckled alder	Betulaceae	N	X	X					
Alyssum alyssoides	Alyssum	Brassicaceae	I	X						
Amaranthus albus	Tumbleweed	Amaranthaceae	N	X						
Amaranthus hybridus	Pigweed	Amaranthaceae	I	X	X					
Amaranthus retroflexus	Green amaranth	Amaranthaceae	I	X						
Ambrosia artemisiifolia	Common ragweed	Asteraceae	N	X	X	X				
Ambrosia trifida	Giant ragweed	Asteraceae	N	X	X	X				
Amelanchier arborea	Juneberry	Rosaceae	N	X	X			X		
Amelanchier canadensis	Oblongleaf juneberry	Rosaceae	N	X						
Amelanchier laevis	Smooth serviceberry	Rosaceae	N	X						
Amianthium muscaetoxicum	Fly poision	Liliaceae	N	X						
Amorpha fruticosa	False-indigo	Fabaceae	A	X	X			X		
Ampelopsis arborea	Pepper-vine	Vitaceae	A		X					
Ampelopsis brevipedunculata	Porcelein berry	Vitaceae	I	X					X	
Amphicarpaea bracteata	Hog-peanut	Fabaceae	N	X	X	X		X		
Anagallis arvensis	Scarlet pimpernel	Primulaceae	I	X						
Andropogon gerardii	Big bluestem	Poaceae	N	X						
Andropogon virginicus	Broom-sedge	Poaceae	N	X					X	
Anemone quinquefolia	Wood anemone	Ranunculaceae	N	X	X	X		X		
Anemone virginiana	Thimbleweed	Ranunculaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Antennaria neglecta	Field pussytoes	Asteraceae	N		X					
Antennaria neodioica	Pussytoes	Compositae	N		X					
Antennaria neoz(currently included in A. howellii and A. neglecta)										
Antennaria parlinii	Ladies'-tobacco	Asteraceae	N	X	X					
Antennaria plantaginifolia	Plantain pussytoes	Asteraceae	N	X	X	X				
Anthemis cotula	Dog-fennel	Asteraceae	I	X	X					
Anthoxanthum odoratum	Sweet vernal grass	Poaceae	I	X		X				
Apocynum androsaemifolium	Pink dogbane	Apocynaceae	N	X	X					X
Apocynum androsaemifolium x cannabinum	Dogbane	Apocynaceae	N	X						
Apocynum cannabinum	Indian hemp	Apocynaceae	N	X	X					X
Apocynum species	Apocynum species	Apocynaceae	N							X
Aquilegia canadensis	Wild columbine	Ranunculaceae	N	X	X	X				
Arabidopsis thaliana	Mouse-ear cress	Brassicaceae	I	X	X					
Arabis canadensis	Sicklepod	Brassicaceae	N	X	X					
Arabis laevigata	Smooth rock-cress	Brassicaceae	N	X	X					
Arabis lyrata	Lyre-leaved rock-cress	Brassicaceae	N	X	X					
Aralia chinensis	Chinese aralia	Araliaceae	I		X					
Aralia elata	Japanese angelica-tree	Araliaceae	I			X		X	X	X
Aralia nudicaulis	Wild sarsaparilla	Araliaceae	N	X	X			X		
Aralia racemosa	Spikenard	Araliaceae	N	X	X			X		
Aralia spinosa	Hercules club	Araliaceae	N	X	X					
Arctium minus	Common burdock	Asteraceae	I	X	X	X			X	
Arenaria serpyllifolia	Thyme-leaved sandwort	Caryophyllaceae	I	X	X					
Arisaema triphyllum	Jack-in-the-pulpit	Araceae	N	X	X	X		X		X
Aristida dichotoma	Poverty grass	Poaceae	N	X						
Aristolochia macrophylla	Dutchman's pipe	Aristolochiaceae	N		X					
Armoracia rusticana	Horseradish	Brassicaceae	I	X						
Aronia arbutifolia	Red chokeberry	Rosaceae	N		X					
Aronia melanocarpa	Black chokeberry	Rosaceae	N	X	X					
Arrhenatherum elatius	Tall oatgrass	Poaceae	I	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Artemisia pontica	Roman wormwood	Asteraceae	I	X						
Artemisia vulgaris	Common mugwort	Asteraceae	I	X	X			X		P
Asarum canadense	Wild ginger	Aristolochiaceae	N	X	X	X		X	X	
Asclepias exaltata	Poke milkweed	Asclepiadaceae	N	X	X					
Asclepias incarnata	Swamp milkweed	Asclepiadaceae	N	X	X					
Asclepias purpurascens	Purple milkweed	Asclepiadaceae	N	X						
Asclepias quadrifolia	Whorled milkweed	Asclepiadaceae	N	X	X					
Asclepias syriaca	Common milkweed	Asclepiadaceae	N	X	X					cf.
Asclepias tuberosa	Butterfly-weed	Asclepiadaceae	N	X					X	
Asclepias variegata	White milkweed	Asclepiadaceae	N	X						
Asimina triloba	Pawpaw	Annonaceae	N	X						
Asparagus officinalis	Asparagus	Liliaceae	I	X	X					
Asplenium pinnatifidum	Lobed spleenwort	Aspleniaceae	N	X	X					
Asplenium platyneuron	Ebony spleenwort	Aspleniaceae	N	X	X	X		X		
Asplenium rhizophyllum	Walking fern	Aspleniaceae	N	X	X					
Asplenium trichomanes	Maiden-hair spleenwort	Aspleniaceae	N	X	X					
Aster cordifolius	Blue wood aster	Asteraceae	N	X	X	X			X	
Aster divaricatus	White wood aster	Asteraceae	N	X	X	X		X		
Aster dumosus	Bushy aster	Asteraceae	N	X						
Aster fragilis	Small white aster	Asteraceae	N	X						
Aster laevis	Smooth blue aster	Asteraceae	N	X						
Aster lanceolatus	Panicled aster	Asteraceae	N	X	X	X				
Aster lateriflorus	Calico aster	Asteraceae	N	X	X					
Aster linariifolius	Stiff-leaved aster	Asteraceae	N	X	X					
Aster macrophyllus	Bigleaf aster	Asteraceae	N					X		
Aster novae-angliae	New England aster	Asteraceae	N	X	X					
Aster patens	Late purple aster	Asteraceae	N	X	X					
Aster paternus	White-topped aster	Asteraceae	N	X	X	X				
Aster pilosus	Heath aster	Asteraceae	N	X	X					
Aster prenanthoides	Zig-zag aster	Asteraceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Aster puniceus	Purple-stemmed aster	Asteraceae	N	X	X					
Aster schreberi	Schreber's aster	Asteraceae	N	X	X					
Aster solidagineus	Narrow-leaved white-topped aster	Asteraceae	N	X						
Aster spectabilis	Showy aster	Asteraceae	N	X						
Aster undulatus	Clasping heart-leaved aster	Asteraceae	N	X	X					
Athyrium filix-femina	Lady fern	Dryopteridaceae	N	X	X	X		X		X
Athyrium filix-femina	Northern lady fern	Dryopteridaceae	N	X	X	X		X		
Athyrium filix-femina	Southern lady fern	Dryopteridaceae	N	X	X	X		X		
Atriplex prostrata	Halberd-leaved orach	Chenopodiaceae	N	X						
Aureolaria pedicularia	Cutleaf false-foxglove	Scrophulariaceae	N	X	X					
Aureolaria virginica	Downy false-foxglove	Scrophulariaceae	N	X	X					
Avena fatua	Wild oats	Poaceae	I	X						
Baccharis halimifolia	Groundsel-tree	Asteraceae	N	X						
Baptisia tinctoria	Wild indigo	Fabaceae	N	X						
Barbarea vulgaris	Yellow-rocket	Brassicaceae	I	X	X	X				
Bartonia virginica	Bartonia	Gentianaceae	N	X	X					
Berberis thunbergii	Japanese barberry	Berberidaceae	I	X	X	X		X	X	
Berberis vulgaris	European barberry	Berberidaceae	I	X						
Berteroa incana	Hoary alyssum	Brassicaceae	I	X						
Betula lenta	Black birch	Betulaceae	N	X	X	X		X		
Betula nigra	River birch	Betulaceae	N	X	X				X	
Betula populifolia	Gray birch	Betulaceae	N	X	X	X				
Betula pubescens	European white birch	Betulaceae	I	X						
Bidens bipinnata	Spanish needles	Asteraceae	N	X	X					
Bidens cernua	Bur-marigold	Asteraceae	N	X	X					
Bidens comosa	Beggar-ticks	Asteraceae	N	X	X					
Bidens connata	Beggar-ticks	Asteraceae	N	X						
Bidens frondosa	Stick-tight	Asteraceae	N	X	X					
Bidens vulgata	Stick-tight	Compositae	N		X					
Boehmeria cylindrica	False nettle	Urticaceae	N	X	X	X		X		X

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Botrychium dissectum	Cut-leaved grape-fern	Ophioglossaceae	N	X	X					
Botrychium matricariifolium	Matricary grape-fern	Ophioglossaceae	N	X						
Botrychium simplex	Least grape-fern	Ophioglossaceae	N	X						
Botrychium virginianum	Rattlesnake fern	Ophioglossaceae	N	X	X			X		
Brachyelytrum erectum	Brachyelytrum	Poaceae	N	X						
Bromus altissimus	Brome grass	Poaceae	N	X						
Bromus commutatus	Hairy chess	Poaceae	I	X						
Bromus hordeaceus	Soft chess	Poaceae	I	X						
Bromus tectorum	Downy chess	Poaceae	I	X						
Broussonetia papyrifera	Paper mulberry	Moraceae	I	X	X				X	
Buglossoides arvense	Bastard alkanet	Boraginaceae	I		X					
Bulbostylis capillaris	Sand-rush	Cyperaceae	N	X						
Cacalia atriplicifolia	Pale-Indian plantain	Asteraceae	N	X						
Callitriche stagnalis	Water-starwort	Callitrichaceae	I	X	X					
Callitriche terrestris	Water chickweed	Callitrichaceae	N	X						
Caltha palustris	Cowslip; Marsh marigold	Ranunculaceae	N	X						
Calystegia hederacea	Japanese bindweed	Convolvulaceae	I	X						
Calystegia pubescens	Japanese bindweed	Convolvulaceae	I	X						
Calystegia sepium	Hedge bindweed	Convolvulaceae	N	X						
Calystegia silvatica	Bindweed; Morning glory	Convolvulaceae	N	X	X					
Calystegia spithamaea	Low bindweed	Convolvulaceae	N	X						
Campanula aparinoides	Marsh bellflower	Campanulaceae	N	X	X					
Capsella bursa-pastoris	Shepherd's-purse	Brassicaceae	I	X	X	X				
Cardamine angustata	Toothwort	Brassicaceae	N	X	X					
Cardamine bulbosa	Spring cress	Brassicaceae	N	X	X					
Cardamine concatenata	Cut-leaved toothwort	Brassicaceae	N	X	X	X		X		
Cardamine hirsuta	Hairy bitter-cress	Brassicaceae	I	X		X		X	X	
Cardamine impatiens	Bitter-cress	Brassicaceae	I	X	X	X		X		
Cardamine pensylvanica	Bitter cress	Brassicaceae	N	X	X	X				
Cardiospermum halicacabum	Balloon-vine; Heart-seed	Sapindaceae	I	X	X					
Carex aestivalis x gracillima	Sedge	Cyperaceae	N	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Carex aggregata	Sedge	Cyperaceae	N	X						
Carex albicans	Sedge	Cyperaceae	N	X			X			
Carex amphibola	Sedge	Cyperaceae	N	X				X		
Carex annectens	Sedge	Cyperaceae	N	X			X			
Carex argyrantha	Sedge	Cyperaceae	N	X			X			
Carex blanda	Sedge	Cyperaceae	N	X			X			
Carex bushii	Sedge	Cyperaceae	N	X						
Carex caroliniana	Sedge	Cyperaceae	N				X			
Carex cephaloidea	Sedge	Cyperaceae	N	X						
Carex cephalophora	Sedge	Cyperaceae	N	X			X			
Carex conjuncta	Sedge	Cyperaceae	N	X			X			
Carex davisii	Sedge	Cyperaceae	N	X						
Carex debilis	Sedge	Cyperaceae	N	X						
Carex digitalis	Sedge	Cyperaceae	N	X			X	X		
Carex emmonsii	Sedge	Cyperaceae	N	X						
Carex festucacea	Sedge	Cyperaceae	N				X	X		
Carex frankii	Sedge	Cyperaceae	N				X			
Carex glaucodea	Sedge	Cyperaceae	N					X		
Carex gracillima	Sedge	Cyperaceae	N	X			X			
Carex grisea	Sedge	Cyperaceae	N	X			X			
Carex hirsutella	Sedge	Cyperaceae	N	X		X				
Carex hirta	Sedge	Cyperaceae	I	X						
Carex hirtifolia	Sedge	Cyperaceae	N	X			X		X	
Carex intumescens	Sedge	Cyperaceae	N	X						
Carex laevivaginata	Sedge	Cyperaceae	N	X						
Carex laxiculmis	Sedge	Cyperaceae	N	X			X	X		
Carex laxiflora	Sedge	Cyperaceae	N	X			X	X		
Carex leptalea	Sedge	Cyperaceae	N	X						
Carex lucorum	Sedge	Cyperaceae	N	X						
Carex lurida	Shallow sedge	Cyperaceae	N	X			X			

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Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Carex mesochorea	Midland sedge	Cyperaceae	N	X						
Carex muhlenbergii	Sedge	Cyperaceae	N	X						
Carex normalis	Sedge	Cyperaceae	N	X			X			
Carex pensylvanica	Sedge	Cyperaceae	N			X	X	X		
Carex prasina	Sedge	Cyperaceae	N	X			X			
Carex projecta	Sedge	Cyperaceae	N				X			
Carex radiata	Sedge	Cyperaceae	N	X			X	X		
Carex rosea	Sedge	Cyperaceae	N	X			X			
Carex scabrata	Sedge	Cyperaceae	N	X						
Carex scoparia	Broom sedge	Cyperaceae	N	X						
Carex sparganioides	Sedge	Cyperaceae	N	X			X			
Carex spicata	Sedge	Cyperaceae	I	X						
Carex squarrosa	Sedge	Cyperaceae	N	X			X			
Carex stipata	Sedge	Cyperaceae	N	X			X			
Carex straminea	Sedge	Cyperaceae	N	X						
Carex swanii	Sedge	Cyperaceae	N	X			X	X		
Carex umbellata	Sedge	Cyperaceae	N	X						
Carex vestita	Sedge	Cyperaceae	N	X						
Carex virescens	Sedge	Cyperaceae	N	X			X		X	
Carex vulpinoidea	Fox sedge	Cyperaceae	N	X			X			
Carpinus caroliniana	Hornbeam	Betulaceae	N	X	X	X		X		
Carya cordiformis	Bitternut hickory	Juglandaceae	N	X	X	X		X	X	
Carya glabra	Pignut hickory	Juglandaceae	N	X	X	X		X		X
Carya ovalis	Sweet pignut hickory	Juglandaceae	N	X	X					
Carya ovata	Shagbark hickory	Juglandaceae	N	X		X				
Carya tomentosa	Mockernut hickory	Juglandaceae	N	X	X				X	
Castanea dentata	American chestnut	Fagaceae	N	X	X			X		
Castilleja coccinea	Indian paintbrush	Scrophulariaceae	N	X						
Catalpa bignonioides	Catalpa	Bignoniaceae	I	X	X					X
Caulophyllum thalictroides	Squaw-root	Berberidaceae	N	X	X			X		

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Ceanothus americanus	New Jersey tea	Rhamnaceae	N		X					
Celastrus orbiculatus	Oriental bittersweet	Celastraceae	I	X	X	X		X		X
Celastrus scandens	American bittersweet	Celastraceae	N	X	X					
Celtis occidentalis	American hackberry	Ulmaceae	N	X	X	X				
Centaurea nigra	Black knapweed	Asteraceae	I	X						
Cephalanthus occidentalis	Buttonbush	Rubiaceae	N	X	X					
Cerastium fontanum	Common mouse-ear chickweed	Caryophyllaceae	I	X	X	X				
Cerastium glomeratum	Mouse-ear chickweed	Caryophyllaceae	I	X						
Cerastium nutans	Nodding chickweed	Caryophyllaceae	N	X	X					
Cercidiphyllum japonicum	Katsura tree	Cercidiphyllaceae	I	X				X		
Cercis canadensis	Redbud	Caesalpiniaceae	N	X	X	X		X		
Chaerophyllum procumbens	Slender chervil	Apiaceae	N	X						
Chamaecrista nictitans	Wild sensitive-plant	Caesalpiniaceae	N	X	X					
Chamaelirium luteum	Devil's bit	Liliaceae	N	X	X					
Chamaesyce maculata	Wartweed; Spotted spurge	Euphorbiaceae	N	X	X	X				
Chamaesyce nutans	Eyebane	Euphorbiaceae	N	X						
Chamaesyce vermiculata	Hairy spurge	Euphorbiaceae	N	X						
Chelidonium majus	Greater celandine; Swallowwort	Papaveraceae	I	X	X	X		X	X	
Chelone glabra	Turtlehead	Scrophulariaceae	N	X	X	X				
Chenopodium album	Goosefoot	Chenopodiaceae	N	X	X					
Chenopodium album var. album	Lamb's quarters	Chenopodiaceae	I		X	X				
Chenopodium ambrosioides	Mexican-tea	Chenopodiaceae	I	X	X					
Chenopodium murale	Nettle-leaved goosefoot	Chenopodiaceae	I	X						
Chenopodium standleyanum	Goosefoot	Chenopodiaceae	N	X	X					
Chimaphila maculata	Pipsissewa	Pyrolaceae	N	X	X	X		X		
Chrysanthemum leucanthemum	Ox-eye daisy	Asteraceae	I	X	X	X				
Chrysanthemum parthenium	Feverfew	Asteraceae	I	X						
Chrysopsis mariana	Golden aster	Asteraceae	N	X	X					
Chrysosplenium americanum	Water-carpet	Saxifragaceae	N	X	X					
Cichorium intybus	Blue chicory	Asteraceae	I	X	X					
Cicuta maculata	Spotted cowbane	Apiaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Cimicifuga racemosa	Black snakeroot	Ranunculaceae	N	X	X			X		
Cinna arundinacea	Wood reedgrass	Poaceae	N	X						
Circaea lutetiana	Common Enchanter's Nightshade	Onagraceae	N	X	X	X		X	X	
Cirsium arvense	Canada thistle	Asteraceae	I	X	X	X				
Cirsium discolor	Field thistle	Asteraceae	N	X	X					
Cirsium pumilum	Pasture thistle	Asteraceae	N	X						
Cirsium vulgare	Bull-thistle	Asteraceae	I	X	X					
Citrullus colocynthis	Watermellon	Cucurbitaceae	I	X						
Claytonia virginica	Spring beauty	Portulacaceae	N	X	X	X		X	X	
Clematis terniflora	Sweet autumn clematis	Ranunculaceae	I	X	X				X	
Clinopodium vulgare	Wild basil	Lamiaceae	I	X	X					
Clitoria mariana	Butterfly pea	Fabaceae	N	X						
Coix lacryma-jobi	Job's tears	Poaceae	I	X						
Collinsia parviflora	blue-eyed Mary	Scrophulariaceae	I	X						
Collinsonia canadensis	Horse-balm	Lamiaceae	N	X	X	X		X	X	
Comandra umbellata	Bastard toadflax	Santalaceae	N	X						
Commelina communis	Dayflower	Commelinaceae	I	X	X	X				
Commelina virginica	Virginia dayflower	Commelinaceae	N			X				
Comptonia peregrina	Sweet-fern	Myricaceae	N	X	X					
Conopholis americana	Squaw-root; Cancer-root	Orobanchaceae	N	X	X					
Conringia orientalis	Hare's-ear mustard	Brassicaceae	I	X						
Convallaria majalis	Lily-of-the-valley	Liliaceae	I	X	X					
Convolvulus arvensis	Field bindweed	Convolvulaceae	I	X						
Conyza canadensis	Horseweed	Asteraceae	N	X	X					
Corallorhiza maculata	Large coralroot	Orchidaceae	N	X						
Corallorhiza odontorhiza	Late coralroot	Orchidaceae	N	X	X					
Corallorhiza wisteriana	Wister's coralroot	Orchidaceae	N	X	X					
Coreopsis lanceolata	Longstalk tickseed	Asteraceae	I	X						
Coreopsis tinctoria	Plains tickseed	Asteraceae	I	X						
Cornus alternifolia	Alternate-leaved dogwood	Cornaceae	N	X	X				X	

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Cornus amomum	Silky dogwood	Cornaceae	N	X	X					
Cornus florida	Flowering dogwood	Cornaceae	N	X	X	X		X		cf
Cornus racemosa	Swamp dogwood	Cornaceae	N	X	X					
Coronilla varia	Crown-vetch	Fabaceae	I	X						
Coronopus didymus	Swine cress	Brassicaceae	I	X						
Corydalis flavula	Yellow fumewort; Yellow harlequin	Fumariaceae	N	X	X					
Corylus americana	Hazlenut	Betulaceae	N		X					
Crataegus coccinea	Red-fruited hawthorn	Rosaceae	N	X						
Crataegus crus-galli	Cockspur hawthorn	Rosaceae	N	X						
Crataegus species	Hawthorn species	Rosaceae	NI		X				X	
Crepis capillaris	Hawk's beard	Asteraceae	I	X						
Crotalaria sagittalis	Rattlebox	Fabaceae	N	X	X					
Cryptotaenia canadensis	Honewort	Apiaceae	N	X	X	X		X		
Cucumis melo	Muskmellon	Cucurbitaceae	I	X						
Cunila origanoides	Common dittany	Lamiaceae	N	X	X					
Cuphea viscosissima	Clammy cuphea; blue waxweed	Lythraceae	N	X						
Cuscuta campestris	Dodder	Cuscutaceae	N	X						
Cuscuta gronovii	Common dodder	Cuscutaceae	N	X	X					
Cymbalaria muralis	Kenilworth-ivy	Scrophulariaceae	I	X	X				X	
Cynosurus cristatus	Crested dog's-tail	Poaceae	I	X						
Cyperus echinatus	Sedge	Cyperaceae	N	X						
Cyperus esculentus	Sedge	Cyperaceae	N	X						
Cyperus lupulinus	Umbrella-sedge	Cyperaceae	N	X						
Cyperus strigosus	Sedge	Cyperaceae	N	X						
Cypripedium acaule	Mocassin flower	Orchidaceae	N	X	X					
Cypripedium calceolus	Yellow lady's slipper	Orchidaceae	N	X	X					
Cystopteris fragilis	Brittle Bladder- fern	Dryopteridaceae	N		X					
Cystopteris tenuis	Fragile fern	Dryopteridaceae	N	X		X		X		
Dactylis glomerata	Orchard grass	Poaceae	I	X						
Danthonia spicata	Poverty grass	Poaceae	N	X				X		

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Datura ferox	Jimsonweed	Solanaceae	I	X						
Datura meteloides	Downy thorn-apple	Solanaceae	I	X						
Datura stramonium	Jimsonweed	Solanaceae	I	X						
Daucus carota	Queen-Anne's lace	Apiaceae	I	X	X					
Dennstaedtia punctilobula	Hay-scented fern	Dennstaedtiaceae	N	X	X	X		X		
Deparia acrostichoides	Silvery glade fern	Dryopteridaceae	N	X	X	X		X		
Deschampsia flexuosa	Common hairgrass	Poaceae	N	X						
Descurainia sophia	Herb-sophia	Brassicaceae	I	X						
Desmodium canadense	Beggar-ticks	Fabaceae	N		X					
Desmodium canescens	Hoary tick-trefoil	Fabaceae	N	X	X					
Desmodium laevigatum	Smooth tick-clover	Fabaceae	N	X	X					
Desmodium marilandicum	Maryland tick-clover	Fabaceae	N	X	X					
Desmodium nudiflorum	Naked-flower tick-trefoil	Fabaceae	N	X	X					
Desmodium nuttallii	Nuttall's tick-trefoil	Fabaceae	N	X						
Desmodium obtusum	Beggar-lice	Fabaceae	N	X	X					
Desmodium paniculatum	Beggar-tick	Fabaceae	N	X	X	X				
Desmodium perplexum	Tick-clover	Fabaceae	N	X	X					
Desmodium rotundifolium	Tick-trefoil	Fabaceae	N	X	X					
Desmodium species	Desmodium species	Fabaceae	N		X					
Desmodium viridiflorum	Velvety tick-trefoil	Fabaceae	N			X				
Deutzia scabra	Deutzia	Hydrangeaceae	I	X	X			X		
Dianthus armeria	Deptford pink	Caryophyllaceae	I	X	X					
Dicentra cucullaria	Dutchman's breeches	Fumariaceae	N	X	X					
Diervilla lonicera	Bush-honeysuckle	Caprifoliaceae	N	X	X					
Digitaria filiformis	Slender crabgrass	Poaceae	N	X						
Digitaria ischaemum	Smooth crabgrass	Poaceae	I	X						
Digitaria sanguinalis	Nortern crabgrass	Poaceae	I	X						
Dioscorea villosa	Wild yamroot	Dioscoreaceae	N	X	X			X		
Diphasiastrum digitatum	Ground pine	Lycopodiaceae	N	X						
Dryopteris carthusiana	Toothed Wood Fern	Dryopteridaceae	N	X		X				

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Dryopteris carthusiana x intermedia	Triploid wood fern	Dryopteridaceae	N	X						
Dryopteris cristata	Crested shield fern	Dryopteridaceae	N	X	X					
Dryopteris goldiana	Giant wood fern	Dryopteridaceae	N	X	X					
Dryopteris intermedia	Fancy Fern	Dryopteridaceae	N	X	X	X		X	X	
Dryopteris marginalis	Marginal wood fern	Dryopteridaceae	N	X	X	X		X		
Duchesnea indica	Indian strawberry	Rosaceae	I	X	X	X		X	X	
Dulichium arundinaceum	Three-way sedge	Cyperaceae	N	X						
Echinochloa crusgalli	Barnyard grass	Poaceae	I	X						
Echinocystis lobata	Prickly cucumber	Cucurbitaceae	N	X	X					
Eclipta prostata	Yerba-de-tajo	Asteraceae	N	X	X					
Elaeagnus umbellata	Autumn olive	Elaeagnaceae	I	X						
Eleusine indica	Goosegrass	Poaceae	I	X						
Elodea nuttallii	Waterweed	Hydrocharitaceae	N						X	
Elymus canadensis	Canada Wild-Rye	Poaceae	N	X						
Elymus hystrix	Bottlebrush grass	Poaceae	N	X						
Elymus riparius	Riverbank wild-rye	Poaceae	N	X						
Elymus villosus	Wild-rye	Poaceae	N	X						
Elymus virginicus	Virginia wild-rye	Poaceae	N	X						
Elytrigia repens	Quackgrass	Poaceae	I	X						
Epifagus virginiana	Beechdrops	Orobanchaceae	N	X	X	X		X	X	
Epigaea repens	Trailing arbutus	Ericaceae	N	X	X				X	
Epilobium angustifolium	Fireweed	Onagraceae	N	X	X					
Epilobium coloratum	Purple leaved willow herb	Onagraceae	N	X	X					
Epilobium strictum	Willow-herb	Onagraceae	N		X					
Equisetum arvense	Field horsetail	Equisetaceae	N	X	X	X				
Equisetum sylvaticum	Woodland horsetail	Equisetaceae	N	X						
Eragrostis capillaris	Lacegrass	Poaceae	N	X						
Eragrostis cilianensis	Stink grass	Poaceae	I	X						
Eragrostis minor	Lovegrass	Poaceae	I	X						
Eragrostis pectinacea	Carolina lovegrass	Poaceae	N	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Eragrostis pilosa	India lovegrass	Poaceae	I	X						
Eragrostis spectabilis	Purple lovegrass	Poaceae	N	X						
Erechtites hieracifolia	Fireweed; Pilewort	Asteraceae	N	X	X	X				
Erigeron annuus	Daisy fleabane	Asteraceae	N	X	X	X				
Erigeron philadelphicus	Philadelphia Daisy	Asteraceae	N	X		X		X		X
Erigeron pulchellus	Robin's-plantain	Asteraceae	N		X	X				
Erigeron strigosus	Daisy fleabane	Asteraceae	N	X	X					
Erodium cicutarium	Redstem filaree	Geraniaceae	I	X	X					
Erophila verna	Whitlow-grass	Brassicaceae	I	X	X					
Erysimum cheiranthoides	Treacle mustard	Brassicaceae	I	X						
Erythronium albidum	White trout lily	Liliaceae	N			X				
Erythronium americanum	Yellow-flowered trout lily	Liliaceae	N	X	X			X	X	
Euodia hupehensis	Bee-bee tree	Rutaceae	I					X	X	
Euonymous fortunei	Wintercreeper	Celastraceae	I					X	X	
Euonymus alatus	Winged euonymous	Celastraceae	I	X	X	X		X		X
Euonymus americanus	Strawberry-bush	Celastraceae	N	X	X				X	
Euonymus atropurpureus	Burning bush	Celastraceae	N	X		X			X	
Euonymus europaeus	European spindletree	Celastraceae	I	X	X					
Euonymus species	Euonymus species	Celastraceae	NI							X
Eupatorium coelestinum	Mistflower	Asteraceae	N	X						
Eupatorium fistulosum	Joe-pye-weed	Asteraceae	N	X	X	X				
Eupatorium hyssopifolium	Hyssop-leaved eupatorium	Asteraceae	N	X						
Eupatorium perfoliatum	Boneset	Asteraceae	N	X	X					
Eupatorium purpureum	Joe-pye-weed	Asteraceae	N	X	X			X	X	
Eupatorium rotundifolium	Round-leaved boneset	Asteraceae	N			X			X	
Eupatorium rugosum	White snakeroot	Asteraceae	N	X	X	X		X		
Eupatorium serotinum	Late-flowering thoroughwort	Asteraceae	I			X				
Euphorbia cyparissias	Cypress spurge; Cemetery plant	Euphorbiaceae	I	X	X					
Euphorbia esula	Leafy spurge; Wolf's milk	Euphorbiaceae	I	X		X				
Euthamia graminifolia	Grass-leaved goldenrod	Asteraceae	N		X					
Fagus grandifolia	American beech	Fagaceae	N	X	X	X		X	X	X

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Festuca elatior	Fescue	Poaceae	I	X						
Festuca obtusa	Nodding fescue	Poaceae	N	X				X		
Festuca ovina	Sheep fescue	Poaceae	I	X						
Festuca rubra	Red Fescue	Poaceae	I	X						
Floerkea proserpinacoides	Mermaid weed	Limnanthaceae	N	X	X					
Foeniculum vulgare	Fennel	Apiaceae	I	X						
Forsythia x intermedia	Forsythia	Oleaceae	I					X		
Fragaria virginiana	Wild strawberry	Rosaceae	N		X					
Fraxinus americana var. americana	White ash	Oleaceae	N		X				X	
Fraxinus americana var. biltmoreana	Biltmore ash	Oleaceae	N			X		X		
Fraxinus pennsylvanica	Red ash	Oleaceae	N	X	X					
Galearis spectabilis	Showy orchid	Orchidaceae	N	X	X					
Galinsoga quadriradiata	Quickweed	Asteraceae	I	X	X	X				
Galium aparine	Cleavers	Rubiaceae	N	X	X	X		X		
Galium asprellum	Rough bedstraw	Rubiaceae	N		X					
Galium circaezans	wild licorice	Rubiaceae	N	X	X					
Galium mollugo	White bedstraw	Rubiaceae	I	X						
Galium triflorum	Sweet scented bedstraw	Rubiaceae	N	X	X	X				
Galium verum	Our-lady's bedstraw	Rubiaceae	I	X						
Gaultheria procumbens	Teaberry	Ericaceae	N	X	X					
Gaura biennis	Biennial gaura	Onagraceae	N	X	X					
Gaylussacia baccata	Black huckleberry	Ericaceae	N	X	X	X				
Gaylussacia frondosa	Dangleberry	Ericaceae	N	X	X			X		
Gentiana clausa	Meadow bottle gentian	Gentianaceae	N	X	X					
Gentianopsis crinita	Fringed gentian	Gentianaceae	N	X	X					
Geranium carolinianum	Cranesbill; Wild geranium	Geraniaceae	N	X						
Geranium maculatum	Wild geranium	Geraniaceae	N	X	X	X		X		
Geranium molle	Dovesfoot cranesbill	Geraniaceae	I	X						
Geranium robertianum	Herb robert	Geraniaceae	N	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Geranium sibiricum	Siberian cranesbill	Geraniaceae	I	X						
Geum canadense	White avens	Rosaceae	N	X	X	X		X	X	
Geum laciniatum	Rough avens	Rosaceae	N	X						
Geum rivale	water avens, purple avens	Rosaceae	N			X				
Geum virginianum	Cream-colored avens	Rosaceae	N			X				
Glechoma hederacea	Gill-over-the-ground	Lamiaceae	I	X	X	X		X	X	
Gleditsia triacanthos	Honey-locust	Caesalpiniaceae	N	X	X	X		X		
Glyceria grandis	American mannagrass	Poaceae	N	X						
Glyceria striata	Fowl mannagrass	Poaceae	N	X						
Gnaphalium obtusifolium	Fragrant cudweed	Asteraceae	N	X	X					
Gnaphalium purpureum	Purple cudweed	Asteraceae	N	X						
Goodyera pubescens	Downy rattlesnake plantain	Orchidaceae	N	X	X					
Gratiola neglecta	Hedge-hyssop	Scrophulariaceae	N	X	X					
Gymnocarpium dryopteris	Oak fern	Dryopteridaceae	N		X					
Gymnocladus dioica	Kentucky coffee-tree	Caesalpiniaceae	A	X	X			X		
Hackelia virginiana	Beggar's-lice	Boraginaceae	N	X	X			X		
Halesia carolina	Carolina silverbells	Styracaceae	A					X		
Hamamelis virginiana	Witch hazel	Hamamelidaceae	N	X	X	X		X	X	X
Hedeoma pulegioides	American pennyroyal	Lamiaceae	N	X	X					
Hedera helix	English ivy	Araliaceae	I		X	X		X		X
Hedyotis caerulea	Quaker-Ladies	Rubiaceae	N		X					
Helenium autumnale	Common sneezeweed	Asteraceae	N	X	X					
Helenium flexuosum	Southern sneezeweed	Asteraceae	I	X	X					
Helianthemum canadense	Frostweed	Cistaceae	N	X	X	X				
Helianthus annuus	Common sunflower	Asteraceae	I	X						
Helianthus decapetalus	Thin-leaved sunflower	Asteraceae	N	X	X					
Helianthus divaricatus	Rough sunflowe	Asteraceae	N	X	X					
Helianthus giganteus	Swamp sunflower	Asteraceae	N			X				
Helianthus tuberosus	Jerusalem artichoke	Asteraceae	A	X	X					
Heliopsis helianthoides	Ox-eye	Asteraceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Hemerocallis fulva	Orange day-lily	Liliaceae	I	X	X			X		
Hepatica nobilis	Liverleaf	Ranunculaceae	N	X	X					
Heracleum lanatum	Cow-parsnip	Apiaceae	N	X	X					
Hesperis matronalis	Dame's-rocket	Brassicaceae	I	X	X			X	X	
Heteranthera reniformis	Mud-plantain	Pontederiaceae	N		X					
Heuchera americana	Alum-root	Saxifragaceae	N	X	X					
Hibiscus syriacus	Rose-of-sharon	Malvaceae	I		X					
Hibiscus trionum	Flower-of-an-hour	Malvaceae	I	X						
Hieracium caespitosum	King-devil	Asteraceae	I			X				
Hieracium flagellare	Hawkweed	Asteraceae	I	X						
Hieracium lachenalii	European hawkweed	Asteraceae	I	X						
Hieracium paniculatum	Hawkweed	Asteraceae	N	X	X	X				
Hieracium piloselloides	King-devil	Asteraceae	I	X						
Hieracium scabrum	Hawkweed	Asteraceae	N	X	X					
Hieracium venosum	Rattlesnake-weed	Asteraceae	N	X	X	X		X		
Holcus lanatus	Velvet grass	Poaceae	I	X						
Hosta ventricosa	Blue plantain-lily	Liliaceae	I	X	X			X		
Houstonia caerulea	Bluets; Quaker-ladies	Rubiaceae	N	X				X		
Humulus japonicus	Japanese hops	Cannabaceae	I	X	X	X		X		
Humulus lupulus	Brewer's hops	Cannabaceae	N	X	X					
Huperzia lucidula	Shining clubmoss	Lycopodiaceae	N	X	X					
Hybanthus concolor	Green violet	Violaceae	N	X						
Hydrangea paniculata	Peegee hydrangea	Hydrangeaceae	I	X	X					
Hydrangea quercifolia	Oak-leaved Hydrangea	Hydrangeaceae	I	X	X	X				X
Hydrastis canadensis	Goldenseal	Ranunculaceae	N		X					
Hydrocotyle americana	Marsh pennywort	Apiaceae	N	X	X					
Hydrocotyle sibthorpioides	Lawn pennywort	Apiaceae	I	X						
Hydrophyllum canadense	Broad-leaved Waterleaf	Hydrophyllaceae	N						X	
Hydrophyllum virginianum	Virginia waterleaf	Hydrophyllaceae	N		X	X		X	X	
Hypericum gentianoides	Orange grass	Clusiaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Hypericum hypericoides	St. Andrew's cross	Clusiaceae	N	X	X					
Hypericum mutilum	dwarf St. John's wart	Clusiaceae	N	X	X					
Hypericum perforatum	St. John's wort	Clusiaceae	I	X	X					
Hypericum punctatum	Spotted St. John's wort	Clusiaceae	N	X	X					
Hypochoeris radicata	Cat's-ear	Asteraceae	I	X						
Hypoxis hirsuta	Yellow star-grass	Liliaceae	N	X	X	X		X		
Ilex crenata	Japanese holly	Aquifoliaceae	I					X		
Ilex opaca	American holly	Aquifoliaceae	N			X		X	X	X
Ilex verticillata	Winterberry	Aquifoliaceae	N	X						
Impatiens capensis	Jewelweed	Balsaminaceae	N	X	X	X		X		X
Impatiens pallida	Pale-jewelweed	Balsaminaceae	N	X	X	X		X		
Inula helenium	Elecampane	Asteraceae	I	X	X					
Ipomoea coccinea	Red morning glory	Convolvulaceae	I	X						
Ipomoea hederacea	Ivy leaved morning glory	Convolvulaceae	I	X	X					
Ipomoea pandurata	Wild potato	Convolvulaceae	N	X	X					
Ipomoea purpurea	Common morning glory	Convolvulaceae	I	X						
Iris pseudoacorus	Water flag; Yellow iris	Iridaceae	I	X	X	X				
Isotria verticillata	Whorled pogonia	Orchidaceae	N	X	X					
Ixeris stolonifera	Creeping lettuce	Asteraceae	I	X						
Juglans cinerea	Butternut	Juglandaceae	N		X					
Juglans nigra	Black walnut	Juglandaceae	N	X	X	X		X		
Juncus effusus	Soft rush	Juncaceae	N	X						
Juncus secundus	Rush	Juncaceae	N	X						
Juncus tenuis	Poverty Rush	Juncaceae	N	X		X		X		
Juniperus communis	Common juniper	Cupressaceae	N	X						
Juniperus virginiana	Red cedar	Cupressaceae	N	X	X	X				
Kalmia angustifolia	Sheep laurel	Ericaceae	N	X	X					
Kalmia latifolia	Mountain laurel	Ericaceae	N	X	X	X		X		X
Kalopanax pictus	Kalopanax	Araliaceae	I					X	X	
Kickxia elatine	Cancerwort	Scrophulariaceae	I	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Krigia biflora	Dwarf dandelion	Asteraceae	N	X	X	X				
Krigia virginica	Dwarf dandelion	Asteraceae	N			X				
Lactuca biennis	Blue lettuce	Asteraceae	N	X	X					
Lactuca canadensis	Wild lettuce	Asteraceae	N	X	X	X				
Lactuca floridana	Woodland lettuce	Asteraceae	N	X	X					
Lactuca saligna	Willow-leaf lettuce	Asteraceae	I	X						
Lactuca serriola	Prickly lettuce	Asteraceae	I	X	X					
Lamium amplexicaule	henbit	Lamiaceae	I	X		X				
Lamium purpureum	Purple dead-nettle	Lamiaceae	I	X		X				
Laportea canadensis	Wood nettle	Urticaceae	N	X	X	X		X		X
Lathyrus latifolius	Perennial sweetpea	Fabaceae	I	X						
Lechea minor	Thyme leaved pinweed	Cistaceae	N	X	X					
Lechea pulchella	Pinweed	Cistaceae	N	X						
Lechea racemulosa	Pinweed	Cistaceae	N	X	X					
Leersia virginica	Whitegrass	Poaceae	N	X				X		
Lemna minor	Duckweed; Water lentils	Lemnaceae	N	X						
Leonurus cardiaca	Common motherwort	Lamiaceae	I	X	X					
Leonurus sibiricus	Motherwort	Lamiaceae	I	X						
Lepidium campestre	Field cress	Brassicaceae	I	X		X				
Lepidium densiflorum	Wild pepper-grass	Brassicaceae	I	X						
Lepidium perfoliatum	Pepper-grass	Brassicaceae	I	X						
Lepidium virginicum	Poor man's pepper	Brassicaceae	N	X	X					
Lespedeza capitata	Bush-clover	Fabaceae	N	X						
Lespedeza hirta	Bush-clover	Fabaceae	N	X	X					
Lespedeza intermedia	Bush-clover	Fabaceae	N	X	X					
Lespedeza procumbens	Trailing bush-clover	Fabaceae	N		X					
Lespedeza violacea	Bush-clover	Fabaceae	N	X	X					
Liatris spicata	Blazing-star	Asteraceae	N	X						
Ligustrum obtusifolium	Privet	Oleaceae	I	X	X			X		X
Ligustrum vulgare	Common privet	Oleaceae	I	X	X	X				

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Lilium philadelphicum	Wood lily	Liliaceae	N	X						
Linaria canadensis	Old-field toadflax	Scrophulariaceae	N	X		X				
Linaria vulgaris	Butter-and-eggs	Scrophulariaceae	I	X	X	X				
Lindera benzoin	Spicebush	Lauraceae	N	X	X	X			X	X
Lindernia dubia	False pimpernel	Scrophulariaceae	N	X	X					
Linum virginianum	Slender yellow flax	Linaceae	N	X	X					
Liparis liliifolia	Large twayblade	Orchidaceae	N	X	X					
Liparis loeselii	Loesel's twayblade	Orchidaceae	N	X						
Liquidambar styraciflua	Sweet gum	Hamamelidaceae	N	X	X	X				
Liriodendron tulipifera	Tulip poplar	Magnoliaceae	N	X	X	X			X	
Lobelia inflata	Indian-tobacco	Campanulaceae	N	X	X	X				
Lobelia siphilitica	Great lobelia	Campanulaceae	N	X	X					
Lolium multiflorum	Ryegrass	Poaceae	I	X						
Lolium perenne	Perenniel ryegrass	Poaceae	I	X						
Lonicera japonica	Japanese honeysuckle	Caprifoliaceae	I	X	X	X		X	X	X
Lonicera maackii	Amur honeysuckle	Caprifoliaceae	I		X			X		
Lonicera morrowii	Morrow's honeysuckle	Caprifoliaceae	I	X				X		
Lonicera sempervirens	Trumpet honeysuckle	Caprifoliaceae	N	X	X			X		
Lonicera standishii	Honeysuckle	Caprifoliaceae	I	X						
Lonicera tatarica	Tartarian honeysuckle	Caprifoliaceae	I		X	X				
Lotus corniculatus	Bird's-foot trefoil	Fabaceae	I	X						
Ludwigia alternifolia	False loosestrife	Onagraceae	N	X	X					
Ludwigia palustris	Water purslane	Onagraceae	I	X	X	X				
Luzula echinata	Common wood-rush	Juncaceae	N	X						
Luzula multiflora	Field Wood-Rush	Juncaceae	N	X				X		
Lycium barbarum	Matrimony-vine	Solanaceae	I	X	X					
Lycopersicon esculentum	Tomato	Solanaceae	I	X						
Lycopodium obscurum	Princess pine; Tree clubmoss	Lycopodiaceae	N	X	X					
Lycopus americanus	Water-horehound	Lamiaceae	N	X	X					
Lycopus species	Bugleweed species	Lamiaceae	NI					X		

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Lycopus uniflorus	Bugleweed	Lamiaceae	N	X	X					
Lycopus virginicus	Virginia bugleweed	Lamiaceae	N	X	X					
Lyonia ligustrina	Maleberry	Ericaceae	N	X	X					
Lyonia mariana	Stagger-bush	Ericaceae	N	X	X					
Lysimachia ciliata	Fringed loosestrife	Primulaceae	N	X	X					
Lysimachia nummularia	Moneywort	Primulaceae	I	X	X	X				
Lysimachia quadrifolia	Whorled loosestrife	Primulaceae	N	X	X	X		X		
Lysimachia vulgaris	Garden loosestrife	Primulaceae	I	X						
Lythrum salicaria	Purple loosestrife	Lythraceae	I			X				
Maclura pomifera	Osage orange	Moraceae	I	X	X					
Magnolia acuminata	Cucumber-tree	Magnoliaceae	N		X	X				
Magnolia tripetala	Umbrella magnolia	Magnoliaceae	A	X	X			X	X	X
Magnolia virginiana	Sweetbay magnolia	Magnoliaceae	N		X					
Maianthemum canadense	Canada mayflower	Liliaceae	N	X	X	X		X	X	
Malaxis unifolia	Green adder's mouth	Orchidaceae	N	X	X					
Malus pumila	Apple	Rosaceae	I		X					
Malus species	Apple species	Rosaceae	I					X		
Malva neglecta	Common mallow	Malvaceae	I		X					
Matelea obliqua	Angle-pod	Asclepiadaceae	N	X	X					
Matteuccia struthiopteris	Ostrich fern	Dryopteridaceae	N	X	X	X		X		
Mazus miguelii	Mazus	Scrophulariaceae	I	X	X					
Mazus pumilus	Japanese mazus	Scrophulariaceae	I	X	X					
Medeola virginiana	Indian cucumber-root	Liliaceae	N	X	X			X		
Medicago falcata	Yellow alfalfa	Fabaceae	I	X						
Medicago lupulina	Black medick	Fabaceae	I	X	X					
Medicago sativa	Alfalfa	Fabaceae	I	X	X					
Melampyrum lineare	Cow-wheat	Scrophulariaceae	I		X					
Melilotus alba	White sweet-clover	Fabaceae	I	X	X	X				
Melilotus officinalis	Yellow sweet-clover	Fabaceae	I	X	X	X				
Menispermum canadense	Moonseed	Menispermaceae	N	X		X				

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Mentha aquatica x spicata	Peppermint	Lamiaceae	I		X					
Mentha arvensis	Field mint	Lamiaceae	N	X	X					
Mentha arvensis x spicata	Red mint	Lamiaceae	I	X						
Mentha spicata	Spearmint	Lamiaceae	I		X					
Mertensia virginica	Virginia bluebells	Boraginaceae	N		X			X		
Microstegium vimineum	Stilt grass	Poaceae	I	X		X		X		X
Mikania scandens	Climbing hempweed	Asteraceae	N	X						
Mimulus alatus	Winged monkey-flower	Scrophulariaceae	N	X	X					
Mimulus ringens	Allegheny monkey-flower	Scrophulariaceae	N	X	X					
Mirabilis nyctaginea	Wild four-o'clock	Nyctaginaceae	I	X						
Mitchella repens	Partridge-berry	Rubiaceae	N	X	X	X		X		
Mitella diphylla	Bishop's-cap	Saxifragaceae	N	X	X					
Mollugo verticillata	Carpet-weed	Molluginaceae	I	X	X					
Monarda clinopodia	Bee-balm	Lamiaceae	N	X	X					
Monarda didyma	Bee-balm	Lamiaceae	N	X	X					
Monarda fistulosa	Wild bergamot	Lamiaceae	N		X					
Monarda media	Purple bergamot	Lamiaceae	N	X						
Monotropa hypopithys	Pine-sap	Monotropaceae	N	X	X					
Monotropa uniflora	indian-pipe	Monotropaceae	N	X	X			X		
Morus alba	White mulberry	Moraceae	I	X	X	X		X	X	
Morus rubra	Red mulberry	Moraceae	N	X	X					
Muhlenbergia frondosa	Wirestem muhly	Poaceae	N	X						
Muhlenbergia schreberi	Dropseed	Poaceae	N	X						
Muhlenbergia sobolifera	Creeping muhly	Poaceae	N	X						
Muhlenbergia sylvatica	Muhly; Woodland dropseed	Poaceae	N	X						
Muhlenbergia tenuiflora	Muhly; Woodland dropseed	Poaceae	N	X						
Muscari botryoides	Grape-hyacinth	Liliaceae	I	X	X					
Myosotis laxa	Wild forget-me-not	Boraginaceae	N	X	X					
Myosotis scorpioides	Water scorpion-grass	Boraginaceae	I	X	X					
Myrica pensylvanica	Bayberry	Myricaceae	N	X		X				

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Narcissus pseudonarcissus	Daffodil	Liliaceae	I		X			X		
Nasturtium officinale	Watercress	Brassicaceae	I	X				X		
Navarretia squarrosa	Navarretia	Polemoniaceae	I	X						
Nepeta cataria	Catnip	Lamiaceae	I	X	X					
Nonea rosea	Nonea	Boraginaceae	I	X						
Nuphar lutea	Spatterdock	Nymphaeaceae	N	X						
Nyssa sylvatica	Sour gum	Nyssaceae	N	X	X	X		X		
Oenothera biennis	Common Evening-Primrose	Onagraceae	N	X	X	X				
Oenothera parviflora	Evening-primrose	Onagraceae	N	X						
Oenothera perennis	Sundrops	Onagraceae	N	X	X					
Onoclea sensibilis	Sensitive fern	Dryopteridaceae	N	X	X	X		X		X
Origanum vulgare	Oregano	Lamiaceae	I	X	X					
Ornithogalum nutans	Star-of-Bethleham	Liliaceae	I	X						
Ornithogalum umbellatum	Star-of-Bethleham	Liliaceae	I	X	X			X	X	
Orobanche uniflora	Broom-rape; Cancer root	Orobanchaceae	N	X	X					
Orontium aquaticum	Golden club	Araceae	N	X						
Orthilia secunda	Wintergreen	Pyrolaceae	N	X	X					
Oryzopsis racemosa	Ricegrass	Poaceae	N	X						
Osmorhiza claytonii	Sweet cicely	Apiaceae	N		X	X		X	X	
Osmorhiza longistylis	Anise-root	Apiaceae	N	X	X	X		X	X	
Osmunda cinnamomea	Cinnamon fern	Osmundaceae	N	X	X			X		
Osmunda claytoniana	Interrupted fern	Osmundaceae	N	X	X	X				
Osmunda regalis	Royal fern	Osmundaceae	N		X					
Ostrya virginiana	Hop-hornbeam	Betulaceae	N	X	X					
Oxalis dillenii	Wood-shamrock; Southern yellow wood-sorrel	Oxalidaceae	N	X						
Oxalis stricta	Yellow Wood -Sorrel	Oxalidaceae	N	X	X	X			X	
Oxalis violacea	Violet wood sorrel	Oxalidaceae	N	X	X					
Oxypolis rigidior	Cowbane	Apiaceae	N	X	X					
Pachysandra terminalis	Japanese spurge	Buxaceae	I	X		X		X	X	X
Panax trifolius	Dwarf ginseng	Araliaceae	N	X	X			X		

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Panicum acuminatum	Panic-grass	Poaceae	N	X				X		
Panicum anceps	Beaked panicum	Poaceae	N	X						
Panicum boscii	Panic-grass	Poaceae	N	X						
Panicum clandestinum	Deer-tongue grass	Poaceae	N	X				X		
Panicum columbianum	Panic-grass	Poaceae	N	X						
Panicum commutatum	Panic-grass	Poaceae	N	X						
Panicum depauperatum	Poverty panic-grass	Poaceae	N	X						
Panicum dichotomiflorum	Smooth panic-grass	Poaceae	N	X						
Panicum dichotomum	Panic-grass	Poaceae	N	X				X		
Panicum gattingeri	Witch grass	Poaceae	N	X						
Panicum latifolium	Panic-grass	Poaceae	N	X						
Panicum microcarpon	Panic-grass	Poaceae	N	X						
Panicum miliaceum	Broomcorn millet	Poaceae	I	X						
Panicum philadelphicum	Panic-grass	Poaceae	N	X						
Panicum polyanthes	Panic-grass	Poaceae	N	X						
Panicum rigidulum	Panic-grass	Poaceae	N	X						
Panicum sphaerocarpon	Panic-grass	Poaceae	N	X						
Panicum villosissimum	Long-haired panic-grass	Poaceae	N	X						
Panicum virgatum	Switch grass	Poaceae	N	X		X				
Panicum yadkinense	Yadkin River panic-grass	Poaceae	N	X						
Papaver somniferum	Opium poppy	Papaveraceae	I	X						
Parietaria pensylvanica	Pellitory	Urticaceae	N	X	X					
Paronychia canadensis	Forked chickweed	Caryophyllaceae	N	X	X			X		
Paronychia fastigiata	Forked chickweed	Caryophyllaceae	N	X						
Parthenocissus quinquefolia	Virginia creeper	Vitaceae	N	X	X	X		X		X
Paspalum setaceum	Slender beardgrass	Poaceae	I	X						
Paspalum setaceum	Slender beardgrass	Poaceae	N	X						
Pastinaca sativa	Wild parsnip	Apiaceae	I	X	X					
Paulownia tomentosa	Princess-tree	Bignoniaceae	I	X	X	X		X		X
Pedicularis canadensis	Forest lousewort	Scrophulariaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Pellaea glabella	Smooth cliff-brake	Adiantaceae	N	X						
Penstemon digitalis	Beard-tongue	Scrophulariaceae	N	X						
Penstemon hirsutus	Beard-tongue	Scrophulariaceae	N	X	X					
Penthorum sedoides	Ditch stonecrop	Saxifragaceae	N	X	X					
Perilla frutescens	Perilla	Labiatae	I		X					
Petunia x hybrida	Petunia	Solanaceae	I	X						
Phacelia purshii	Miami mist	Hydrophyllaceae	N	X						
Phalaris arundinacea	Reed canary-grass	Poaceae	N	X		X		X		
Phaseolus polystachios	Wild bean	Fabaceae	N	X						
Phegopteris connectilis	Long beech fern	Thelypteridaceae	N		X					
Phegopteris hexagonoptera	Broad beech fern	Thelypteridaceae	N		X	X		X		
Phellodendron lavallei	Corktree	Rutaceae	I					X	X	
Philadelphus coronarius	Mock-orange	Hydrangeaceae	I		X			X	X	
Phleum pratense	Timothy	Poaceae	I	X						
Phlox paniculata	Summer pholx	Polemoniaceae	N		X					
Photinia parviflora	Photinia	Rosaceae	I					X		
Photinia villosa	Photinia	Rosaceae	I					X		
Phragmites australis	Common reed	Poaceae	N	X					X	
Phryma leptostachya	Lopseed	Verbenaceae	N	X	X					
Physalis heterophylla	Clammy ground-cherry	Solanaceae	N	X						
Physalis subglabrata	Ground-cherry	Solanaceae	N	X	X					
Physocarpus opulifolius	Ninebark	Rosaceae	N	X	X					
Phytolacca americana	Pokeweed	Phytolaccaceae	N	X	X	X		X		X
Picea abies	Norway spruce	Pinaceae	I	X				X		
Picea mariana	Black spruce	Pinaceae	N	*						
Picris hieracioides	Ox-tongue	Asteraceae	I	X						
Pilea pumila	Clearweed	Urticaceae	N	X	X	X				X
Pinus echinata	Shortleaf pine	Pinaceae	N	X						
Pinus nigra	Austrian pine	Pinaceae	I	X	X					
Pinus rigida	Pitch pine	Pinaceae	N		X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Pinus strobus	White pine	Pinaceae	N		X	X		X		
Pinus sylvestris	Scots pine	Pinaceae	I		X	X			X	
Pinus virginiana	Scrub pine	Pinaceae	N	X	X					
Piptochaetium avenaceum	Black oatgrass	Poaceae	N	X						
Plantago lanceolata	English plantain; Ribgrass	Plantaginaceae	I	X	X					
Plantago major	Broadleaf plantain; Whiteman's foot	Plantaginaceae	I	X	X	X				
Plantago pusilla	Dwarf plantain	Plantaginaceae	N	X						
Plantago rugelii	Common Plantain	Plantaginaceae	N	X	X					
Plantago virginica	Dwarf plantain	Plantaginaceae	N	X						
Platanthera clavellata	Green wood orchis	Orchidaceae	N	X						
Platanus occidentalis	Sycamore	Platanaceae	N	X	X	X		X		
Platanus x acerifolia	London planetree	Plantanaceae	N			X				
Poa annua	Annual bluegrass	Poaceae	I	X						
Poa autumnalis	Autumn bluegrass	Poaceae	N	X						
Poa compressa	Canada bluegrass	Poaceae	I	X						
Poa cuspidata	Bluegrass	Poaceae	N	X						
Poa pratensis	Kentucky bluegrass	Poaceae	I	X						
Podophyllum peltatum	May-apple	Berberidaceae	N	X	X	X		X	X	
Podostemum ceratophyllum	Riverweed	Podostemaceae	N	X						
Polemonium reptans	Greek valerian	Polemoniaceae	N	X	X					
Polygala sanguinea	Purple milkwort	Polygalaceae	N	X						
Polygala senega	Seneca snakeroot	Polygalaceae	N	X						
Polygala verticillata	Whorled milkwort	Polygalaceae	N	X						
Polygonatum biflorum	Solomon's seal	Liliaceae	N	X	X	X				
Polygonatum pubescens	Solomon's seal	Liliaceae	N	X				X		cf
Polygonum arenastrum	Doorweed	Polygonaceae	I	X						
Polygonum arifolium	Halberd-leaved tearthumb	Polygonaceae	N	X	X				X	
Polygonum aviculare	Knotweed	Polygonaceae	I	X	X					
Polygonum caespitosum	Low smartweed	Polygonaceae	I	X	X	X		X		
Polygonum convolvulus	Black bindweed	Polygonaceae	I	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Polygonum cuspidatum	Japenese knotweed	Polygonaceae	I	X	X	X		X		X
Polygonum hydropiper	Common smartweed	Polygonaceae	I	X		X				
Polygonum hydropiperoides	Mild water-pepper	Polygonaceae	N			X				X
Polygonum lapathifolium	Dock-leaved smartweed	Polygonaceae	I	X	X					
Polygonum orientale	Prince's-feather	Polygonaceae	I	X						
Polygonum pensylvanicum	Smartweed	Polygonaceae	N	X	X	X				
Polygonum perfoliatum	Mile-a-minute	Polygonaceae	I						X	
Polygonum persicaria	Lady's-thumb	Polygonaceae	I	X	X	X				
Polygonum punctatum	Dotted smartweed	Polygonaceae	N	X	X					
Polygonum sagittatum	Arrow-leaved tearthumb	Polygonaceae	N	X	X	X				
Polygonum scandens	Climbing false-buckwheat	Polygonaceae	N	X	X					
Polygonum tenue	Slender knotweed	Polygonaceae	N	X	X					
Polygonum virginianum	Jumpseed	Polygonaceae	N		X	X		X	X	
Polypodium virginianum	Rock polypody	Polypodiaceae	N	X	X	X		X		
Polystichum acrostichoides	Christmas fern	Dryopteridaceae	N	X	X	X		X	X	X
Poncirus trifoliata	Hardy orange	Rutaceae	I			X		X		
Populus grandidentata	Large-toothed aspen	Salicaceae	N	X	X					
Populus tremuloides	Quaking aspen	Salicaceae	N	X	X	X				
Porteranthus trifoliatus	Bowman's-root	Rosaceae	N	X						
Portulaca oleracea	Purslane	Portulacaceae	N	X	X					
Potentilla canadensis	Cinquefoil	Rosaceae	N	X	X	X				
Potentilla norvegica	Strawberry-weed	Rosaceae	N	X	X					
Potentilla recta	Sulfur cinquefoil	Rosaceae	I	X	X					
Potentilla simplex	Old-field cinquefoil	Rosaceae	N	X	X			X		
Poteranthus trifoliatus	Bowman's-root	Rosaceae	N		X					
Prenanthes altissima	Tall White Lettuce	Asteraceae	N	X	X	X				
Prenanthes trifoliolata	Gall-of-the-earth	Asteraceae	N	X	X	X		X		
Prunella vulgaris var. lanceolata	Heal-all	Lamiaceae	N		X					
Prunus avium	Bird cherry	Rosaceae	I	X	X			X		
Prunus domestica	Plum	Rosaceae	I	X						
Prunus padus	European bird cherry	Rosaceae	I	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Prunus persica	Peach	Rosaceae	I	X	X					
Prunus serotina	Wild black cherry	Rosaceae	N	X	X	X		X	X	
Prunus subhirtella	Cherry	Rosaceae	I					X		
Pseudosasa japonica	Bamboo	Poaceae	I					X		
Pteridium aquilinum	Bracken fern	Dennstaedtiaceae	N	X	X	X		X		
Pycnanthemum tenuifolium	Mountain-mint	Lamiaceae	N			X			X	
Pycnanthemum verticillatum	Mountain-mint	Lamiaceae	N	X	X					
Pycnanthemum virginianum	Mountain-mint	Lamiaceae	N		X					
Pyrola chlorantha	Wintergreen	Pyrolaceae	N	X	X					
Pyrola elliptica	Shinleaf	Pyrolaceae	N	X	X					
Pyrus communis	Pear	Rosaceae	I		X					
Quercus alba	White oak	Fagaceae	N	X	X	X		X		
Quercus bicolor	Swamp oak	Fagaceae	N	X	X			X		
Quercus coccinea	Scarlet oak	Fagaceae	N	X	X	X				
Quercus montana	Chestnut Oak	Fagaceae	N	X	X	X		X		X
Quercus muhlenbergii	Chinquapin oak	Fagaceae	N			X				
Quercus palustris	Pin oak	Fagaceae	N	X	X	X				
Quercus phellos	Willow oak	Fagaceae	N			X				
Quercus rubra	Red oak	Fagaceae	N	X	X	X		X	X	
Quercus velutina	Black oak	Fagaceae	N	X	X	X		X		
Ranunculus abortivus	Small flowered crowfoot	Ranunculaceae	N	X	X	X		X	X	
Ranunculus acris	Common meadow buttercup	Ranunculaceae	I	X	X					
Ranunculus bulbosus	Bulbous buttercup	Ranunculaceae	I		X	X				
Ranunculus ficaria	Lesser celandine	Ranunculaceae	I	X	X	X		X	X	X
Ranunculus hispidus	Hairy buttercup	Ranunculaceae	N	X	X					
Ranunculus recurvatus	Hooked crowfoot	Ranunculaceae	N	X	X			X		
Ranunculus repens	Creeping buttercup	Ranunculaceae	I	X						
Rhexia virginica	Virginia meadow-beauty	Melastomaceae	N	X						
Rhododendron catawbiense	Catawba rhododendron	Ericaceae	I			X				
Rhododendron maximum	Great Rhododendron	Ericaceae	N		X	X		X		cf
Rhododendron periclymenoides	Pinxter-flower	Ericaceae	N	X	X			X	X	

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Rhodotypos scandens	Jetbead	Rosaceae	I	X	X	X		X		X
Rhus glabra	Smooth sumac	Anacardiaceae	N	X	X					
Rhus species	Rhus species	Anacardiaceae	NI							X
Rhus typhina	Staghorn sumac	Anacardiaceae	N	X	X					
Robinia pseudoacacia	Black locust	Fabaceae	N	X	X	X		X		X
Rorippa palustris	Marsh watercress	Brassicaceae	N	X	X					
Rorippa sylvestris	Creeping yellow-cress	Brassicaceae	I	X	X					
Rosa carolina	Pasture rose	Rosaceae	N	X	X					
Rosa multiflora	Multiflora rose	Rosaceae	I			X		X		X
Rosa virginiana	Wild rose	Rosaceae	N	X						
Rubus allegheniensis	Common blackberry	Rosaceae	N	X	X	X		X		X
Rubus enslenii	Southern dewberry	Rosaceae	N	X						
Rubus flagellaris	Prickly dewberry	Rosaceae	N	X	X			X		
Rubus hispidus	Swamp dewberry	Rosaceae	N		X					
Rubus laciniatus	Cut-leaved blackberry	Rosaceae	I		X					
Rubus occidentalis	Black raspberry	Rosaceae	N	X	X	X				
Rubus odoratus	Purple-flowering raspberry	Rosaceae	N	X	X					
Rubus pensilvanicus	Blackberry	Rosaceae	N	X						
Rubus phoenicolasius	Wineberry	Rosaceae	I	X	X	X		X	X	X
Rudbeckia hirta	Black-eyed susan	Asteraceae	N	X	X					
Rudbeckia laciniata	Tall coneflower	Asteraceae	N	X	X					
Rudbeckia triloba	Coneflower	Asteraceae	N	X	X					
Rumex acetosella	Sheep sorrel	Polygonaceae	I	X	X					
Rumex altissimus	Tall dock	Polygonaceae	N	X	X					
Rumex crispus	Curly dock	Polygonaceae	I	X	X					
Rumex obtusifolius	Bitter dock	Polygonaceae	I	X	X	X		X		
Rumex pulcher	Fiddle dock	Polygonaceae	I	X						
Sagina decumbens	Pearlwort	Caryophyllaceae	N	X						
Sagina japonica	Japanese pearlwort	Caryophyllaceae	I	X						
Sagina procumbens	Bird's-eye	Caryophyllaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Sagittaria australis	Southern arrow-head	Alismataceae	N		X					
Sagittaria latifolia	Common arrow-head	Alismataceae	N	X	X					
Salix babylonica	Weeping willow	Salicaceae	I		X					
Salix caprea	Goat willow	Salicaceae	I	X	X					
Salix fragilis	Crack willow	Salicaceae	I	X	X					
Salix nigra	Black willow	Salicaceae	N	X	X					
Salix purpurea	Basket willow	Salicaceae	I	X	X					
Salix sericea	Silky willow	Salicaceae	N	X	X					
Salvia lyrata	Lyre-leaved sage	Lamiaceae	N	X	X					
Sambucus canadensis	American elder	Caprifoliaceae	N	X	X			X		X
Sanguinaria canadensis	Bloodroot	Papaveraceae	N	X	X	X		X	X	X
Sanicula canadensis	Snake-root	Apiaceae	N	X	X					
Sanicula marilandica	Black snake-root	Apiaceae	N	X						
Sanicula odorata	Fragrant snake-root	Apiaceae	N	X	X	X		X		X
Sanicula trifoliata	Large-fruited sanicle	Apiaceae	N	X	X					
Saponaria officinalis	Soapwort	Caryophyllaceae	I	X	X					
Sassafras albidum	Sassafras	Lauraceae	N	X	X	X		X		X
Saururus cernuus	Lizard's tail	Saururaceae	N	X	X					
Saxifraga pensylvanica	Swamp saxifrage	Saxifragaceae	N	X	X					
Saxifraga virginiensis	Early saxifrage	Saxifragaceae	N	X	X					
Schizachyrium scoparium	Little bluestem	Poaceae	N	X		X				
Schoenoplectus fluviatilis	River bulrush	Cyperaceae	N	X						
Schoenoplectus purshianus	Bulrush	Cyperaceae	N	X						
Schoenoplectus tabernaemontani	Great bulrush; Soft stem bulrush	Cyperaceae	N	X						
Scilla sibirica	Siberian squill	Liliaceae	I		X					
Scirpus atrovirens	Blackish wool grass	Cyperaceae	N	X						
Scirpus cyperinus	Wool grass	Cyperaceae	N	X						
Scirpus polyphyllus	Bulrush	Cyperaceae	N	X						
Scleria muhlenbergii	Reticulated nut rush	Cyperaceae	N	X						
Scrophularia lanceolata	lanceleaf figwort	Scrophulariaceae	N		X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Scrophularia marilandica	Figwort	Scrophulariaceae	N		X					
Scutellaria elliptica	Hairy skullcap	Lamiaceae	N	X	X					
Scutellaria integrifolia	Hyssop skullcap	Lamiaceae	N	X						
Scutellaria lateriflora	Mad-dog skullcap	Lamiaceae	N	X						
Scutellaria leonardii	Small skullcap	Lamiaceae	N	X						
Sedum sarmentosum	Orpine	Crassulaceae	I	X	X					
Selaginella apoda	Creeping spikemoss; meadow spikemoss	Selaginellaceae	N	X	X					
Senecio aureus	Golden ragwort	Asteraceae	N	X	X					
Senecio jacobaea	Stinky-willie	Asteraceae	I	X						
Senecio obovatus	Groundsel	Asteraceae	N	X						
Senna hebecarpa	Wild senna	Caesalpiniaceae	N	X	X					
Setaria faberi	Giant foxtail	Poaceae	I	X						
Setaria geniculata	Perenniel foxtail	Poaceae	N	X						
Setaria italica	Foxtail millet; Italian millet	Poaceae	I	X						
Setaria pumila	Yellow foxtail	Poaceae	I	X						
Setaria verticillata	Bristly foxtail	Poaceae	I	X						
Setaria viridis	Green foxtail	Poaceae	I	X						
Sherardia arvensis	Field-madder	Rubiaceae	I	X						
Sicyos angulatus	Bur cucumber	Cucurbitaceae	N	X	X	X				
Silene alba	White campion	Caryophyllaceae	I	X						
Silene antirrhina	Sleepy catchfly	Caryophyllaceae	N	X	X					
Silene armeria	Garden catchfly	Caryophyllaceae	I	X						
Silene stellata	Starry campion	Caryophyllaceae	N	X	X			X		
Silene vulgaris	Bladder campion	Caryophyllaceae	I	X	X					
Silphium perfoliatum	Cup-plant	Asteraceae	A	X	X					
Sinapis arvensis	Wild mustard	Brassicaceae	I	X	X					
Sisymbrium altissimum	Tumble mustard	Brassicaceae	I		X					
Sisymbrium officinale	Bank cress	Brassicaceae	I	X	X					
Sisyrinchium angustifolium	Blue-Eyed Grass	Iridaceae	N	X	X	X				
Sisyrinchium mucronatum	Blue eyed grass	Iridaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Smilacina racemosa	False solomon's-seal	Liliaceae	N	X	X	X		X	X	P
Smilax glauca	Sawbrier	Smilacaceae	N	X	X				X	
Smilax herbacea	Carrion flower	Smilacaceae	N		X			X		
Smilax pulverulenta	Carrion flower	Smilacaceae	N	X						
Smilax rotundifolia	Common catbrier	Smilacaceae	N	X	X	X		X		cf
Solanum carolinense	Horse-nettle	Solanaceae	N	X	X					
Solanum dulcamara	Trailing nightshade	Solanaceae	I	X	X	X		X		cf
Solanum nigrum	Black nightshade	Solanaceae	I	X	X					
Solidago altissma	Late goldenrod	Asteraceae	N			X				
Solidago arguta	Forest goldenrod	Asteraceae	N	X	X					
Solidago bicolor	Silverrod	Asteraceae	N	X	X				X	
Solidago caesia	Blue-stemmed goldenrod	Asteraceae	N	X	X	X		X		
Solidago canadensis	Canada goldenrod	Asteraceae	N	X	X	X				
Solidago flexicaulis	Zigzag goldenrod	Asteraceae	N	X		X		X	X	
Solidago gigantea	Smooth goldenrod	Asteraceae	N	X	X					
Solidago juncea	Early goldenrod	Asteraceae	N	X		X				
Solidago nemoralis	Wreath goldenrod	Asteraceae	N	X	X				X	
Solidago odora	Sweet goldenrod	Asteraceae	N	X	X					
Solidago puberula	Downy goldenrod	Asteraceae	N	X	X					
Solidago rugosa	Rough goldenrod	Asteraceae	N	X	X				X	
Solidago ulmifolia	Elm-leaved goldenrod	Asteraceae	N	X	X					
Sonchus asper	Spiny-leaved sow-thistle	Asteraceae	I	X						
Sonchus oleraceus	Milk-thistle	Asteraceae	I	X						
Sophora japonica	Japanese pagoda	Fabaceae	I					X		
Sorghastrum nutans	Indian grass	Poaceae	N	X						
Sparganium eurycarpum	Bur-reed	Sparganiaceae	N	X						
Sphenopholis nitida	Wedge-grass	Poaceae	N	X						
Spinacia oleracea	Spinach	Chenopodiaceae	I	X						
Spiraea latifolia	Meadow-sweet	Rosaceae	N		X					
Spiranthes cernua	Nodding ladies' tresses	Orchidaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Spiranthes lacera	Southern slender ladies'-tresses	Orchidaceae	N	X	X					
Spiranthes ochroleuca	Yellow nodding ladies'-tresses	Orchidaceae	N	X						
Spirodela polyrhiza	Greater duckweed; Water-flaxseed	Lemnaceae	N	X						
Sporobolus vaginiflorus	Poverty grass	Poaceae	N	X						
Staphylea trifolia	Bladdernut	Staphyleaceae	N	X	X	X		X	X	
Stellaria alsine	Bog chickweed	Caryophyllaceae	I	X	X					
Stellaria graminea	Common stitchwort	Caryophyllaceae	I	X	X					
Stellaria longifolia	Long-leaved stitchwort	Caryophyllaceae	N	X	X					
Stellaria media	Common chickweed	Caryophyllaceae	I	X	X	X		X	X	
Stellaria pubera	Great chickweed	Caryophyllaceae	N	X	X	X			X	
Strophostyles helvola	Wild bean	Fabaceae	N	X	X					
Strophostyles umbellata	Wild bean	Fabaceae	N	X						
Stylophorum diphyllum	Celidane poppy	Phytolaccaceae	I			X				
Symphoricarpos orbiculatus	Coralberry	Caprifoliaceae	N	X	X			X		
Symphytum officinale	Comfrey	Boraginaceae	I	X						
Symplocarpus foetidus	Skunk cabbage	Araceae	N	X	X	X		X	X	X
Symplocos paniculatus	Sapphire-berry; Asiatic sweetleaf	Styracaceae	I					X		
Taraxacum laevigatum	Red-seeded dandelion	Asteraceae	I	X						
Taraxacum officinale	Common dandelion	Asteraceae	I	X	X	X		X		
Tephrosia virginiana	Goat's rue	Fabaceae	N	X	X					
Teucrium canadense var. virginicum	Wild germander	Lamiaceae	N		X					
Thalictrum dioicum	Early meadow-rue	Ranunculaceae	N	X	X	X				
Thalictrum pubescens	Tall meadow rue	Ranunculaceae	N	X	X					
Thalictrum revolutum	Purple meadow-rue; Skunk meadow-rue	Ranunculaceae	N	X						
Thalictrum thalictroides	Rue anemone	Ranunculaceae	N	X	X	X				
Thaspium barbinode	Meadow-parsnip	Apiaceae	N	X	X					
Thaspium trifoliatum	Meadow-parsnip	Apiaceae	N	X	X					
Thelypteris noveboracensis	New York fern	Thelypteridaceae	N	X	X	X		X		
Thelypteris palustris	Marsh fern	Thelypteridaceae	N	X	X	X				

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Thlaspi arvense	Field penny-cress	Brassicaceae	I	X						
Tilia americana	American basswood	Tiliaceae	N	X	X	X			X	
Toxicodendron radicans	Poison Ivy	Anacardiaceae	N	X	X	X		X	X	X
Tradescantia virginiana	Spiderwort	Commelinaceae	N	X	X					
Tragopogon dubius	Goat's-beard	Asteraceae	I	X						
Trichophorum planifolium	Club rush	Cyperaceae	N	X						
Trichostema dichotomum	False pennyroyal	Lamiaceae	N	X	X					
Tricyrtis hirta	Toadlily	Liliaceae	I		X					
Tridens flavus	Purple-top	Poaceae	N	X						
Trifolium aureum	Large hop-clover	Fabaceae	I	X	X					
Trifolium campestre	Low hop-clover	Fabaceae	I	X						
Trifolium hybridum	Alsike clover	Fabaceae	I	X	X					
Trifolium pratense	Red clover	Fabaceae	I	X	X	X				
Trifolium repens	Dutch clover	Fabaceae	I	X	X	X				
Trillium cernuum	Nodding trillium	Liliaceae	N	X	X					
Trillium cuneatum	Huger's trillium	Liliaceae	I					X	X	
Triodanis perfoliata	Venus's-looking-glass	Campanulaceae	N	X	X					
Triphora trianthophora	Three birds orchid	Orchidaceae	N	X	X					
Tsuga canadensis	Hemlock	Pinaceae	N	X	X	X		X		
Ulmus americana	American elm	Ulmaceae	N	X	X	X		X		
Ulmus parvifolia	Chinese elm	Ulmaceae	I					X		
Ulmus rubra	Slippery elm	Ulmaceae	N	X	X	X			X	X
Urtica dioica	Stinging nettle	Urticaceae	I	X	X			X		P
Urtica dioica var. dioica	Stinging nettle	Urticaceae	I			X			X	
Urtica dioica var. gracilis	Stinging nettle	Urticaceae	I			X				
Uvularia perfoliata	Perfoliate bellwort	Liliaceae	N	X						
Uvularia sessilifolia	Sessile-leaved bellwort	Liliaceae	N	X	X	X			X	
Vaccinium angustifolium	Low sweet blueberry	Ericaceae	N	X	X					
Vaccinium corymbosum	Highbush blueberry	Ericaceae	N	X	X			X		
Vaccinium macrocarpon	Cranberry	Ericaceae	N	X						

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Vaccinium pallidum	Lowbush blueberry	Ericaceae	N	X	X	X		X	X	
Vaccinium stamineum	Deerberry	Ericaceae	N	X	X	X		X		
Valerianella umbilicata	Corn-salad	Valerianaceae	N	X	X					
Verbascum blattaria	Moth mullein	Scrophulariaceae	I	X	X					
Verbascum lychnitis	White mullein	Scrophulariaceae	I	X	X					
Verbascum thapsus	Common mullein	Scrophulariaceae	I	X	X	X				
Verbena urticifolia	White vervain	Verbenaceae	N	X	X	X				
Vernonia glauca	Tawny ironweed	Asteraceae	N	X						
Vernonia noveboracensis	New York ironweed	Asteraceae	N	X	X					
Veronica arvensis	Corn speedwell	Scrophulariaceae	I	X						
Veronica filiformis	Creeping speedwell	Scrophulariaceae	I	X						
Veronica hederifolia	ivy-leaved speedwell	Scrophulariaceae	I	X	X	X		X	X	
Veronica officinalis	Common speedwell	Scrophulariaceae	N	X	X					
Veronica peregrina	Neckweed	Scrophulariaceae	N	X	X					
Veronica polita	Speedwell	Scrophulariaceae	I	X						
Veronica serpyllifolia	Thyme-leaved speedwell	Scrophulariaceae	I	X	X					
Viburnum acerifolium	Maple-leaved viburnum	Caprifoliaceae	N		X	X				X
Viburnum dentatum	Downy arrow-wood	Caprifoliaceae	N		X				X	
Viburnum dilatatum	Linden viburnum	Caprifoliaceae	I					X	X	
Viburnum opulus	Guelder-rose	Caprifoliaceae	I	X	X					
Viburnum plicatum	Doublefile viburnum	Caprifoliaceae	I		X			X		
Viburnum prunifolium	Black-haw	Caprifoliaceae	N	X	X	X		X		
Viburnum recognitum	Arrow-wood	Caprifoliaceae	N	X	X	X		X		
Viburnum sieboldii	Siebold viburnum	Caprifoliaceae	I	X	X			X		
Viburnum trilobum	Highbush cranberry	Caprifoliaceae	N	X						
Vicia tetrasperma	Slender vetch	Fabaceae	I	X						
Vinca minor	Common periwinkle	Apocynaceae	I	X	X	X		X	X	
Vincetoxicum nigrum	Black swallow-wort	Asclepiadaceae	I		X					
Viola affinis	LeConte's violet	Violaceae	N	X						
Viola blanda	Sweet white violet	Violaceae	N	X	X					

Table A-1.4 (continued). Records of plants (X= present; P = probable presence based on generic identification) from Wissahickon Valley Park and adjoining areas. Sources are the ANSP Herbarium (as compiled in the ANSP-Morris Arboretum database), Fogg (from Fogg 1996), Heavers 1999 study of sedges (Heaver 1999), and from the plant surveys associated with the NLREEP master planning (vegetation assessment, floral assessment by A. Rhoads, and miscellaneous observations of A.E. Schuyler, R. Horwitz, J. Weintraub, and others). Status codes are N (native to SE Pennsylvania), A (native to US, but not to SE Pennsylvania), and I (not native to US). Common and scientific names from Rhoads and Block (2000) or the ANSP herbarium records.

Scientific Name	Common Name	Family	Status	Herbarium	Fogg	David et al.	Heavers	Rhoads	Schuyler et al.	Veg. Assess-ment
Viola conspersa	American dog violet	Violaceae	N	X	X					
Viola cucullata	Blue marsh violet	Violaceae	N	X	X			X		
Viola hirsutula	Southern wood violet	Violaceae	N	X	X					
Viola macloskeyi	Sweet white violet	Violaceae	N	X	X			X		
Viola palmata	Early blue violet	Violaceae	N	X	X					
Viola pedata	Birdfoot violet	Violaceae	N	X	X					
Viola primulifolia	Primrose violet	Violaceae	N	X	X					
Viola pubescens var. pubescens	Downy Yellow Violet	Violaceae	N		X			X		
Viola pubescens var. scabriscula	Smooth yellow violet	Violaceae	N		X	X				
Viola rotundifolia	Round-leaved violet	Violaceae	N	X	X			X		
Viola sagittata var. ovata	Ovate-leaved violet	Violaceae	N		X					
Viola sororia	Common Blue Violet	Violaceae	N	X	X	X		X		
Viola striata	Striped violet	Violaceae	N	X	X					
Vitis aestivalis	Summer grape	Vitaceae	N	X	X			X		
Vitis labrusca	Fox grape	Vitaceae	N	X	X					
Vitis riparia	Riverbank grape	Vitaceae	N	X	X					
Vitis vulpina	Frost grape	Vitaceae	N	X	X			X		cf
Wisteria sinensis	Chinese wisteria	Fabaceae	I		X			X		
Woodsia obtusa	Blunt-leaved cliff fern	Dryopteridaceae	N	X	X					
Woodwardia areolata	Netted chain fern	Blechnaceae	N	X	X					
Xanthium strumarium	Common cocklebur	Asteraceae	N	X	X					
Xanthorhiza simplicissima	Shrub yellowroot	Berberidaceae	I					X		
Zanthoxylum species	Prickly-ash species	Rutaceae	NI							X

Appendix A-2.1. List of bird species observed during 1998 census of the Fairmount Park system (late migrants, aberrant individuals not included).

Common Name	Species ID	Indicator Species?	Migrant Status
Double-crested Cormorant	DCCO		Resident
Black-crowned Night-Heron	BCNH	Yes	Resident
Great Blue Heron	GRBH	Yes	Resident
Great Egret	GREG	Yes	Summer
Canada Goose	CAGO		Resident
Mallard	MALL		Resident
Wood Duck	WODU	Yes	Resident
American Coot	AMCO	Yes	Uncertain
Killdeer	KILL	Yes	Resident
Spotted Sandpiper	SPSA	Yes	Summer
Laughing Gull	LAGU		Resident
Ring-billed Gull	RBGU		Resident
Red-tailed Hawk	RTHA	Yes	Resident
Ring-necked Pheasant	PHEA	Yes	Resident
Mourning Dove	MODO		Resident
Yellow-billed Cuckoo	YBCU	Yes	Summer
Great Horned Owl	GHOW	Yes	Resident
Chimney Swift	CHSW		Summer
Ruby-throated Hummingbird	RTHU	Yes	Summer
Belted Kingfisher	BEKI	Yes	Resident
Red-bellied Woodpecker	RBWP		Resident
Northern Flicker	NOFL		Resident
Downy Woodpecker	DOWP		Resident
Hairy Woodpecker	HAWP		Resident
Pileated Woodpecker	PIWP	Yes	Resident
Eastern Kingbird	EAKI		Summer
Great Crested Flycatcher	GCFL	Yes	Summer
Eastern Wood-Pewee	EWPW	Yes	Summer
Eastern Phoebe	PHOE	Yes	Summer
Acadian Flycatcher	ACFL	Yes	Summer
Willow Flycatcher	WIFL	Yes	Summer
Tree Swallow	TRSW	Yes	Summer
Northern Rough-winged Swallow	RWSW	Yes	Summer
Barn Swallow	BASW	Yes	Summer

Appendix A-2.1 (continued). List of bird species observed during 1998 census of the Fairmount Park system (late migrants, aberrant individuals not included).

Common Name	Species ID	Indicator Species?	Migrant Status
Bank Swallow	BKSW	Yes	Summer
Blue Jay	BLJA		Resident
American Crow	AMCR		Resident
Fish Crow	FICR		Resident
Tufted Titmouse	TUTI		Resident
Carolina Chickadee	CACH		Resident
White-breasted Nuthatch	WBNH		Resident
House Wren	HOWR	Yes	Summer
Carolina Wren	CAWR	Yes	Summer
Blue-gray Gnatcatcher	BGGN	Yes	Summer
Wood Thrush	WOTH	Yes	Summer
Veery	VEER	Yes	Summer
American Robin	AMRO		Resident
Northern Mockingbird	NOMO		Resident
Brown Thrasher	BRTH	Yes	Summer
Cedar Waxwing	CEWX		Resident
White-eyed Vireo	WEVI	Yes	Summer
Yellow-throated Vireo	YTVI	Yes	Summer
Red-eyed Vireo	REVI	Yes	Summer
Warbling Vireo	WAVI	Yes	Summer
Prothonotary Warbler	PRWA	Yes	Summer
Blue-winged Warbler	BLWW	Yes	Summer
Northern Parula	NOPA	Yes	Summer
Black-and-white Warbler	BWWA	Yes	Summer
Cerulean Warbler	CEWA	Yes	Summer
Chestnut-sided Warbler	CSWA	Yes	Summer
Yellow Warbler	YEWA	Yes	Summer
Hooded Warbler	HOWA	Yes	Summer
Worm-eating Warbler	WEWA	Yes	Summer
Ovenbird	OVEN	Yes	Summer
Louisiana Waterthrush	LAWT	Yes	Summer
Common Yellowthroat	COYT	Yes	Summer
American Redstart	AMRE	Yes	Summer

Appendix A-2.1 (continued). List of bird species observed during 1998 census of the Fairmount Park system (late migrants, aberrant individuals not included).

Common Name	Species ID	Indicator Species?	Migrant Status
Rose-breasted Grosbeak	RBGB	Yes	Summer
Northern Cardinal	NOCA		Resident
Indigo Bunting	INBU	Yes	Summer
Eastern Towhee	EATO	Yes	Resident
Song Sparrow	SOSP		Resident
Field Sparrow	FISP	Yes	Resident
Chipping Sparrow	CHSP	Yes	Summer
Swamp Sparrow	SWSP	Yes	Resident
Red-winged Blackbird	RWBB	Yes	Summer
Brown-headed Cowbird	BHCB		Summer
Common Grackle	COGR		Resident
Orchard Oriole	OROR	Yes	Summer
Baltimore Oriole	BAOR	Yes	Summer
Scarlet Tanager	SCTA	Yes	Summer
American Goldfinch	AMGO		Resident
House Finch	HOFI		Resident

Appendix A-2.2. Park-specific list of individual bird indicator species observed in 1998 in the Fairmount Park system.

Species ID	Cobbs Creek	FDR	Fairmount (East/West)	Pennypack	Poquessing	Tacony	Wissahickon	Total
Acadian Flycatcher	5			15		1	41	62
American Redstart	1	1	1	12			8	23
Baltimore Oriole	19	6	13	32	2	12	18	102
Barn Swallow	1	14	9	10		3	11	48
Black-crowned Night-heron	1	3	1			1		6
Belted Kingfisher	3			1	1	2	2	9
Blue-gray Gnatcatcher	10		2	31		1	43	87
Bank Swallow				1				1
Blue-winged Warbler							2	2
Brown Thrasher	1	1			1			3
Black-and-white Warbler	1						1	2
Carolina Wren	6	1	6	9	4	3	21	50
Cerulean Warbler							1	1
Chipping Sparrow	3						3	6
American Coot		2						2
Common Yellowthroat	8	5	15	7	5	1	9	50
Chestnut-sided Warbler					1		1	2
Eastern Kingbird	10	9	9	3		4	1	36
Eastern Towhee	9		5	8	3	2	9	36

Appendix A-2.2 (continued). Park-specific list of individual bird indicator species observed in 1998 in the Fairmount Park system.

Species ID	Cobbs Creek	FDR	Fairmount (East/West)	Pennypack	Poquessing	Tacony	Wissahickon	Total
Eastern Wood-pewee	12		1	23	1	2	30	69
Field Sparrow							3	3
Great Crested Flycatcher		1	3	10		2	12	28
Great Horned Owl			1					1
Great Blue Heron	1	4	1					6
Great Egret	1	3	1			1		6
Hooded Warbler				1				1
House Wren	2	7	10	14	10	3	8	54
Indigo Bunting		1	2	2			2	7
Killdeer		1		1				2
Louisiana Waterthrush							16	16
Northern Parula				2			3	5
Orchard Oriole	1	1	13	3	2	1		21
Osprey	1			1				2
Ovenbird							20	20
Ring-necked Pheasant		9		1				10
Eastern Phoebe	2		1	5		1	10	19
Pileated Woodpecker							1	1
Prothonotary Warbler			1					1

Appendix A-2.2 (continued). Park-specific list of individual bird indicator species observed in 1998 in the Fairmount Park system.

Species ID	Cobbs Creek	FDR	Fairmount (East/West)	Pennypack	Poquessing	Tacony	Wissahickon	Total
Rose-breasted Grosbeak							1	1
Red-eyed Vireo	15	1	7	33	1	7	56	120
Red-tailed Hawk			1	1			1	3
Ruby-throated Hummingbird				1			6	7
Redwinged Blackbird	3	22	13	8	1	1		48
Northern Rough-winged Swallow	8	10	19	4			16	57
Scarlet Tanager			1	7			13	21
Spotted Sandpiper		7		2				9
Swamp Sparrow		1		1				2
Tree Swallow		5		2				7
Veery				8			35	43
Warbling Vireo	22	2	9	10	1	4		48
White-eyed Vireo			1	1			4	6
Worm-eating Warbler							1	1
Willow Flycatcher		3	1	2	1			7
Wood Duck			1				43	44
Wood Thrush	25		12	41	9	6	59	152
White-throated Sparrow			1					1

Appendix A-2.2 (continued). Park-specific list of individual bird indicator species observed in 1998 in the Fairmount Park system.

Species ID	Cobbs Creek	FDR	Fairmount (East/West)	Pennypack	Poquessing	Tacony	Wissahickon	Total
Yellow-breasted Chat					1			1
Yellow-billed Cuckoo							1	1
Yellow Warbler	5	7	14	23	3		4	56
Yellow-throated Vireo				3			1	4
Total	**173**	**125**	**174**	**337**	**46**	**58**	**517**	**1430**

Total Taxa: 55

Appendix A-2.3. Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Pied-billed Grebe	1941	McNeil		Transient: "Regular"				McNeil '41
Double-crested Cormorant	1941	McNeil		"Casual Visitant"				McNeil '41
American Bittern	**30Apr35**	**Yoder**	**2**	**Resident**	**-**	**Extirpated**	McNeil: irreg. breedr; Miller '31: Holmseburg nest	Cassinia
Least Bittern	**06Jun03**	**Fowler, H.**	**2**	**Breeder**	**-**	**Extirpated**	"Frequent about Holmesburg"; McNeil 1941: lists as irregular breeder	Fowler '03
Great Blue Heron	**1941**	**McNeil**	**3**	**Resident: "Regular"**		**Resident**	No nesting within territory	McNeil '41
Great Egret	1941	McNeil		Transient: Fall				McNeil '41
Snowy Egret								
Green-backed Heron	**1890s**	**Fowler, H.**		**Breeder**	**-**	**Extirpated?**	"Very common. . . Breeds"; McNeil 1941: Common	Fowler '03
Black-crowned Night-heron	**1941**	**McNeil**		**Breeder: "Regular"**	**-**	**Extirpated**		McNeil,'41
Snow Goose	1941	McNeil		"Casual Visitant"				McNeil '41
Canada Goose	1941	McNeil		Transient: "Regular"	+	**Breeder**		McNeil '41
Wood Duck	**1941**	**McNeil**		**Beeder: "Irregular"**		**Extirpated**		McNeil '41
Green-winged Teal	1941	McNeil		Transient: Spring				McNeil '41
American Black Duck	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated**		McNeil '41
Mallard	**1941**	**McNeil**		**Breeder: "Regular"**	+	**Breeder**		McNeil '41
Northern Pintail	1941	McNeil		Winter			"Winter Resident and Visitant"	McNeil '41
Northern Shoveler								
Gadwall								
American Wigeon								
Turkey Vulture	**1941**	**McNeil**		**Beeder: "Irregular"**		**Extirpated**		McNeil '41
Osprey	1941	McNeil		Transient: "Regular"		**Breeder?**	Appears to be nesting along the Delaware River	McNeil '41
Sharp-shinned Hawk	**1941**	**McNeil**	**4**	**Breeder: "Never common"**	**-**	**Extirpated**		McNeil '41
Cooper's Hawk	**1941**	**McNeil**	**3**	**Breeder: "Never common"**	**-**	**Extirpated**	Miller 1933: Bustleton, Frankford	McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Northern Goshawk			4					
Red-shouldered Hawk	1941	McNeil	3	Winter	-		"Winter Resident and Visitant"	McNeil '41
Broad-winged Hawk	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated**	Miller 1933: "Uncommon but regular", Bustleton	McNeil '41
Red-tailed Hawk	1941	McNeil		Winter			Wint. Res. & Visit; Miller: 1910 nest above Fox Chase	McNeil '41
American Kestrel	**1941**	**McNeil**		**Breeder: "Regular"**	**-**	**Extirpated**		McNeil '41
Merlin	1941	McNeil		Transient: "Regular"		?		McNeil '41
Peregrine Falcon	1941	McNeil		Transient: "Regular"				McNeil '41
Ring-necked Pheasant	**1941**	**McNeil**		**Resident**		**Breeder?**	1997: Mouth of Pennypack	McNeil '41
Wild Turkey								
King Rail	**1890s**	**Fowler**	**1**	**Breeder**	**-**	**Extirpated?**	"Seen occasionally on the marshes about Holmesburg in summer"	Fowler '03
Northern Bobwhite	**1941**	**McNeil**	**3**	**Breeder: "Regular"**	**-**	**Extirpated?**		McNeil '41
Common Moorhen								
American Coot								
Killdeer	**1941**	**McNeil**		**Resident**		**Breeder?**		McNeil '41
Solitary Sandpiper	1941	McNeil		Transient: "Regular"				McNeil '41
Spotted Sandpiper	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder?**		McNeil '41
American Woodcock	**1890s**	**Fowler, H.**		**Breeder**			"Formerly common but now becoming scarce"; McNeil 1941: irregular breeder	Fowler '03
Ring-billed Gull	1941	McNeil		Winter			"Winter Resident and Visitant"	McNeil '41
Herring Gull	1941	McNeil		Winter			"Winter Resident and Visitant"	McNeil '41
Great Black-backed Gull					0			
Rock Dove	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Mourning Dove	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Black-billed Cuckoo	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated?**		McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Yellow-billed Cuckoo	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated?**	Miller 1933: nests occ. at Frankford	McNeil '41
Barn Owl	**1941**	**McNeil**	**3**	**Breeder: "Regular"**		**Extirpated?**	Miller 1931: nest at Holmseburg	McNeil '41
Eastern Screech-owl	**1941**	**McNeil**		**Resident**		**Resident?**		McNeil '41
Great Horned Owl	1941	McNeil		"Casual Visitant"		**Resident?**		McNeil '41
Barred Owl	1941	McNeil		Winter			"Winter Resident and Visitant"	McNeil '41
Long-eared Owl	1941	McNeil	4	Winter			Miller 1933: 1898 nest with 4 fledge. Frankford	McNeil '41
Northern Saw-whet Owl	21Jan34	Miller, R.F.		Winter			Non-breeder	Cassinia
Common Nighthawk					-		Present all summer, no nest within territory	McNeil '41
Whip-poor-will			4		-			
Chimney Swift	**1941**	**McNeil**		**Breeder: "Regular"**		**"Breeder"**	Probably breeds in residential areas adjacent to park	McNeil '41
Ruby-throated Hummingbird	**1941**	**McNeil**		**Breeder: "Regular"**	**-**	**Breeder**		McNeil '41
Belted Kingfisher	**1941**	**McNeil**		**Resident**		**Breeder**	Nests near Rhawn Street	McNeil '41
Red-headed Woodpecker	**1941**	**McNeil**	**3**	**Breeder: "Regular"**	**-**	**Extirpated**		McNeil '41
Red-bellied Woodpecker						**Breeder**		
Yellow-bellied Sapsucker	1941	McNeil	4	Transient: "Regular"				McNeil '41
Downy Woodpecker	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Hairy Woodpecker	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Northern Flicker	**1941**	**McNeil**		**Resident**		**Breeder**		McNeil '41
Pileated Woodpecker						**Resident**		
Olive-sided Flycatcher	1941	McNeil		"Casual Visitant"	-		Seen 5 Sep, 1894 by Fowler	McNeil '41
Eastern Wood-pewee	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Yellow-bellied Flycatcher	1941	McNeil		Transient: "Regular"	-			McNeil '41
Acadian Flycatcher	**1908**	**Miller, R.F.**		**Breeder: "Regular"**		**Breeder**	Miller 1931: Stopped nesting 1925	McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Alder Flycatcher	**21Jun38**	**Yoder**		**Breeder: "Irregular"**			: 1939, nest with 4 eggs @ Holmesburg; see McNeil	McNeil '41
Willow Flycatcher						**Breeder?**		
Least Flycatcher	**1941**	**McNeil**	**4**	**Breeder: "Irregular"**		**Extirpated**		McNeil '41
Eastern Phoebe	**1941**	**McNeil**		**Breeder: "Regular"**	-	**Breeder**	"Buttonwoods": near Pine Street (Habitat now gone?)	McNeil '41
Great-crested Flycatcher	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Eastern Kingbird	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**	"Buttonwoods": near Pine Street (Habitat now gone?)	McNeil '41
Purple Martin	**1941**	**McNeil**	**3**	**Breeder: "Regular"**		**Extirpated**	Miller 1910: Colonies at Holmseburg & Bustleton	McNeil '41
Tree Swallow	1941	McNeil		Transient: "Regular"		**Breeder**		McNeil '41
Northern Rough-winged Sw.	**1910-41**	**McNeil**		**Breeder: "Regular"**		**Breeder?**	Frank. Av. Bridge: >30 yrs nested in 2nd arch of bridge	McNeil '41
Bank Swallow	**1896**	**Miller, R.F**		**Breeder**		**Extirpated?**	Holmesburg: "Breeding Abundantly)"; McNeil '41: Irreg. Breeder	
Cliff Swallow					-			
Barn Swallow	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Blue Jay	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
American Crow	**1934**	**Miller**		**Breeder: Common**		**Breeder**	Historical records for appr. 30 breeding pairs	Oölogist
Fish Crow	**April, 1935**	**Miller, R.F.**		**Resident**		**Breeder?**	"3 pairs, all nesting; one pair had eggs in late April"	Cassinia
Black-capped Chickadee	1941	McNeil		Winter				McNeil '41
Carolina Chickadee	**7/1/1882**	**G.S. Morris**		**Resident**		**Resident**	"Fox Chase, Pennypack": ANSP 76399; ANSP 76400 with same data	ANSP
Tufted Titmouse	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Red-breasted Nuthatch	1941	McNeil		Winter				McNeil '41
White-breasted Nuthatch	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Brown Creeper	1941	McNeil		Winter				McNeil '41
Carolina Wren	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
House Wren	**1941**	**McNeil**		**Breeder: Common**		**Breeder**		McNeil '41
Winter Wren	1941	McNeil		Winter				McNeil '41
Marsh Wren	**1941**	**McNeil**	**3**	**Breeder: Common**		**Breeder**	"Long-billed"	McNeil '41
Golden-crowned Kinglet	1941	McNeil		Winter				McNeil '41
Ruby-crowned Kinglet	1941	McNeil		Transient: "Regular"				McNeil '41
Blue-gray Gnatcatcher	**11May42**	**Reimann**		**Breeder**		**Breeder**	1st record Breeding pair: Phila.; McNeil: Casual	Casssinia
Eastern Bluebird	**1941**	**McNeil**	**3**	**Breeder: "Regular"**		**Extirpated?**		McNeil '41
Veery	**1941**	**McNeil**		**Breeder: "Irregular"**		**Breeder**		McNeil '41
Gray-cheeked Thrush	1941	McNeil		Transient: "Regular"				McNeil '41
Bicknell's Thrush						Transient		
Swainson's Thrush	1941	McNeil		Transient: "Regular"	-		"Olive-backed Thrush"	McNeil '41
Hermit Thrush	1941	McNeil		Transient: "Regular"				McNeil '41
Wood Thrush	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
American Robin	**1941**	**McNeil**		**Resident**		**Breeder**		McNeil '41
Gray Catbird	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Northern Mockingbird	1941	McNeil		"Casual Visitant"		Breeder:		
Brown Thrasher	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Cedar Waxwing	**1941**	**McNeil**		**Beeder: "Irregular"**		**Breeder?**		McNeil '41
European Starling	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
White-eyed Vireo	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Blue-headed Vireo	1941	McNeil		Transient: "Regular"			"Blue-headed"	McNeil '41
Yellow-throated Vireo	**1941**	**McNeil**		**Breeder: "Irregular"**		**Breeder?**		McNeil '41
Warbling Vireo	**1941**	**McNeil**		**Breeder: "Irregular"**		**Breeder**	Miller 1933: Fox Chase; 1997: Ingersoll, Russell and Ridgely	McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Philadelphia Vireo	1941	McNeil		Transient:			also, Yoder, Cassinia 1937 record	McNeil '41
Red-eyed Vireo	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Blue-winged Warbler	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated?**		McNeil '41
Golden-winged Warbler	1941	McNeil		Transient: "Regular"	-			McNeil '41
Tennessee Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Orange-crowned Warbler						Transient		
Nashville Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Northern Parula	1941	McNeil		Transient: "Regular"				McNeil '41
Yellow Warbler	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Chestnut-sided Warbler	**1941**	**McNeil**		**Breeder: "Irregular"**		**Extirpated?**		McNeil '41
Magnolia Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Cape May Warbler	07Oct35	Yoder		Transient: "Regular"		Transient	Hist. Status from McNeil 1941	McNeil '41
Black-throated Blue Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Yellow-rumped Warbler	1941	McNeil		Transient: "Regular"			"Myrtle"	McNeil '41
Black-throated Green Warbler						Transient		
Blackburnian Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Yellow-throated Warbler	1941	McNeil		Transient: Spring				McNeil '41
Pine Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Prairie Warbler	1941	McNeil		Transient: Spring		Transient:		McNeil '41
Palm Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Bay-breasted Warbler	15May35	Yoder		Transient:		Transient		McNeil '41
Blackpoll Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Cerulean Warbler								
Black-and-white Warbler	**1941**	**McNeil**		**Breeder: "Irregular"**		**Extirpated?**		McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
American Redstart	1941	McNeil		Transient: "Regular"			Miller 1933: Formerly (<1920) uncommon nester	McNeil '41
Prothonotary Warbler	24May47	Reynolds					Breeder?	McNeil '41
Worm-eating Warbler	1941	McNeil		Transient: "Regular"		Breeder: Rare?		McNeil '41
Ovenbird	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder?**	Near Bustleton Ave.	McNeil '41
Northern Waterthrush	1941	McNeil		Transient: "Regular"				McNeil '41
Louisiana Waterthrush	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated?**		McNeil '41
Kentucky Warbler	**1941**	**McNeil**		**Breeder: "Regular"**		**Extirpated?**	Miller 1910: nest: Bustleton (Pennypack)	McNeil '41
Connecticut Warbler	13Oct35	Yoder		Transient: Fall		Transient:	Also McNeil '41 Fall Transient	Cassinia
Mourning Warbler	1941	McNeil		Transient: Fall	-	Transient:		McNeil '41
Common Yellowthroat	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Hooded Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Wilson's Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Canada Warbler	1941	McNeil		Transient: "Regular"				McNeil '41
Yellow-breasted Chat	**1941**	**McNeil**		**Breeder: "Regular"**	**-**	**Extirpated?**		McNeil '41
Summer Tanager						Vagrant		
Scarlet Tanager	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**	1941: near Krewstown Rd.	McNeil '41
Northern Cardinal	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Rose-breasted Grosbeak	1941	McNeil		Transient: "Regular"				McNeil '41
Blue Grosbeak						Vagrant		
Indigo Bunting	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder?**	Nr. Pine Rd.; McNeil notes: is where Wilson first encountered	McNeil '41
Eastern Towhee	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
American Tree Sparrow	1941	McNeil		Winter		Winter:		McNeil '41
Chipping Sparrow	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**		McNeil '41
Field Sparrow	**1941**	**McNeil**		**Resident**		**Extirpated?**		McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Vesper Sparrow	**1941**	**McNeil**	**3**	**Breeder: "Regular"**	**-**	**Extirpated?**	No suitable habitat	McNeil '41
Savannah Sparrow	**1941**	**McNeil**		**Breeder: "Regular"**	**-**	**Extirpated?**	No suitable habitat	McNeil '41
Henslow's Sparrow	03May37	Yoder	2	Transient:	-	Transient:		McNeil '41
Fox Sparrow	Wintr 1938	Yoder		Winter: ?		Transient: ?	"Wintered"	McNeil '41
Song Sparrow	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
Lincoln's Sparrow						Winter		
Swamp Sparrow	**1941**	**McNeil**		**Breeder: "Regular"**		**Resident**		McNeil '41
White-throated Sparrow	1941	McNeil		Winter		Winter:		McNeil '41
White-crowned Sparrow	1941	McNeil		Transient: Fall		Transient:		McNeil '41
Dark-eyed Junco	1941	McNeil		Winter		Winter:		McNeil '41
Bobolink	**1941**	**McNeil**	**4**	**Breeder: "Regular"**	**-**	**Extirpated**	Fields@Ryer's Horse Infirmary; No suit. hab. left	McNeil '41
Red-winged Blackbird	**1941**	**McNeil**		**Breeder: "Regular"**				McNeil '41
Eastern Meadowlark	**1941**	**McNeil**		**Resident**				McNeil '41
Rusty Blackbird	1941	McNeil		Transient: "Regular"			ANSP 175263: Coll. 10.27.1880 by W. Stone at Pennypack	McNeil '41
Common Grackle	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder?**	Miller 1933: Holmesburg	McNeil '41
Brown-headed Cowbird	**1941**	**McNeil**		**Breeder: "Irregular"**		**Breeder**		McNeil '41
Orchard Oriole	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder: 1997**	"Buttonwoods":near Pine Street; Miller 1931: Bustleton	McNeil '41
Baltimore Oriole	**1941**	**McNeil**		**Breeder: "Regular"**		**Breeder**	"Buttonwoods": near Pine Street (Habitat now gone?)	McNeil '41
Purple Finch	08Mar36	Mathews		Winter	-	Winter		McNeil '41
House Finch					+	Resident		
Red Crossbill					-	Winter:		
White-winged Crossbill	1941	McNeil		Winter		Winter:		McNeil '41
Common Redpoll	08Mar36	Matthews		Winter		Winter:	30 were seen	McNeil '41

Appendix A-2.3 (continued). Historical accounts of bird occurrence in Pennypack Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of the journal Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Remarks from Literature	Reference
Pine Siskin	1941	McNeil		Winter:		Winter:		McNeil '41
American Goldfinch	**1941**	**McNeil**		**Resident**		**Resident**	Miller 1933: nests at Holmesburg	McNeil '41
Evening Grosbeak						Winter		
House Sparrow	**1941**	**McNeil**		**Resident**		**Resident**		McNeil '41
American Pipit	Apr/May '34	Yoder		Winter		Transient:		McNeil '41

Appendix A-2.4. Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Pied-billed Grebe								
Double-crested Cormorant								
American Bittern			2		-			
Least Bittern			2		-			
Great Blue Heron			3					
Great Egret								
Snowy Egret								
Green Heron	1942	Tracy		Breeder: ?	-		Cresheim: above Devils pool; poss. breeder near Lake Surprise	Cassinia, '42
Black-crowned Night-Heron					-		Former rookery in Andorra nurseries, opposite Whitemarsh C.C.	Cassinia, '70
Snow Goose								
Canada Goose					+			
Wood Duck	**1960s**	**C. Ross**		**Breeder: ?**		**Breeder**	Ross notes a single pair seen during breeding season	Cassinia '62
Green-winged Teal								
American Black Duck								
Mallard	**1942**	**Tracy**		**Breeder**	+	**Breeder**	Cresheim: "One pair nested by Lake Surprise"; Russell: feral status questionable	Cassinia, '42
Northern Pintail								
Northern Shoveler								
Gadwall								
American Wigeon								
Turkey Vulture	**22-Apr-23**	**Trotter**		**Breeder: Rare**		**Resident**	Ross notes were found in 20's, but not since; Russell, '73: Scarce resident	Cassinia, '70

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Osprey	25-Oct-37	C. Ross				Transient		Cassinia
Sharp-shinned Hawk			4		-			
Cooper's Hawk	**1960s**	**C. Ross**	**3**	**Breeder: "Regular"**	**-**	**Breeder: ?**	Miller, 1930: Regular nester: Wissahickon Woods; Rare Summer Resident	Cassinia
Northern Goshawk			4					Cassinia, '73
Red-shouldered Hawk	1960s		3	Transient	-	Transient	Russell notes especially found around Carpenters woods	Cassinia, '73
Broad-winged Hawk	**1960s**	**C. Ross**		**Breeder: "Regular"**		**Extirpated**	Miller, 1933: "Uncommon but regular"; Russell: Scarce sum. res./ breeder	Cassinia
Red-tailed Hawk	**1960s**	**Russell**		**Breeder: "Suspected"**		**Breeder?**	Russell, '73 notes yearly sightings of immatures and family groups	Cassinia, '73
American Kestrel	**1960s**	**C.Ross**		**Breeder: "Regular"**	**-**	**Extirpated?**	Russell, '73, '79: "Uncommon summer resident and breeder", declined	Cassinia '62
Merlin								
Peregrine Falcon	Apr-33	Weyl (sight)		Not Noted				Cassinia '34
Ring-necked Pheasant	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Extirpated**	Russell, '79: fairly common	Cassinia '62
Wild Turkey								
King Rail			1		-			
Northern Bobwhite	**April, 1935**	**Ross, C.**	**3**	**Breeder: Rare**	**-**	**Extirpated**	Ross notes last heard in Cresh. Val., but still in Morris Arb.: Russell, '73: Virt. eliminated	Cassinia '62
Common Moorhen								
American Coot								
Killdeer	**1960s**	**Russell**		**Breeder**		**Extirpated**	Russell, '73: Formerly bred: NE of Wiss. Av. at site of Houston Rec. Ctr.	Cassinia, '73
Solitary Sandpiper								

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Spotted Sandpiper	**1942**	**Tracy, J.C.**		**Breeder**		**Extirpated**	Cresheim: "Common feeding... along creek. No breeding record"; Ross: gone	Cassinia, '43
American Woodcock	**Nov-33**	**Jay**		**Breeder: ?**		**Extirpated**	"Germantown"; Rare summer resident & poss. breeder	Cassinia '34
Ring-billed Gull								
Herring Gull								
Great Black-backed Gull								
Rock Dove	**1979**	**Russell**		**Resident: C**		**Resident**	Breeds at Valley Green Inn and other buildings	Cassinia, '79
Mourning Dove	**1942**	**Tracy, J.C.**		**Resident**		**Resident**	Cresheim: "one nest... near the railroad" and appr. 4 pr. for entire region	Cassinia, '42
Black-billed Cuckoo	**1960s?**	**Bond, M.**		**Breeder: Rare**		**Breeder?**	Cresheim: Ross, 1970, states Mary Bond found a nest	Cassinia, '70
Yellow-billed Cuckoo	**1942**	**Tracy, J.C.**		**Breeder:?**		**Breeder?**	Cresheim: Occasionally seen, no nest; Russell, '73: U sum. res., pos. breed	Cassinia, '42
Barn Owl	**< 1960s**	**Russell**	**3**	**Uncertain**			Russell, '73: Lists as possible previous breeder; uncertain	
Eastern Screech-Owl	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Resident**	Russell, '73: Uncommon perm. res. and breeder	Cassinia '62
Great Horned Owl	**1960s**	**Russell**		**Resident: U-C**		**Resident**	Russell, '73: Uncommon to scarce perm. res. & breeder; C near BM Rd.	
Barred Owl								
Long-eared Owl	**1960s**	**Ross, C.**	**4**	**Breeder:?**		**Extirpated**	Seen sev. times in breeding season nr. Bell's Mill Rd; no nest found	Cassinia, '70
Northern Saw-whet Owl								
Common Nighthawk					-			
Whip-poor-will	**1963**	**Russell**	**4**	**Breeder: Rare**	-	**Extirpated**	1 record in woods southwest of creek, at Thomas Mill. Rd.	Cassinia, '73
Chimney Swift	**1942**	**Tracy, J.C.**		**Breeder**		**"Breeder"**	Cresheim: no nesters, but very abund.; Russ., '73: nests in residential areas	Cassinia, '42

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Ruby-throated Hummingbird	**1942**	**Tracy, J.C.**		**Breeder**	**-**	**Breeder**	Cresheim: "A fairly frequent visitor"; Russell, '73: beeding status doubtful	Cassinia, '42
Belted Kingfisher	**1942**	**Tracy, J.C.**		**Resident**		**Breeder**	Cresheim; Russell, '79: Fairly common summer resident, no found nests	Cassinia, '42
Red-headed Woodpecker	**1910s**	**Trotter**	**3**	**Breeder**	**-**	**Extirpated**	Ross comments how was once common; soon after 1916 gone	Cassinia, '70
Red-bellied Woodpecker	**12-May-05**	**Cadbury, J.**		**Breeder: Rare**		**Breeder**	Carpenters Woods: 1st nest found, '59; Russell: Uncommon-Rare	Cassinia '73
Yellow-bellied Sapsucker			4			Transient		
Downy Woodpecker	**1942**	**Tracy, J.C.**		**Resident**		**Resident**	Cresheim: two nests; common elsewhere in valley	Cassinia, '43
Hairy Woodpecker	**1942**	**Tracy, J.C.**		**Resident: U**		**Resident**	Cresheim: 1 nest by L. Surprise; 2nd family near upper limit of region	Cassinia, '43
Northern Flicker	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: Abundant; Russell, '73: C summer res. & breeder	Cassinia, '43
Pileated Woodpecker	**1946**	**Cadbury, J.**		**Resident: U**		**Resident**	Germantown: Seen 1-4 March, 1946 by Mrs. C.R. Cary; Russell: uncertain	Cassinia '47
Olive-sided Flycatcher				Transient	-	Transient		
Eastern Wood-pewee	**1960s**	**Ross, C.**		**Breeder: "Regular"**			Russell, '73: fairly common to uncomm. sum. res. and breeder	Cassinia '62
Yellow-bellied Flycatcher				Transient	-	Transient		
Acadian Flycatcher	**1942**	**Tracy, J.C.**		**Breeder: U?**		**Breeder**	Cresheim: 1 nest below Devil's Pool; C.Ross: regular breeder	Cassinia, '43
Alder Flycatcher				Transient		Transient		
Willow Flycatcher	**1960s**	**Russell**		**Su. Res.**		**Transient**	Seen mid-sixties in fields sw of creek at Bell's Mill Road	
Least Flycatcher	**1960s**	**Russell**	**4**	**Su. Res.**		**Transient**	Seen early 60's at Lykin's Lane and Manatawna ave.	Cassinia, '79
Eastern Phoebe	**1942**	**Tracy, J.C.**		**Breeder**	**-**	**Breeder**	Cresheim: 2 pr.: Butter. cot. & bridge at Devil's pool; Russell-Uncommon	Cassinia, '43

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Great Crested Flycatcher	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: 3 pr.; Russell, '73: Uncommon summer res. and breeder	Cassinia, '43
Eastern Kingbird	**1960s**	**Trotter**		**Breeder: Rare**		**Breeder?**	Ross states not common; Russell, '73: Farily common to uncommon	Cassinia, '70
Purple Martin			3					
Tree Swallow								
Northern Rough-winged Sw.	**1960s**	**Ross, C.**		**Breeder: U**		**Breeder?**	Trotter found: Rex Av.; Bond: Germantown Pike bridge; Russell: Unknown	Cassinia, '70
Bank Swallow								
Cliff Swallow	**1902**	**Trotter, S.**		**Uncommon**	-	**Extirpated?**	Chestnut Hill; No more specific data	
Barn Swallow	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Breeder**	Russell, '73: "Regular uncommon summer resident and probable breeder"	Cassinia '62
Blue Jay	**1942**	**Tracy, J.C.**		**Resident**		**Resident**	Cresheim: 2 pairs; Russell, '73: Common res. and breeder	Cassinia, '43
American Crow	**1942**	**Tracy, J.C.**		**Resident**		**Resident**	Cresheim: 1 nest found, several pairs observed	Cassinia, '43
Fish Crow	**1960s**	**Ross, C.**		**Resident: "Regular"**		**Resident**	Russell, '73: former uncommon, "Present" status unknown	Cassinia '62
Black-capped Chickadee	1960s	Russell		Breeder: Rare			Russell: Near Bell's Mill Rd. - where undoubt. hybridizes with CACH	
Carolina Chickadee	**1960s**	**Ross, C.**		**Resident: "Rare"**		**Resident**	23 May, 1954 C. Ross found nest near G'town bridge; Russell: Become common	Cassinia, '70
Tufted Titmouse	**1942**	**Tracy, J.C.**		**Resident: C**		**Resident**	Cresheim: "Probably the most consistent Wissahickon bird"; two nesters	Cassinia, '43
Red-breasted Nuthatch								
White-breasted Nuthatch	**1942**	**Tracy, J.C.**		**Breeder: ?**		**Resident**	Cresheim: "no nuthatches were found breeding"; Russell: Uncommon resident	Cassinia, '43
Brown Creeper								
Carolina Wren	**1942**	**Tracy, J.C.**		**Resident**		**Resident**	Cresheim: pair lived above Devil's Pool, but nest not found	Cassinia, '43

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
House Wren	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: "One pair nesting" behind Butt. Cott.; two other pairs observed	Cassinia, '43
Winter Wren	1972	Russell		Breeder: ?		Winter:	Russell, '73: 1 terr. bird found just north of Thomas Mill Rd.	Cassinia, '73
Marsh Wren			3					
Golden-crowned Kinglet								
Ruby-crowned Kinglet								
Blue-gray Gnatcatcher	**13-May-35**	**Devlin**		**Breeder: U**		**Breeder**	Upper Wissahickon: "Pair at nest"; Russell, '73: Scarce but regular	Cassinia '36
Eastern Bluebird	**<1960s**	**Ross, C.**	**3**	**Breeder: "Regular"**		**Extirpated?**	Once found at golf course above Hartwell La.; uncommon	Cassinia, '70
Veery	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Breeder**	Nest never found by Trotter: since become regular	Cassinia, '70
Gray-cheeked Thrush				Transient		Transient		
Bicknell's Thrush	25-May-53	Cadbury, J.		Transient		Transient	Germantown: "Banded by J.M. Cadbury"	Cassinia '54
Swainson's Thrush				Transient	-	Transient		
Hermit Thrush						Transient		
Wood Thrush	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: Six pairs observed; two nests found	Cassinia, '43
American Robin	**1942**	**Tracy, J.C.**		**Resident: C**		**Breeder**	Cresheim: "Undoubtedly the most prevalent bird in the entire area"	
Gray Catbird	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: "One of the commonest breeders"; prob. > 10 pair	Cassinia, '43
Northern Mockingbird	**1960s**	**Ross, C.**		**Breeder: Rare**		**Breeder**	Russell, '73: Uncommon; Once rare, now more common	Cassinia, '70
Brown Thrasher	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Breeder?**	2 pairs observed by Tracy in 1942; Russell, '73: Uncommon breeder	Cassinia '62
American Pipit								
Cedar Waxwing	1960s	Russell		Breeder: ?		Transient	Russell: breeding is doubtful	Cassinia, '73

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
European Starling	**1942**	**Tracy, J.C.**		**Resident**		**Resident**	Cresheim: 1 nest in dead stump near limit of census area	Cassinia, '43
White-eyed Vireo	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Breeder**	Trotter, '32: not common; Ross sees it regularly (no nest, though)	Cassinia, '71
Blue-headed Vireo	2 Oct, 1880	W.L. Abbott		Transient		Transient	"Chestnut Hill": ANSP 28701	ANSP
Yellow-throated Vireo	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Breeder**	Russell, '73: Rare but regular breeder SW of Bell's Mill Rd.	Cassinia
Warbling Vireo	**1975**	**Russell**		**Breeder: ?**		**Breeder?**	Poss. seen at Mt. Airy Av. bridge in June	Cassinia, '79
Philadelphia Vireo	11-May-46	Goldstein & E. Kramer		Transient		Transient		Cassinia '47
Red-eyed Vireo	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: 7 pair in census; 10 more elsewhere; Russell: Common	Cassinia, '43
Blue-winged Warbler	**1960s**	**Ross, C.**		**Breeder: "Regular"**	-	**Breeder?**	Thomas Mill Rd: nested regularly along w. side of main stream	Cassinia, '72
Golden-winged Warbler	3 Sep, 1878	W.L. Abbott		Transient [?]			"Chestnut Hill": ANSP 28745	ANSP
Tennessee Warbler				Transient		Transient		
Orange-crowned Warbler	10/15/1877	W.L. Abbott		Transient		Transient	"Chestnut Hill": ANSP 28753	ANSP
Nashville Warbler				Transient		Transient		
Northern Parula	**7-Jun-52**	**Arnett & Corson**		**Breeder:**		**Breeder**	Chestnut Hill: "Singing male"; Russell, '73: Irreg. summ. res., poss. breeder	Cassinia '73
Yellow Warbler	**1960s**	**Ross, C.**		**Breeder: Poss.**		**Breeder**	Thomas Mill Rd: Ross: singing male at upper pt. of Rd on w. side of Stream	Cassinia, '70
Chestnut-sided Warbler	**8-Jun-52**	**Bond**		**Breeder:**		**Breeder?**	Up. Wissa.: "Nest with four fully fledged young"; Ross: reg. on Wiss.@T.M.Rd.	Cassinia
Magnolia Warbler	28 Sep, 1878	W.L. Abbott		Transient		Transient	"Chestnut Hill": ANSP 28823	ANSP
Cape May Warbler				Transient		Transient		
Black-throated Blue Warbler	9/21/1878	W.L. Abbott		Transient		Transient	"Chestnut Hill": ANSP 28804	ANSP

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Yellow-rumped Warbler	12 May, 1877	W.L. Abbott		Winter		Winter	"Chestnut Hill": ANSP 28823	ANSP
Black-throated Green Warb.	4 Sep, 1877	W.L. Abbott		Transient		Transient	"Chestnut Hill": ANSP 28906	ANSP
Blackburnian Warbler	9/25/1877	W.L. Abbott		Transient		Transient	"Chestnut Hill": ANSP 28898	ANSP
Yellow-throated Warbler	**June, 1954**	**Anon.**		**Breeding: doubtful**		**Extirpated?**	Thomas Mill Rd.; Russell, '79: June 1977 just north of covered bridge	Cassinia, '70
Pine Warbler				Transient		Transient		
Prairie Warbler	**1960s**	**Ross, C.**		**Breeding: Poss.**		**Extirpated?**	Bell's Mill Rd: Ross reports has nested near Rd.	Cassinia, '70
Palm Warbler	10/17/1877	W.L. Abbott		Transient		Transient	"Chestnut Hill": 28929	ANSP
Bay-breasted Warbler	9 Oct, 1880	W.L. Abbott		Transient		Transient	"Chestnut Hill": 28869	ANSP
Blackpoll Warbler	11 Sep, 1880	W.L. Abbott		Transient		Transient	"Chestnut Hill": 28884	ANSP
Cerulean Warbler	**14-May-55**	**E. Kramer**		**Breeder: U**		**Breeder?**	Bell's Mill Rd: Ross: regular breeder (in the 1960s);	Cassinia, '70
Black-and-white Warbler	**15-Jun-12**	**Miller, R.F.**		**Breeding: Rare**		**Extirpated?**	Chest. Hill: Empty nest found in which brood had been raised	Miller, 1933
American Redstart	**14-May-05**	**Bond**		**Breeding: Rare**		**Breeder?**	Up. Wissa.: Nest w/ young (in Ross's account); Russell: Uncommon	Cassinia, '71
Prothonotary Warbler	10-May-52	Cadbury				Transient	Germantown	Cassinia '53
Worm-eating Warbler	**1960s**	**Ross, C.**		**Breeder: "Regular"**		**Breeder?**	Bell's Mill Rd.:Trotter found nest in 1898; Miller others;	Cassinia, '72
Ovenbird	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: 3 pr. in census; elswhere 5 singing males	Cassinia, '43
Northern Waterthrush						Transient		
Louisiana Waterthrush	**Jun-36**	**Stevenson**		**Breeder: common**		**Breeder**	"young birds seen"; Russell, '73: rare but regular breeder	Cassinia '73
Kentucky Warbler	**1942**	**Tracy, J.C.**		**Breeder: common**		**Extirpated**	Cresheim: "By far the commonest breeding warbler"	Cassinia, '43
Connecticut Warbler	18-Sep-57	Cadbury, J.		Transient	-	Transient	"Bird banded at Germantown"	Cassinia '58

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Mourning Warbler						Transient		
Common Yellowthroat	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: "Three pairs present in the valley"	Cassinia, '43
Hooded Warbler	**1960s**	**Ross, C.**		**Breeder: U**		**Extirpated**	Devil's pool; w. side of stream at top of hill at B.M. entrance to Forbidden dr.	Cassinia, '70
Wilson's Warbler	11-May-35	Weyl		Transient		Transient	Migrant	Cassinia '36
Canada Warbler	12-Nov-57	Jay		Transient	-	Transient	Germantown	Cassinia '58
Yellow-breasted Chat	**1942**	**Tracy, J.C.**		**Breeder: Rare**		**Extirpated?**	Cresheim: Chats deserted the valley; listed by Ross in 1970; Rus.: SW of BM Rd.	Cassinia, '43
Summer Tanager	26-May-52	Hebard		Transient		Transient	Chestnut Hill; Russell, '73: Previous and current status unknown	Cassinia '73
Scarlet Tanager	**1942**	**Tracy, J.C.**		**Breeder: U**		**Breeder**	Cresheim: nest at allens lane station; Russell, '73: Uncommon to common	Cassinia, '43
Northern Cardinal	**1942**	**Tracy, J.C.**		**Breeder**		**Resident**	Cresheim: Four pairs; Russell, '73: Common	Cassinia, '43
Rose-breasted Grosbeak	**25-May-28**	**Anon**		**Breeder: Rare**		**Breeder?**	Andorra Nurseries: As reported in Ross; Russell, '73: Uncommon to scarce	Cassinia, '71
Blue Grosbeak								
Indigo Bunting	**1942**	**Tracy, J.C.**		**Breeder**		**Breeder**	Cresheim: two nesting pairs; Russell, '73: Uncommon breeder	Cassinia, '43
Eastern Towhee	**1942**	**Tracy, J.C.**		**Breeder**		**Resident**	Cresheim: two pairs present	Cassinia, '43
American Tree Sparrow								
Chipping Sparrow	**1942**	**Tracy, J.C.**		**Breeder: U?**		**Breeder**	Cresheim: one pair fledged; Russell, '73: Rare and local breeder	Cassinia, '43
Field Sparrow	**1942**	**Tracy, J.C.**		**Breeder**	-	**Breeder**	Cresheim: one pair seen feeding young; Russell, '79: Fairly common	Cassinia, '43
Vesper Sparrow			3		-			
Savannah Sparrow					-			
Henslow's Sparrow	**1960s**	**Russell**	**2**	**Breeder:?**		**Extirpated**	Once bred where now stands Houston Rec Center	Cassinia, '73

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Fox Sparrow								
Song Sparrow	**1942**	**Tracy, J.C.**		**Resident: C**		**Resident**	Cresheim: 7 pair in census area; 14 others along entire length of creek	Cassinia, '42
Lincoln's Sparrow	10-May-62	Hitchner				Transient		Cassinia '63
Swamp Sparrow								
White-throated Sparrow						Winter		
White-crowned Sparrow						Winter		
Dark-eyed Junco					-	Winter		
Bobolink			4			Transient		
Red-winged Blackbird	**1960s**	**Russell**		**Breeder:?**		**Breeder?**	Russell notes as a possible breeder in brushy areas of Roxborough	Cassinia, '73
Eastern Meadowlark						Transient		
Rusty Blackbird						Transient		
Common Grackle	**1942**	**Tracy, J.C.**		**Breeder: U?**		**Breeder**	Cresheim: common throughout valley; only one nest found; Russell, '73: Common	Cassinia, '42
Brown-headed Cowbird	**1942**	**Tracy, J.C.**		**Breeder: U**		**Breeder**	Cresheim: "not very common"; Russell, '73: Uncommon	Cassinia, '42
Orchard Oriole	**1960s?**	**Russell**		**Breeder:?**		**Extirpated?**	Russell, '73: Uncertain about previous or current status	Cassinia, '73
Baltimore Oriole	**1942**	**Tracy, J.C.**		**Breeder: U**	-	**Breeder**	Cresheim: 1 pr. nesting nr. upper end of valley; Russell, '73: Common	Cassinia, '42
Purple Finch	2-Mar-57	Abramson		Winter:	+	Winter	Carpenters Woods: 2 seen	Cassinia
House Finch	**1960s**	**Russell**		**Resident**	-	**Breeder**	Russell, '73: Scarce to uncommon resident	Cassinia, '73
Common Redpoll	26-Feb-36	Stevenson				Winter	Cresheim: "26, Feeding on birch seeds"	Cassinia '37
Pine Siskin	21-Feb-57	Ross, C.		Winter:			Chestnut Hill: 12 seen	Cassinia '62
American Goldfinch	**1960s**	**Russell**		**Breeder: U**		**Breeder**		Cassinia, '73

Appendix A-2.4 (continued). Historical accounts of bird occurrence in Wissahickon Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Date	Source	State Cons. Status	Historic Status	Regional Change	Current Status	Locality/Remarks	Reference
Evening Grosbeak	10-Jan-57	Cadbury, J.		Winter:			Germantown: 2 seen	Cassinia '58

Appendix A-2.5. Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Pied-billed Grebe	Cedar Gr. Dam	1914	Morris		Transient		"often seen in the spring or fall" at pond (above Cedar Grove Dam)	Morris, '15
Double-crested Cormorant								
American Bittern				2				
Least Bittern				2				
Great Blue Heron	**Cedar Gr. Dam**	**1914**		**3**	**Transient**	**Extirpated?**	**"stops occasionally" at pond (above Cedar Grove Dam)**	**Morris, '15**
Great Egret								
Snowy Egret								
Green Heron	**Cedar Gr. Dam**	**1914**			**Breeder**	**Extirpated?**	**"Comparitively [with GBH] common"**	**Morris, '15**
Black-crowned Night-heron	**Cedar Gr. Dam**	**1914**			**Breeder**	**Extirpated?**	**"Comparitively [with GBH] common"**	**Morris, '15**
Snow Goose								
Canada Goose								
Wood Duck								
Green-winged Teal								
American Black Duck	**Cedar Gr. Da**	**<1914**	**Morris**			**Extirpated?**	**Morris only had two records from the pond (above Cedar Grove Dam?)**	**Morris, '15**
Mallard	**Cedar Gr. Da**	**<1914**	**Morris**			**Resident**	**Morris only had one record from the pond (above Cedar Grove Dam?)**	**Morris, '15**
Northern Pintail								
Northern Shoveler								
Gadwall								
American Wigeon								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Turkey Vulture								
Osprey								
Sharp-shinned Hawk				4				
Cooper's Hawk	**Tacony**	**<1914**	**Morris**	**3**	**Breeder: (Rare)**	**Extirpated?**	**"a wider piece of woodland with a swampy centre through which the tributary flows"**	
Northern Goshawk				4				
Red-shouldered Hawk				3				
Broad-winged Hawk								
Red-tailed Hawk								
American Kestrel								
Merlin								
Peregrine Falcon								
Ring-necked Pheasant								
Wild Turkey								
King Rail				1				
Northern Bobwhite				3				
Common Moorhen								
American Coot								
Killdeer	**Cedar Gr. Da**	**1914**	**Morris**			**Extirpated?**	**"the cry of the Killdeer is a familiar sound"**	**Morris, '15**
Solitary Sandpiper	Cedar Gr. Da	1914	Morris		Transient: "Regular"		"in the early spring, the Solitary Sandpiper is a regular migrant"	Morris, '15
Spotted Sandpiper	**Tacony**	**1914**	**Morris**		**Breeder: "Common"**	**Extirpated?**	**"common throughout the valley"**	**Morris, '15**
American Woodcock								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Ring-billed Gull								
Herring Gull								
Great Black-backed Gull								
Rock Dove								
Mourning Dove						**Breeder**		
Black-billed Cuckoo								
Yellow-billed Cuckoo								
Barn Owl				3				
Eastern Screech Owl								
Great Horned Owl								
Barred Owl								
Long-eared Owl				4				
Northern Saw-whet Owl								
Common Nighthawk								
Whip-poor-will				4				
Chimney Swift						**"Breeder"**		
Ruby-throated Hummingbird								
Belted Kingfisher	**Tacony**	**<1914**	**Morris**		**Breeder**	**Resident**	**occ. nest in banks of old quarry, on the rt. side, above turnpike**	**Morris, '15**
Red-headed Woodpecker	**Tacony**	**1914**	**Morris**	**3**	**Resident**	**Extirpated**	**"Intermittently common or scarce over periods of several" cons. yrs.**	**Morris, '15**
Red-bellied Woodpecker						**Resident**		
Yellow-bellied Sapsucker	Tacony	1914	Morris	4	Transient:"Not infrequent"			Morris, '15

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Downy Woodpecker	**Tacony**	**1914**	**Morris**		**Resident: "Common"**	**Resident**		**Morris, '15**
Hairy Woodpecker	**Tacony**	**1914**	**Morris**		**Resident: 'Uncommon "**	**Resident**		**Morris, '15**
Northern Flicker	**Tacony**	**1914**	**Morris**		**Breeder**	**Breeder**		**Morris, '15**
Pileated Woodpecker								
Olive-sided Flycatcher								
Eastern Wood-peewee	**Tacony**	**1914**	**Morris**		**Breeder: Common**	**Breeder**	**"always characteristic of the place"**	**Morris, '15**
Yellow-bellied Flycatcher								
Acadian Flycatcher	**Tacony Creek**	**<1910**	**Miller, R.F.**		**Breeder: Common**	**Breeder**	**Miller notes stopped nesting in 1910**	**Miller, 1933**
Alder Flycatcher								
Willow Flycatcher								
Least Flycatcher				4				
Eastern Phoebe	**3-arched Bridge**	**<1914**	**Morris**		**Breeder: Rare**	**Breeder**		
Great-crested Flycatcher								
Eastern Kingbird								
Purple Martin				3				
Tree Swallow								
Northern Rough-winged Sw.	**Turnpike Bridge**	**<1914**	**Morris**		**Breeder**	**Extirpated?**	**"used to build nests in the two stone arches. . .but that is ancient history"**	**Morris, '15**
Bank Swallow	**Tacony**	**<1914**	**Morris**		**Breeder**	**Extirpated?**	**nested in the banks of the old quarry, on the rt. side, above turnpike**	**Morris, '15**
Cliff Swallow								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Barn Swallow						**Breeder**		
Blue Jay								
American Crow	**Tacony**	**1914**	**Morris**		**Resident: Common**	**Resident**		Morris, '15
Fish Crow								
Black-capped Chickadee								
Carolina Chickadee						**Resident**		
Tufted Titmouse	**Tacony**	**1914**	**Morris**		**Resident**	**Resident**	**found in same tributary as White-eyed Vireo**	**Morris, '15**
Red-breasted Nuthatch								
White-breasted Nuthatch								
Brown Creeper								
Carolina Wren	**Tacony**	**1914**	**Morris**		**Resident**	**Breeder**		**Morris, '15**
House Wren						**Breeder**		
Winter Wren	Tacony	1914	Morris		Winter		Where the valley narrows upstream from the pond	Morris, '15
Marsh Wren				3				
Golden-crowned Kinglet								
Ruby-crowned Kinglet								
Blue-gray Gnatcatcher						**Breeder**		
Eastern Bluebird				3				
Veery								
Gray-cheeked Thrush								
Bicknell's Thrush								
Swainson's Thrush								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Hermit Thrush								
Wood Thrush	**Tacony**	**1914**	**Morris**		**Breeder: Common**	**Breeder**	**Hillside in front of Mansion- find approx. where**	**Morris, 1915**
American Robin						**Breeder**		
Gray Catbird						**Breeder**		
Northern Mockingbird								
Brown Thrasher								
Cedar Waxwing								
European Starling						**Resident**		
White-eyed Vireo	**Tacony**	**1914**	**Morris**		**Breeder: Rare**	**Extirpated?**	**Found two breeding pairs on tributary - a wooded valley**	**Morris, '15**
Solitary Vireo								
Yellow-throated Vireo								
Warbling Vireo								
Philadelphia Vireo								
Red-eyed Vireo	**Tacony**	**1914**	**Morris**		**Breeder**	**Breeder**		**Morris, '15**
Blue-winged Warbler	**Tacony**	**1914**	**Morris**		**Breeder**	**Extirpated**	**"Invariable builds" in 2nd growth just north of pond**	**Morris, '15**
Golden-winged Warbler								
Tennessee Warbler								
Orange-crowned Warbler								
Nashville Warbler								
Northern Parula Warbler								
Yellow Warbler	**Tacony**	**1914**	**Morris**		**Breeder**	**Extirpated?**	**"about the headwaters of the pond"; frequently found nest**	**Morris, '15**

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Chestnut-sided Warbler								
Magnolia Warbler								
Cape May Warbler								
Black-throated Blue Warbler								
Yellow-rumped Warbler								
Black-throated Green Warbler								
Blackburnian Warbler								
Yellow-throated Warbler								
Pine Warbler								
Prairie Warbler								
Palm Warbler								
Bay-breasted Warbler								
Blackpoll Warbler								
Cerulean Warbler								
Black-and-white Warbler								
American Redstart								
Prothonotary Warbler								
Worm-eating Warbler	**Tacony**	**1914**	**Morris**		**Breeder: "Regularly"**	**Extirpated**	**"a wider piece of woodland with a swampy centre through which the tributary flows"**	**Morris, '15**
Ovenbird	**Tacony**	**1914**	**Morris**		**Breeder:**	**Extirpated**	**"a wider piece of woodland with a swampy centre through which the tributary flows"**	
Northern Waterthrush								
Louisiana Waterthrush								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Kentucky Warbler	**Tacony**	**1914**	**Morris**		**Breeder**	**Extirpated**	**"almost certain to hear" in narrow strectch above pond; notes its increase**	**Morris, '15**
Connecticut Warbler								
Mourning Warbler								
Common Yellow-throat	**Tacony**	**1914**	**Morris**		**Breeder**	**Breeder**	**"about the headwaters of the pond"; and farther up**	**Morris, '15**
Hooded Warbler	**Tacony**	**1914**	**Morris**		**Rare**	**Extirpated**	**Morris shot both specimens he saw in narrow stretch above pond**	**Morris, '15**
Wilson's Warbler								
Canada Warbler								
Yellow-breasted Chat	**Tacony**	**1914**	**Morris**		**Breeder**	**Extirpated**	**"Invariable builds" in 2nd growth just north of pond**	**Morris, '15**
Summer Tanager								
Scarlet Tanager								
Northern Cardinal	**Tacony**	**1914**	**Morris**		**Resident**	**Resident**	**in 2nd growth just north of pond**	**Morris, '15**
Rose-breasted Grosbeak	Tacony	1914	Morris		Transient		"a wider piece of woodland with a swampy centre through which the tributary flows"	Morris, '15
Blue Grosbeak								
Indigo Bunting	Tacony	1914	Morris		Breeder	**Extirpated**	"about the headwaters of the pond"; frequently found nest	Morris, '15
Eastern Towhee						**Breeder**		
American Tree Sparrow	Tacony	1914	Morris		Winter		"about the headwaters of the pond"	Morris, '15
Chipping Sparrow								
Field Sparrow	Tacony	1914	Morris		Winter: "Occasional"		"about the headwaters of the pond"; occasional	Morris, '15
Vesper Sparrow				3				
Savannah Sparrow								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
Henslow's Sparrow				2				
Fox Sparrow	Tacony	1914	Morris		Winter		in 2nd growth just north of pond: "always expect to hear"	Morris, '15
Song Sparrow	**Tacony**	**1914**	**Morris**		**Resident**	**Resident**	**"about the headwaters of the pond"**	**Morris, '15**
Lincoln's Sparrow								
Swamp Sparrow	**Tacony**	**1914**	**Morris**		**Breeder**	**Extirpated**	**"about the headwaters of the pond"**	**Morris, '15**
White-throated Sparrow	Tacony	1914	Morris		Winter		"about the headwaters of the pond"	Morris, '15
White-crowned Sparrow								
Dark-eyed Junco	Tacony	1914	Morris		Winter		"about the headwaters of the pond"	Morris, '15
Bobolink				4				
Red-winged Blackbird	**Tacony**	**1914**	**Morris**		**Breeder**	**Breeder**	**"about the headwaters of the pond"**	**Morris, '15**
Eastern Meadowlark								
Rusty Blackbird								
Common Grackle								
Brown-headed Cowbird								
Orchard Oriole								
Baltimore Oriole								
Purple Finch								
House Finch								
Red Crossbill								
White-winged Crossbill								
Common Redpoll								
Pine Siskin								

Appendix A-2.5 (continued). Historical accounts of bird occurrence in Tacony Creek Park. Boldface indicates a current or former breeding species. (Note: 'Cassinia' in the Reference column with no date is the General Notes Section of Cassinia for the year listed in the Date column.)

Species	Exact Locality	Date	Collector/ Observer	State Cons. Status	Status - Historic	Status - Current	Remarks	Reference
American Goldfinch								
Evening Grosbeak								
House Sparrow								
American Pipit								

Appendix A-3. Habitat preferences of mollusk species historically recorded from or currently present in the Fairmount Park system. *Vallonia pulchella* and *V. excentrica* and *Oxychilus cellarius* and *O. draparnauldi* require anatomical studies to distinguish them, so records based on shells alone are uncertain. Since the same habitat preferences within each species pair are the same, they have been listed on single lines. Key: N=native, I=introduced, H=historic, C=current; > = tendency; ● = preference; ●● = strong preference; "-" = avoidance.

Family	**Species**	Status	Calcium	Upland	Mountain	Woods	Ravine	Low-land	Talus	Leaf-litter	Dry	Wet	Wetland	Flood plain	Meadow	Grass-land	Roadsides	Urban
Pomatiopsidae	*Pomatiopsis lapidaria*	N H	●		●		●		●					●●				
Carychiidae	*Carychium exiguum*	N H			●				●	●		>						
Carychiidae	*Carychium exile*	N H			●				●	●●								
Cionellidae	*Cionella lubrica*	N H C										>			●	●	●	
Valloniidae	*Vallonia costata*	N H C													●	●	●	
Valloniidae	*Vallonia pulchella/excentrica*	N H C													●	●	●	
Pupillidae	*Gastrocopta armifera*	N H	●			●											●	
Pupillidae	*Gastrocopta contracta*	N H C				●		●		●	●	●					●	
Pupillidae	*Gastrocopta pentodon*	N H	●	●							●							
Pupillidae	*Gastrocopta tappaniana*	N H	●															
Pupillidae	*Pupoides albilabris*	N H	>														●	●
Pupillidae	*Vertigo gouldii*	N H C		●						●								
Pupillidae	*Vertigo ovata*	N H											●					
Pupillidae	*Vertigo pygmaea*	N H C	●					●								●		

Appendix A-3 (continued). Habitat preferences of mollusk species historically recorded from or currently present in the Fairmount Park system. *Vallonia pulchella* and *V. excentrica* and *Oxychilus cellarius* and *O. draparnauldi* require anatomical studies to distinguish them, so records based on shells alone are uncertain. Since the same habitat preferences within each species pair are the same, they have been listed on single lines. Key: N=native, I=introduced, H=historic, C=current; > = tendency; ● = preference; ●● = strong preference; "-" = avoidance.

Family	**Species**	Status	Calcium	Upland	Mountain	Woods	Ravine	Low-land	Talus	Leaf-litter	Dry	Wet	Wetland	Flood plain	Meadow	Grass-land	Roadsides	Urban
Strobilopsidae	*Strobilops aeneus*	N H				●				●								
Strobilopsidae	*Strobilops labyrinthicus*	N H				●				●								
Succineidae	*Catinella sp.*	N H											●					
Succineidae	*Novisuccinea ovalis*	N H C			●	●							●●					
Succineidae	*Succinea sp. C*	N H C											●					
Philomycidae	*Philomycus sp.*	N H C		●	●		●											
Discidae	*Anguispira alternata*	N H				●											●	●
Discidae	*Discus rotundatus*	I C				●						●						●
Discidae	*Discus whitneyi*	N H						●				●	●		●		●	●
Helicodiscidae	*Helicodiscus parallelus*	N H C		●						●				●			●	●
Punctidae	*Punctum minutissimum*	N H C								●								
Punctidae	*Punctum vitreum*	N C								●								
Helicarionidae	*Euconulus chersinus*	N H C			●	●	●			●								
Zonitidae	*Glyphyalinia burringtoni*	N H			●	●	●			●								

Appendix A-3 (continued). Habitat preferences of mollusk species historically recorded from or currently present in the Fairmount Park system. *Vallonia pulchella* and *V. excentrica* and *Oxychilus cellarius* and *O. draparnauldi* require anatomical studies to distinguish them, so records based on shells alone are uncertain. Since the same habitat preferences within each species pair are the same, they have been listed on single lines. Key: N=native, I=introduced, H=historic, C=current; > = tendency; ● = preference; ●● = strong preference; "-" = avoidance.

Family	**Species**	Status	Calcium	Upland	Mountain	Woods	Ravine	Low-land	Talus	Leaf-litter	Dry	Wet	Wetland	Flood plain	Meadow	Grass-land	Roadsides	Urban
Zonitidae	*Glyphyalinia indentata*	N H C				●●				●●					●		●	●
Zonitidae	*Glyphyalinia rhoadsi*	N H		●						●								
Zonitidae	*Hawaiia minuscula*	N H								-				●	●		●	●
Zonitidae	*Nesovitrea electrina*	N H						●				●	●	●				
Zonitidae	*Oxychilus cellarius/draparnauldi*	I H C				●												●
Zonitidae	*Striatura meridionalis*	N H C			●●	●●	●●			●●				●				
Zonitidae	*Ventridens ligera*	N H C				●						●●			●●		●●	
Zonitidae	*Ventridens suppressus*	N H C		●						●								
Zonitidae	*Zonitoides arboreus*	N H C		●										●			●	●
Zonitidae	*Zonitoides nitidus*	N H C										●	●	●			●	
Subulinidae	*Subulina octona*	I H																
Haplotrematidae	*Haplotrema concavum*	N H		●						●								
Polygyridae	*Euchemotrema fraternum*	N H		●						●								
Polygyridae	*Euchemotrema leai*	N H										●	●	●	●		●	

Appendix A-3 (continued). Habitat preferences of mollusk species historically recorded from or currently present in the Fairmount Park system. *Vallonia pulchella* and *V. excentrica* and *Oxychilus cellarius* and *O. draparnauldi* require anatomical studies to distinguish them, so records based on shells alone are uncertain. Since the same habitat preferences within each species pair are the same, they have been listed on single lines. Key: N=native, I=introduced, H=historic, C=current; > = tendency; ● = preference; ●● = strong preference; "-" = avoidance.

Family	**Species**	Status	Calcium	Upland	Mountain	Woods	Ravine	Low-land	Talus	Leaf-litter	Dry	Wet	Wetland	Flood plain	Meadow	Grass-land	Roadsides	Urban
Polygyridae	*Mesodon thyroidus*	N H C			●		●			●●			●	●●	●		●	●
Polygyridae	*Stenotrema hirsutum*	N H		●						●	>							
Polygyridae	*Triodopsis fallax*	N H				-									●		●	●
Polygyridae	*Triodopsis juxtidens*	N H			●	●	●			●							●	●
Polygyridae	*Triodopsis tridentata*	N H C		●●						●●					●		●	●
Polygyridae	*Xolotrema albolabris*	N H			●	●	●			●							●	●
Arionidae	*Arion subfuscus*	I H C				●									●			●
Limacidae	*Limax maximus*	I H C				●												●
Agriolimacidae	*Deroceras reticulatum*	I H C						●								●		●
Helicidae	*Cryptomphalus aspersus*	I C	>			●												●

Appendix A-4.1. List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF1,,GPS,woods south of Chamounix Mansion,FEW
West Fairmount Park
40 00'06.1"N,75 11'46.5"W
Sweeping woodland, clearing and seep
Malaise trap set on wooded slope, near clearing and seep (Chamounix Run)
JKGelhaus field numbers 783, 786, 789, 792, 795, 810

CF2,,map,woods west of Chamounix Stables,FEW
West Fairmount Park
40 00'15"N,75 12'10"W
Sweeping woodland, West Tributary 2, skunk cabbage marsh
Malaise trap set in skunk cabbage marsh, approximately 30m from stream
JKGelhaus field numbers 783, 787, 790, 793, 796, 811

CF3,,GPS,Roberts Hollow woods,FEW
West Fairmount Park
40 00'19.8"N,75 12'10.2"W
Sweeping woodland slope, clearing,
Malaise trap set on wooded slope (not near West Tributary 1)
JKGelhaus field numbers 783, 788, 791, 794, 797, 812

CF4,,map,West Tributary 4, near Horticulture Center,FEW
West Fairmount Park
Bioblitz 1998 sampling - light trap set in marshy area along creek at Belmont Drive (west of road)
aqautic sample taken

CF5,,map,Japanese Gardens area,FEW
West Fairmount Park
Bioblitz 1998 sampling at Gardens, West tributary 3

CF6,,map,Gorgas Lane,W
Wissahickon Park
#784-1 sweeping from end of Gorgas Lane to tributary creek 20 (Henry Ave. overpass)
#784-2 sweeping along tributary creek 20
#784-3 sweeping woodland slope north of tributary creek 20

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

#784-4 sweeping along Wissahickon Creek

CF7,,map,Livezey's Lane,W
Wissahickon Park
sweeping along tributary 3
JKGelhaus field 805

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF8,,GPS,Livezey's Lane,W
Wissahickon Park
40 02'45"N,75 12'34.1"W
sweeping along tributary 4
JKGelhaus field 806

CF9,,map,Cresheim Creek,W
Wissahickon Park
sweeping along Cresheim Creek at St. Martin's Lane bridge
JKGelhaus field 809

CF10,,map,Valley Green Inn,W
Wissahickon Park
sweeping along Valley Green tributary (dry)
JKGelhaus field 807

CF11,,map,Wise's Mill Road,W
Wissahickon park
sweeping along Wise's Mill Creek at parking area (near confluence with Wissahickon Creek)

CF12,,map,Thomas Mill,W
Wissahickon Park
sweeping along Thomas Mill creek between Seminole St. and Wissahickon Creek
JKGelhaus field 808

CF13,,GPS,Cathedral Meadows,W
Wissahickon Park
light trap (CATH-1) in meadow/woods ecotone enclosed by Tributary12/14 and tributary 15
sweeping along tributary 15

CF14,,GPS,Cathedral Meadows,W
Wissahickon Park
light trap (CATH-2) in meadow enclosed by tributary 12/14 and tributary 15

CF15,,GPS,Bell's Mill Road, W
Wissahickon Park

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

light trap set along Bell's Mill Creek near confluence with Wissahickon Creek (BMR-1)

CF16,,GPS,Andorra Natural Area,W

Wissahickon Park

light trap (AND-1) in woods above Wissahickon Creek

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF17,,GPS,Andorra Natural Area pond,W
Wissahickon Park
sweeping at pond near "Tree House"

CF18,,GPS,Andorra Natural Area,W
Wissahickon Park
light trap (AND-2) in woods above Wissahickon Creek

CF19,,GPS,Pennypack Creek mouth,PCP
Pennypack Creek Park
Mouth of Pennypack Creek (confluence with Delaware River)
Rich Horwitz

CF20,,GPS,Rhawn Street,PCP
Pennypack Creek Park
light trap in woods at edge of marsh, RHWN-2
sweeping marshy area
sweeping along bike path
JKGelhaus 800

CF21,,map,Bergen and Large streets, PCP
Pennypack Creek Park
Tributary 12 and 13, sweeping
RWBouchard Jr. #7

CF22,,map,Bustelton Avenue to Bergen Street, PCP
Pennypack Creek Park
Pennypack Creek, sweeping along creek from mouth of tributaries 12/13 to near Bustleton Avenue
RWBouchard Jr. #8

CF23,,GPS,Gregg Street,PCP
Pennypack Creek Park
light trap at Three Springs run (at end of Gregg Street), GRG
sweeping along Three Springs run and springs from Gregg Street end to confluence with Pennypack Creek
JKGelhaus #801

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF24,,map,Tributary 15 along Krewestown Road, PCP

Pennypack Creek Park

Tributary 15

RWBouchard Jr. #5, sweeping along tributary

JKGelhaus field #802, sweeping along tributary

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF25,,map,Tabor Avenue to Krewestown Road, PCP
Pennypack Creek Park
Pennypack Creek, sweeping along creek from mouths of Sedden's Run to tributary 15
RWBouchard Jr. #6

CF26,,GPS,meadow between Tabor Ave and Krewestown Road,PCP
Pennypack Creek Park
light trap set in meadow along railroad tracks, between Tabor Avenue and Krewestown Road
RRMDW
Jason Weintraub

CF27,,map,Tabor Avenue,PCP
Pennypack Creek Park
RWBouchard Jr. #1-4, sweeping along Seddens Run, marsh and surrounding woods

#1,4	woodland along Seddens Run
#2	Sedden's Run
#3	marshy area along Sedden's Run
#1	"first tributary Tabor and Stanwood"
#3,5	"marshy area E of Tabor near railroad"

CF28,,GPS,Pennypack Environmental Center,PCP
Pennypack Creek Park
light trap set along wooded slope, PPE-1
light trap set in low wet area between creek and slope on east slope, PPE-2
Jason Weintraub

CF29,,map,Pennypack Environmental Center,PCP
Pennypack Creek Park
Southeast side of Pennypack Creek and woodland, from Center to mouth of Ballard Run
Sweeping grass and creek on west side
JKGelhaus field #782-1, 782-2, 782-3, 803

CF30,,map,Pennypack Environmental Center,PCP
Pennypack Creek Park
Sweeping wooded slope along northwest side of Pennypack Creek
JKGelhaus field #782-7

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF31,,map, Ballard Run,PCP

Pennypack Creek Park

Sweeping along Ballard Run

JKGelhaus field #782-4

Appendix A-4.1 (continued). List of locations in the Fairmount Park system sampled during 1998 for the crane fly survey.

CF32,,map,Rockledge Brook,PCP
Pennypack Creek Park
Sweeping along lower reach of Brook #5
Sweeping along Rockledge Brook and skunk cabbage marsh #6
JKGelhaus field #782-5, 782-6

CF33,,map,Carroll Park,CCP
Cobbs Creek Park
sweeping
RWBouchard Jr. #5

CF34,,map,Indian Run,CCP
Cobbs Creek Park
sweeping
RWBouchard Jr. #6

CF35,,map,Poquessing Park,PQCP
Poquessing Creek Park
sweeping area PV1 (along creek and floodplain)
sweeping area PV2 (along creek and floodplain)
sweeping Bucks County side, forested slope
REBouchard Jr. #1

CF36,,map, F.D.R. Park,FDR
Franklin D. Roosevelt Park
RWBouchard Jr. #1

Appendix A-4.2. Species of crane flies in Cobbs Creek Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Locality Number	**CF33**	**CF34**	**# Sites**
Month of Samples	**VII**	**VII**	
Number of Samples	**1**	**1**	**Max.=2**
SPECIES			
Brachypremna dispellens		U	1
Dolichopeza (Oropeza) obscura	U		1
Epiphragma solatrix	U	U	2
Erioptera (Mesocyphona) caliptera	U		1
Limonia (Discobola) annulata	U		1
Nephrotoma cornifera	U		1
Nephrotoma eucera	U		1
Nephrotoma macrocera	U		1
Nephrotoma virescens		U	1
Tipula (*Schummelia*) spp.		U	1
Tipula (*Yamatotipula*) *furca*	U		1
Total spp. Cobbs = 11			
TOTAL SPECIES	**8**	**4**	
Number of samples	**1**	**1**	

Appendix A-4.3. Species of crane flies in Fairmount (West) Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Localities	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**#sites**
Months Sampled	**VI-XI**	**VI-XI**	**VI-XI**	**VI**	**VI**	**max. = 5**
# of samples	**11**	**11**	**11**	**2**	**1**	
SPECIES						
Atarba picticornis	C	A	U			3
Brachypremna dispellens	A	A	C			3
Cladura flavoferruginea	A	A	A			3
Dicranota (Rhaphidolabis) sp.	U					1
Dolichopeza (Oropeza) walleyi		U				1
Dolichopeza sp.		U				1
Elephantomyia westwoodi	U	U				2
Epiphragma fasciapennis	U	A				2
Epiphragma solatrix	A	A	U	U	U	5
Erioptera (Erioptera) chlorophylla group		U				1
Erioptera (Erioptera) megopthalma		U				1
Erioptera (Erioptera) septemtrionis		U				1
Erioptera (Mesocyphona) caliptera		C				1
Erioptera (Mesocyphona) needhami		U				1
Erioptera (Symplecta) cana		U				1
Gnophomyia tristissima	U	U	U			3
Gonomyia (Lipophleps) manca		U				1
Helius flavipes		U				1
Limnophila (Dicranophragma) fuscovaria	C	U				2
Limnophila (Lasiomastix) macrocera	U	U				2
Limnophila (Phylidorea) similis group				U		1
Limonia (Dicranomyia) brevivena		U				1
Limonia (Dicranomyia) fusca		U				1
Limonia (Dicranomyia) globithorax	A	A	C			3
Limonia (Dicranomyia) humidicola		A				1
Limonia (Dicranomyia) liberta	U	U	U			3
Limonia (Dicranomyia) macateei		U				1
Limonia (Dicranomyia) sp. near pudica			U			1
Limonia (Discobola) annulata		C				1
Limonia (Geranomyia) "canadensis"		U				1
Limonia (L.) sp.		U				1
Limonia (Limonia) indigena indigena		U				1

Appendix A-4.3 (continued). Species of crane flies in Fairmount (West) Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Localities	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**#sites**
Months Sampled	**VI-XI**	**VI-XI**	**VI-XI**	**VI**	**VI**	**max. = 5**
# of samples	**11**	**11**	**11**	**2**	**1**	
Limonia (Limonia) sp. near fallax	A	A	C			3
Limonia (Metalimnobia) annulus cinctipes	C	A	A			3
Limonia (Metalimnobia) immatura	A	A	A			3
Limonia (Metalimnobia) triocellata	U	U	U			3
Limonia (Neolimonia) rara	C	A	U			3
Limonia (Rhipidia) domestica	U	U				2
Limonia (Rhipidia) fidelis		U				1
Limonia (Rhipidia) lecontei	C	A	U			3
Limonia (Rhipidia) shannoni		U				1
Molophilus cramptoni (dark species)	U					1
Molophilus spp.		U				1
Nephrotoma alterna	A	A	A			3
Nephrotoma cingulata	U					1
Nephrotoma eucera	U	C	A			3
Nephrotoma ferruginea	U	U				2
Nephrotoma gnata		U				1
Nephrotoma macrocera	U	U	U	U		4
Nephrotoma polymera		U	U			2
Nephrotoma urocera		C	A			2
Nephrotoma virescens	A	A	A			3
Ormosia nigripila group		U				1
Ormosia pygmaea	U					1
Ormosia romanovichiana	U	U	U			3
Pedicia (Pedicia) albivitta	U					1
Pedicia (Tricyphona) inconstans	C	C				2
Pedicia sp.	A					1
Pilaria tenuipes	U	U	U			3
Pseudolimnophila luteipennis		U				1
Teucholabis spp.	A	C	U	U		4
Tipula (Beringotipula) borealis	U	U	U			3
Tipula (Lunatipula) sp. near mallochi	U	U	U			3
Tipula (Lunatipula) sp. near submaculata			U			1

Appendix A-4.3 (continued). Species of crane flies in Fairmount (West) Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Localities	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**#sites**
Months Sampled	**VI-XI**	**VI-XI**	**VI-XI**	**VI**	**VI**	**max. = 5**
# of samples	**11**	**11**	**11**	**2**	**1**	
Tipula (Lunatipula) submaculata group	U	U	U			3
Tipula (Nippotipula) metacomet		U				1
Tipula (Nippotipula) sp.		U		U		2
Tipula (Platytipula) ultima	U	U				2
Tipula (Pterelachisus) sp. near trivittata			U			1
Tipula (Schummelia) spp.		U				1
Tipula (Trichotipula) stonei			U			1
Tipula (Trichotipula) unimaculata	U					1
Tipula (Yamatotipula) furca		U				1
Tipula (Yamatotipula) sayi	U	U				2
Tipula (Yamatotipula) strepens		U				1
Tipula (Yamatotipula) tricolor		U				1
Ula elegans	U	U				2
Ulomorpha pilosella	U					1
Ptychoptera rufocincta	U					1
Trichocera (Metatrichocera) sp.		U				1
Trichocera annulata	A	A	U			3
TOTAL SPECIES	**41**	**64**	**28**	**5**	**1**	
# of samples	**11**	**11**	**11**	**2**	**1**	

Appendix A-4.4. Species of crane flies in Pennypack Creek Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Number ->	**CF19**	**CF20**	**CF21**	**CF22**	**CF23**	**CF24**	**CF25**	**CF26**	**CF27**	**CF28**	**CF29**	**CF30**	**CF31**	**CF32**	**# Sites**
Months Sampled	**X**	**IV-X**	**VII**	**VII**	**III-X**	**III,VII X**	**VII**	**IV-IX**	**VII**	**IV-IX**	**VI,IX-X**	**VI**	**VI**	**VI**	**Max.=14**
No. of Samples	**1**	**9**	**1**	**1**	**10***	**3***	**1**	**6**	**3**	**10**	**3**	**1**	**1**	**1**	
SPECIES V															
Antocha spp.		C			U			A		A					4
Antocha saxicola		C			A			A		A	U		U		6
Atarba picticornis		U						U						U	3
Austrolimnophila toxoneura											U		C	A	3
Brachypremna dispellens			U		U	U			U						4
Cheilotrichia (Empeda) stigmatica										U					1
Cladura flavoferruginea		C			A	A					A				4
Dicranota (Paradicranota) eucera					U										1
Dicranota sp.						U									1
Dicranota (Rhaphidolabis) cayuga					U	U									2
Dolichopeza (Oropeza) carolus									U				U		2
Dolichopeza (Oropeza) obscura			U												1
Dolichopeza (Oropeza) tridenticulata									U						1
Elephantomyia westwoodi		U													1
Epiphragma fasciapennis										A	U	A	C	A	5
Epiphragma solatrix		U	U			U	U		C	U	A	A	U	A	10
Erioptera (Erioptera) chlorophylla					U										1
Erioptera (Erioptera) chlorophylla group					U										1
Erioptera (Erioptera) chlorophylla grp.sp 2					U										1
Erioptera (Erioptera) megopthalma					A									U	2
Erioptera (Erioptera) septemtrionis		U			C			U		U	U				5

Appendix A-4.4 (continued). Species of crane flies in Pennypack Creek Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Number ->	**CF19**	**CF20**	**CF21**	**CF22**	**CF23**	**CF24**	**CF25**	**CF26**	**CF27**	**CF28**	**CF29**	**CF30**	**CF31**	**CF32**	**# Sites**
Months Sampled	**X**	**IV-X**	**VII**	**VII**	**III-X**	**III,VII X**	**VII**	**IV-IX**	**VII**	**IV-IX**	**VI,IX-X**	**VI**	**VI**	**VI**	**Max.=14**
No. of Samples	**1**	**9**	**1**	**1**	**10***	**3***	**1**	**6**	**3**	**10**	**3**	**1**	**1**	**1**	
Erioptera (Mesocyphona) caliptera		C			U			U	U	C	U		U	A	8
Erioptera (Mesocyphona) needhami					U				U					U	3
Erioptera (Mesocyphona) parva		U								U				U	3
Erioptera (Psiloconopa) venusta					U				U						2
Erioptera (Symplecta) cana		C			U									U	3
Gnophomyia tristissima											C	A			2
Gonomyia (Gonomyia) subcinerea		U			U					U					3
Helius flavipes		U			U										2
Hexatoma (Eriocera) albitarsis									C						1
Limnophila (Dicranophragma) fuscovaria					A	U		U	U					A	5
Limnophila (Eloeophila) solstitialis									U						1
Limnophila (Lasiomastix) macrocera					C	U			U					U	4
Limnophila (Phylidorea) similis group									U					A	2
Limonia (Dicranomyia) divisa						U					U				2
Limonia (Dicranomyia) fusca									U						1
Limonia (Dicranomyia) globithorax					U										1
Limonia (Dicranomyia) humidicola					U				A		U		U	C	5
Limonia (Dicranomyia) liberta		C			U										2
Limonia (Dicranomyia) longipennis								U							1
Limonia (Dicranomyia) sp. (open discal)					U										1
Limonia (Dicranomyia) sp. near pudica					U										1

Appendix A-4.4 (continued). Species of crane flies in Pennypack Creek Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Number ->	**CF19**	**CF20**	**CF21**	**CF22**	**CF23**	**CF24**	**CF25**	**CF26**	**CF27**	**CF28**	**CF29**	**CF30**	**CF31**	**CF32**	**# Sites**
Months Sampled	**X**	**IV-X**	**VII**	**VII**	**III-X**	**III,VII X**	**VII**	**IV-IX**	**VII**	**IV-IX**	**VI,IX-X**	**VI**	**VI**	**VI**	**Max.=14**
No. of Samples	**1**	**9**	**1**	**1**	**10***	**3***	**1**	**6**	**3**	**10**	**3**	**1**	**1**	**1**	
Limonia (Discobola) annulata									U		U				2
Limonia (Geranomyia) "canadensis"		A												U	2
Limonia (Geranomyia) diversa		U													1
Limonia (Geranomyia) rostrata					U										1
Limonia (L.) sp.		U			U				U						3
Limonia (Limonia) indigena indigena													U		1
Limonia (Limonia) sp. near fallax		U			C										2
Limonia (Limonia) tristigma											U				1
Limonia (Metalimnobia) annulus cinctipes										U					1
Limonia (Metalimnobia) immatura					U					U	U				3
Limonia (Neolimonia) rara					U										1
Limonia (Rhipidia) bryanti		U			U										2
Limonia (Rhipidia) domestica		U			U										2
Limonia (Rhipidia) fidelis										U	U				2
Limonia (Rhipidia) lecontei		C			C			U	U	U	U			U	7
Molophilus sp. (dark species)														U	1
Molophilus spp.					U					U			U	U	4
Nephrotoma alterna		C			U			U		U				U	5
Nephrotoma cingulata														U	1
Nephrotoma eucera				U							U			U	3
Nephrotoma macrocera					U	U							U	U	4
Nephrotoma urocera						U				U					2

Appendix A-4.4 (continued). Species of crane flies in Pennypack Creek Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Number ->	**CF19**	**CF20**	**CF21**	**CF22**	**CF23**	**CF24**	**CF25**	**CF26**	**CF27**	**CF28**	**CF29**	**CF30**	**CF31**	**CF32**	**# Sites**
Months Sampled	**X**	**IV-X**	**VII**	**VII**	**III-X**	**III,VII X**	**VII**	**IV-IX**	**VII**	**IV-IX**	**VI,IX-X**	**VI**	**VI**	**VI**	**Max.=14**
No. of Samples	**1**	**9**	**1**	**1**	**10***	**3***	**1**	**6**	**3**	**10**	**3**	**1**	**1**	**1**	
Nephrotoma virescens		U			U		U	U	U		U				6
Ormosia (Ormosia) nigripila					A										1
Ormosia nigripila group															0
Pedicia (Pedicia) albivitta					U	U		U							3
Pedicia (Tricyphona) inconstans					C										1
Pilaria imbecilla imbecilla														U	1
Pilaria tenuipes			U		U				C		U				4
Pseudolimnophila contempta					U	U			U						3
Pseudolimnophila luteipennis					U										1
Teucholabis spp.					A					A	U				3
Tipula (Lunatipula) fuliginosa											U				1
Tipula (Lunatipula) sp. near mallochi		U			U						U		U	U	5
Tipula (Lunatipula) sp. near submaculata					U				U		C				3
Tipula (Lunatipula) submaculata group		U										A	U	U	4
Tipula (Nippotipula) abdominalis					U										1
Tipula (Nippotipula) spp.					A	A									1
Tipula (Nobilotipula) sp.					U										1
Tipula (Nobilotipula) collaris					U										
Tipula (Platytipula) paterifera	U	U			A						A				4
Tipula (Platytipula) spenceriana		U													1
Tipula (Platytipula) ultima		A			U										2

Appendix A-4.4 (continued). Species of crane flies in Pennypack Creek Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Number ->	**CF19**	**CF20**	**CF21**	**CF22**	**CF23**	**CF24**	**CF25**	**CF26**	**CF27**	**CF28**	**CF29**	**CF30**	**CF31**	**CF32**	**# Sites**
Months Sampled	**X**	**IV-X**	**VII**	**VII**	**III-X**	**III,VII X**	**VII**	**IV-IX**	**VII**	**IV-IX**	**VI,IX-X**	**VI**	**VI**	**VI**	**Max.=14**
No. of Samples	**1**	**9**	**1**	**1**	**10***	**3***	**1**	**6**	**3**	**10**	**3**	**1**	**1**	**1**	
Tipula (Pterelachisus) sp. near trivittata										U					1
Tipula (Trichotipula) oropezoides														U	1
Tipula (Yamatotipula) caloptera		U	U							U	U				4
Tipula (Yamatotipula) furca										U					1
Tipula (Yamatotipula) sayi		A			U										2
Tipula (Yamatotipula) sp. nr. dejecta					U										
Tipula (Yamatotipula) strepens		U			U										2
Tipula (Yamatotipula) subeluta?					U										1
Tipula (Yamatotipula) tephrocephala														U	1
Tipula (Yamatotipula) tricolor					U				A						2
Ula elegans		U								U	U				3
Trichocera annulata						U									1
Trichocera sp.		U									U				2
Bittacomorpha clavipes						U									
Ptychoptera rufocincta					U	U			U						3
Ptychoptera sp. 1									U						1
TOTAL SPP = 88															
TOTAL SPP	**1**	**32**	**6**	**1**	**56**	**14**	**2**	**12**	**25**	**21**	**26**	**4**	**12**	**26**	
# of samples* includes additional sample in March 1999	**1**	**9**	**1**	**1**	**10**	**3**	**1**	**6**	**3**	**10**	**3**	**1**	**1**	**1**	

Appendix A-4.5. Species of Crane flies in Poquessing Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Sample Number - >	**CF35**
Month of Sample	**VI**
Number of Samples	**1**
Species	
Austrolimnophila toxoneura	U
Dicranoptycha germana?	U
Dicranoptycha winnemana?	U
Elephantomyia westwoodi	U
Epiphragma fasciapennis	U
Epiphragma solatrix	C
Erioptera (Mesocyphona) caliptera	U
Erioptera (Symplecta) cana	U
Gnophomyia tristissima	U
Limonia (Dicranomyia) humidicola	U
Limonia (Rhipidia) lecontei	U
Molophilus spp.	U
Nephrotoma alterna	U
Nephrotoma eucera	U
Nephrotoma macrocera	U
Nephrotoma polymera	U
Pilaria tenuipes	U
Teucholabis spp.	U
Tipula (Lunatipula) sp. near mallochi	C
Tipula (Lunatipula) submaculata group	C
Tipula (Yamatotipula) caloptera	U
Tipula (Yamatotipula) furca	U
Tipula (Yamatotipula) jacobus	U
TOTAL SPECIES	**22**
Number of sites	**1**

Appendix A-4.6. Species of crane flies in Wissahickon Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Species	**CF6**	**CF7**	**CF8**	**CF9**	**CF10**	**CF11**	**CF12**	**CF13**	**CF14**	**CF15**	**CF16**	**CF17**	**CF18**	**#sites**
Month of Sample Collection	**VI**	**X**	**X**	**X**	**X**	**VI**	**X**	**IV-IX**	**IV-IX**	**IV-IX**	**IV-IX**	**VII,IX**	**IV**	**max.=13**
# of Samples	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**7**	**6**	**8**	**6**	**2**	**1**	
Antocha spp.								U		C	U			3
Antocha obtusa?								U						1
Antocha saxicola	U							C	C	A	A			5
Atarba picticornis	U							U			U			3
Austrolimnophila toxoneura										U	U			2
Brachypremna dispellens	U													3
Cheilotrichia (Empeda) stigmatica											U			1
Cladura flavoferruginea		A	A	A	A		A							5
Dolichopeza (Oropeza) carolus	U					A								3
Dolichopeza (Oropeza) johnsonella	U													1
Dolichopeza (Oropeza) obscura	U					U								2
Dolichopeza (Oropeza) tridenticulata	C					A				A				5
Dolichopeza (Oropeza) walleyi	U					U								2
Dolichopeza sp.	U					C								4
Elephantomyia westwoodi	U													1
Epiphragma fasciapennis								U		U	A			3
Epiphragma solatrix	C					U		U		U	A	U		9
Erioptera (Erioptera) megopthalma											U			1
Erioptera (Erioptera) septemtrionis								U			U			2
Erioptera (Mesocyphona) caliptera									U					1
Erioptera (Mesocyphona) needhami										U				1
Erioptera (Symplecta) cana								U	U		U			3
Gnophomyia tristissima		U												1
Gonomyia (Gonomyia) subcinerea								U						1

Appendix A-4.6 (continued). Species of crane flies in Wissahickon Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Species	**CF6**	**CF7**	**CF8**	**CF9**	**CF10**	**CF11**	**CF12**	**CF13**	**CF14**	**CF15**	**CF16**	**CF17**	**CF18**	**#sites**
Month of Sample Collection	**VI**	**X**	**X**	**X**	**X**	**VI**	**X**	**IV-IX**	**IV-IX**	**IV-IX**	**IV-IX**	**VII,IX**	**IV**	**max.=13**
# of Samples	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**7**	**6**	**8**	**6**	**2**	**1**	
Gonomyia (Progonomyia) sp.										U				1
Limnophila (Dicranophragma) fuscovaria								U						1
Limnophila (Lasiomastix) macrocera												U		1
Limnophila (Phylidorea) similis group											U			1
Limonia (Dicranomyia) divisa								U			U			2
Limonia (Dicranomyia) fusca												U		1
Limonia (Dicranomyia) humidicola	A	U	U			C	U	U		C	U	U		9
Limonia (Dicranomyia) sp. near stulta									U					1
Limonia (Geranomyia) distincta?										U				1
Limonia (Geranomyia) rostrata												U		1
Limonia (L.) sp.	U													1
Limonia (Limonia) sp. near fallax											U			1
Limonia (Limonia) tristigma	U													1
Limonia (Metalimnobia) annulus cinctipes											A			2
Limonia (Metalimnobia) immatura	U										A			2
Limonia (Metalimnobia) sp. unidentifiable											C			1
Limonia (Rhipidia) bryanti								U			U			2
Limonia (Rhipidia) fidelis									U					1
Limonia (Rhipidia) lecontei								U	U	U	A			4
Limonia (Rhipidia) shannoni										U				1
Limonia (subgenus?) defuncta		U										U		2
Molophilus cramptoni (dark species)										U				1
Molophilus sp. (dark species)								U						1
Molophilus sp. (yellow species)										C				1

Appendix A-4.6 (continued). Species of crane flies in Wissahickon Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Species	**CF6**	**CF7**	**CF8**	**CF9**	**CF10**	**CF11**	**CF12**	**CF13**	**CF14**	**CF15**	**CF16**	**CF17**	**CF18**	**#sites**
Month of Sample Collection	**VI**	**X**	**X**	**X**	**X**	**VI**	**X**	**IV-IX**	**IV-IX**	**IV-IX**	**IV-IX**	**VII,IX**	**IV**	**max.=13**
# of Samples	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**7**	**6**	**8**	**6**	**2**	**1**	
Nephrotoma alterna	C										U			4
Nephrotoma eucera	U													2
Nephrotoma gnata	U													2
Nephrotoma macrocera	U							U						3
Nephrotoma polymera	U													1
Nephrotoma species	C													3
Nephrotoma subalterna	U													1
Nephrotoma virescens	U							U		U	U			4
Ormosia nigripila group								U						1
Ormosia romanovichiana										U				1
Pedicia (Tricyphona) inconstans												U		1
Pilaria tenuipes			U							U				2
Teucholabis spp.	U							U			U	U		4
Tipula (Lunatipula) georgiana								U						1
Tipula (Lunatipula) sp. near mallochi	C													2
Tipula (Lunatipula) sp. near submaculata	U							U						4
Tipula (Lunatipula) submaculata group	A										U			5
Tipula (Nobilotipula) sp.		U					U							2
Tipula (Nippotipula) metacomet										U	U			2
Tipula (Nippotipula) sp.	U					U	A							2
Tipula (Platytipula) ultima				U				U						2
Tipula (Yamatotipula) caloptera	U									U				2
Tipula (Yamatotipula) furca								U				U		2
Tipula (Yamatotipula) jacobus										U				1

Appendix A-4.6 (continued). Species of crane flies in Wissahickon Park in 1998. U = uncommon, 5 flies or less; C = common, 6-10 flies; A = abundant, more than 10 flies.

Species	**CF6**	**CF7**	**CF8**	**CF9**	**CF10**	**CF11**	**CF12**	**CF13**	**CF14**	**CF15**	**CF16**	**CF17**	**CF18**	**#sites**
Month of Sample Collection	**VI**	**X**	**X**	**X**	**X**	**VI**	**X**	**IV-IX**	**IV-IX**	**IV-IX**	**IV-IX**	**VII,IX**	**IV**	**max.=13**
# of Samples	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**7**	**6**	**8**	**6**	**2**	**1**	
Tipula (Yamatotipula) sayi										U				1
Ula elegans											U		U	2
Ulomorpha pilosella												U		1
Trichocera (Metatrichocera) sp.			U	A										2
Trichocera annulata		A	A		A		A							4
Trichocera bimacula				U										1
TOTAL SPECIES = 69	25	6	5	4	2	7	5	22	6	20	23	10	1	
# of samples	1	1	1	1	1	1	1	7	6	8	6	2	1	

Appendix A-4.7. Species of crane flies historically recorded in Philadelphia region but not sampled in 1998 in the Fairmount Park system.

Region	Philadelphia	Southeast PA	Southwest NJ	# Regions
Species				
Ctenophora (Tanyptera) dorsalis		X		1
Erioptera (Hoplolabis) armata		X		1
Erioptera (Trimicra) pilipes			X	1
Hexatoma spp. (any stream species)		X		1
Leptotarsus (Longurio) rivertonensis			X	1
Leptotarsus (Longurio) testaceus	X			1
Limnophila (Phylidorea) auripennis			X	1
Limnophila (Phylidorea) fratria	X			1
Limnophila (Prionolabis) rufibasis	X		X	2
Limonia (Dicranomyia) gibsoni			X	1
Limonia (Dicranomyia) immodestoides		X		1
Limonia (Geranomyia) communis			X	1
Liogma nodicornis	X	X		2
Molophilus focipulus			X	1
Neolimnophila ultima			X	1
Nephrotoma calinota		X		1
Nephrotoma sodalis		X		1
Nephrotoma tenuis	X			1
Ormosia (Ormosia) meigenii	X			1
Ormosia (Ormosia) rubella			X	1
Pedicia (Tricyphona) vernalis	X		X	2
Pilaria quadrata	X			1
Shannonomyia lenta		X		1
Tipula (Arctotipula) williamsiana		X		1
Tipula (Lunatipula) bicornis		X		1
Tipula (Lunatipula) duplex		X		1
Tipula (Nobilotipula) collaris	X	X		2
Tipula (Platytipula) tennessa			X	1
Tipula (Triplicitipula) "undulata"		X		1
Tipula (Triplicitipula?) valida	X	X		2
Tipula (Vestiplex) longiventris	X	X	X	3
Tipula (Yamatotipula) aprilina	X			1
Tipula (Yamatotipula) dejecta	X	X	X	3
Tipula (Yamatotipula) eluta		X	X	2
Tipula (Yamatotipula) iroqouis		X		1
TOTAL SPECIES for all region = 35				
Total species per region (not found in 1998)	13	18	14	

Appendix A-4.8. Species of crane flies that were new or introduced to the Fairmount Park system area by 1998, or of general interest.

SPECIES NEW TO THE REGION

Six species were discovered new to the area in 1998. The extensions to their known distributions ranged from 150-350 miles. Each species is treated below.

Nephrotoma cornifera

This species was known from Virginia, Indiana, Florida and Tennessee, before being found in 1998 in Philadelphia. Last year the species was found only at Cobbs Creek and appeared relatively common. It is considered a rare species apparently throughout its range. Larvae develop presumably in leaf litter.

Nephrotoma subalterna

This species was described as recently as 1984 from specimens from Virginia, North Carolina, Tennessee, Indiana and Georgia. It was found at only one locality, sweeping along tributary 20 (Gorgas Lane) in Wissahickon Park and was uncommon. Larvae develop presumably in leaf litter.

Nephrotoma urocera

This was considered a southeastern U.S. species before being discovered in Philadelphia in 1998. Other than Philadelphia, the distribution includes North Carolina, Tennessee, Georgia, Alabama and Florida. The species was recorded from both West Park and Pennypack Park and uncommon to abundant at four sites. Larvae develop presumably in leaf litter.

Tipula (Platytipula) paterifera

Although described from Tennessee as recently as 1962, it has a much wider distribution, being found in Kansas (Young 1978) and common in southern New Jersey, northern Maryland, western Pennsylvania and now Philadelphia. The species was found throughout Pennypack Park, from mouth at Delaware River to near the Environmental Center and was abundant at these sites. Larvae develop in saturated soils, often in turf areas, which dry in late spring; adults are a late fall species.

Tipula (Platytipula) spenceriana

This species was known from widely separate localities from Newfoundland to British Columbia and south through the Rocky Mountains; the closest distribution to Philadelphia is in Maine, a distance of at least 350 miles. This species was found at only one locality, the freshwater marsh at Rhawn Street and was uncommon, although a similar looking and related species, *Tipula ultima*, was abundant. Larvae develop in pools of water which dry in the late spring.

Tipula (Nippotipula) metacomet

This is one of the largest crane fly species, but was not separated and described from its close relative, *Tipula abdominalis*, until 1965. Previous known range was Massachusetts, but specimens in the Academy collection indicate a much wider distribution. The species was found in West Park and

Wissahickon, but larval collections of this subgenus show one or both of the species of *Nippotipula* to occur throughout streams in the region, and based on larvae, to be abundant at some sites. Larvae of *Nippotipula* are important aquatic insects for breaking down leaves in streams and are generally the largest shredding organism in streams in the region.

Limonia (Rhipidia) shannoni

This species was known from Maryland to Florida; its occurrence in Philadelphia extends the distribution slightly northward. It was found in West Park and Wissahickon Park and was uncommon at both sites. The larval habitat is unknown.

INTRODUCED SPECIES

Of the 115 species found during the 1998 inventory, only one is known to be introduced; all other species are assumed to be native species.

Trichocera annulata

This species is the only introduced species of crane fly that occurs in the park system. The species is native to the Palearctic, and now is known from several sites on the East and West coasts of North America. The species was recorded in all parks sampled during its flight season (late fall through early spring) and was abundant in several areas of Wissahickon, along with related species of native winter crane flies. The larval habitat is in damp rotting leaves.

SPECIES OF GENERAL INTEREST

Tipula abdominalis and *metacomet*

The larvae of these species are large, and can be abundant in leaf packs in streams. Densest populations in the park were at Three Springs and Tributary 15 in Pennypack Park, and Thomas Mills in Wissahickon, but the larvae were found to be widely distributed at lower densities throughout the system. Larvae feed on the decaying leaves in the stream and by breaking the leaves down, make the detritus available to a wide variety of other insects; they also are one of the largest stream insects in the park. As such, their size and importance in the stream environment make them useful in recognizing for nature walks, classes on streams, etc. The adults are the largest crane flies in the park, and attractively colored, but appear to be secretive in behavior and are not conspicuous.

Cladura flavoferruginea

This species is one of the few crane flies which is an adult in late fall, and one of the few insects active in the woods at this time of year. Adults are an inch long, attractive and yellowish, with spotting on wings and body. They are abundant in the woods and rest on understory vegetation and fly slowly between perches. They are undoubtedly an important form of food to late fall migrant birds. Larvae develop in forest soil, and at a time, in the summer, when the soil is most dry. They are a readily recognizable component of the forest soil ecosystem.

Epiphragma solatrix and *fasciapennis*

These two species can be some of the commonest crane flies in the park, spreading out from their saturated wood habitats into forest uplands. Adults are moderate sized, with handsomely patterned wings, and often perch on the surface of understory leaves.

Trichocera (winter crane flies)

As with *Cladura*, these species emerge in late fall, but they continue as adults through the winter. They readily swarm in the late afternoon so they are conspicuous to homeowners, hikers, etc, although individually they are small and gray as adults. They can be abundant, and may be one of the few flying insects around in late fall and winter. Larvae develop in soil and feed on decaying vegetation.

Bittacomorpha clavipes (phantom crane fly)

The adult of this species is a large dark fly with long legs spectacularly ringed with white and swollen at the ends. The adult can be common in shaded wetlands where the dark body with white rings gives a wonderful effect, noticeable to even those not interested in insects. The long, swollen legs are held radiated out from the body in flight, like spokes on a wheel, with the white and black pattern making the fly stand out from the dark background. The larvae occur in marshy areas.

Tipula spp. (fall species)

Several species emerge in fall only and develop as larvae from vernal habitats. The adults can be common around these habitats and readily come to lights in houses nearby. One species, *Tipula ultima*, is a common, large yellowish species. *Tipula sayi* and *paterifera* are less conspicuous but more common and likely to be in a range of habitats including low areas of turf. They represent species that occur in wetlands that don't remain "wet" throughout the year.

Pedicia albivitta

A spectacular large species of crane flies with beautiful chocolate brown striped wings and a body patterned with dark brown and silver. This is a characteristic species of marsh habitats. Larvae are voracious predators on other aquatic insects in these marshes. This species would make an excellent “poster”insect representing the importance of the shaded marsh habitats.

Nephrotoma species

Thirteen species are known for Philadelphia in this group, and are medium to large in size and often attractively colored. Larvae develop in soil, ranging from floodplain to slopes, with a few species even occurring in home gardens. This group is a wonderful representation of the diversity of insect species in the park, showing the myriad of species that exist unknown to the casual park visitor but important to the park’s ecology.

Appendix A-4.9. Grouping of crane fly species by habitat.

Aquatic, in streams: 14 species
Antocha spp. (2 species)
Bittacomorpha clavipes ?
Cryptolabis paradoxa *
Dicranota spp. (2 species)
Hexatoma spp. *(except *albitarsis*) (2 species)
Leptotarsus testaceus *(small streams)
Ptychoptera rufocincta ?
Tipula abdominalis (shaded streams)
Tipula caloptera (moss/algal mats)
Tipula metacomet (shaded streams)
Tipula williamsiana *

Aquatic – vertical ledges & rocks 11 spp. where water seeps/falls
Limonia canadensis
Limonia defuncta
Limonia rostrata
Limonia stulta
Dactylolabis spp. * (2 species)
Limonia humidicola
Limonia simulans
Limonia diversa
Pedicia albivitta?
Dicranota sp.?

Semi-aquatic – in saturated or damp logs in or near wetlands 8 spp.
Atarba picticornis
Austrolimnophila toxoneura
Elephantomyia westwoodi
Epiphragma fasciapennis
Epiphragma solatrix
Limonia lecontei?
Limonia macateei (fungi)
Limonia rara

Aquatic/semi-aquatic – temporary aquatic pool or stream: 6 spp.
Pilaria quadrata
Shannonomyia lenta *
Tipula spenceriana?
Tipula paterifera
Tipula sayi
Tipula ultima

Aquatic & Semi-aquatic – in saturated soil along streams: 31 spp.
Brachypremna dispellens
Dolichopeza carolus (mosses)
Dolichopeza walleyi (mosses)
Erioptera armata *
Erioptera caliptera
Erioptera cana
Erioptera needhami
Erioptera parva
Erioptera pilipes *
Erioptera venusta
Gonomyia manca
Gonomyia subcinerea
Gonomyia (*Progonomyia*) sp.
Limnophila macrocera (slow streams)
Limnophila rufibasis *(small streams)?
Limnophila solstitialis (small streams)
Limonia canadensis (algae)
Limonia humidicola (algae/mosses)
Liogma nodicornis * (mosses)
Molophilus forcipulus
Pilaria tenuipes
Pseudolimnophila contempta
Tipula borealis?
Tipula furca
*Tipula ignobilis**(mosses)
Tipula iroquois *(mosses)
Tipula jacobus?
Tipula oropezoides (mosses)
Tipula strepens
Tipula tricolor
Tipula (*Schummelia*) sp.

Semi-aquatic – in saturated soil (open marshy areas): 14 spp.
Erioptera venusta
Helius flavipes
Limnophila macrocera
Limonia longipennis
Liogma nodicornis *
Pilaria imbecilla
Pilaria recondita
Pseudolimnophila luteipennis
Tipula sayi
Tipula spenceriana?
Tipula subeluta
Tipula tricolor
Tipula ultima
Ptychoptera rufocincta

Appendix A-4.9 (continued). Grouping of crane fly species by habitat.

Aquatic & Semi-aquatic - in saturated soil in forests (skunk cabbage marsh): 42 spp.

Brachypremna dispellens
Cheilotrichia stigmatica?
Dolichopeza johnsonella (mosses)
Dolichopeza obscura (mosses)
Erioptera caliptera
Erioptera chlorophylla
Erioptera megopthalma
Erioptera needhami
Erioptera parva
Erioptera septemtrionis
Helius flavipes
Hexatoma albitarsis
Limnophila (*Phylidorea*)spp. (2 species)
Limnophila fuscovaria
Limnophila macrocera
Limnophila rufibasis *
Limonia brevivena (mosses)
Limonia divisa (algae/mosses)
Limonia fallax
Limonia fusca
Limonia immodesta *
Limonia stulta
Molophilus forcipulus
Molophilus hirtipennis
Ormosia nigripila
Pedicia albivitta
Pedicia inconstans
Pilaria tenuipes
Pseudolimnophila luteipennis
Tipula borealis?
Tipula collaris
Tipula dejecta *
Tipula furca
Tipula jacobus
Tipula oropezoides
Tipula sayi
Tipula tricolor
Tipula (*Schummelia*) sp.
Ulomorpha pilosella
Bittacomorpha clavipes
Ptychoptera rufocincta

Terrestrial - Forest soil: 34 spp.

Cladura flavoferruginea
Dicranoptycha spp. (4 species)
Dolichopeza tridenticulata (moss)
Limonia indigena?
Limonia domestica
Nephrotoma spp. (flood plain to slopes) (13 species)
Tipula duplex *(oak hickory, flood plain)
Tipula fuliginosa (oak hickory)
Tipula georgiana (oak hickory)
Tipula longiventris * (oak hickory)
Tipula mallochi (oak hickory, flood plain)
Tipula stonei
Tipula submaculata (oak hickory, flood plain)
Tipula valida *(oak hickory, flood plain)
Tipula (*Triplicitipula*) spp. * (2 species)
Trichocera spp. (3 species)

Terrestrial – grassland soil: 7 spp.

Nephrotoma ferruginea
Tipula bicornis *
Tipula georgiana?
Tipula paterifera
Tipula (*Triplicitipula*) spp. *
Trichocera annulata?

Terrestrial – in rotting wood (not associated with wet area) 14 spp.

Ctenophora spp. * (2 species)
Gnophomyia tristissima
Limonia annulata
Limonia annulus cinctipes (fungi)
Limonia bryanti
Limonia fidelis
Limonia globithorax (fungi)
Limonia immatura
Limonia triocellata (fungi)
Teucholabis spp. (2 species)
Tipula trivittata
Ula elegans (fungi)

*regional sp. not recorded in 1998 survey
? Identification uncertain

Appendix A-5.1. Documented occurrence of target-group Lepidoptera by sample site - Fairmount Park system Terrestrial Insect Survey (*indicates sight record). Abbreviations are: AND=Andorra; BMR=Bell's Mill; CTHDRL=Cathedral Meadow; PPE=Pennypack Environmental Center; PPE-MDW= Pennypack Meadow; GRG-LT=Gorgas light trap; GRG-MDW=Gorgas Meadow; RR-MDW=Rail Road Meadow; TABOR/RRMDW=Tabor Road Meadow; RHWN=Rhawn Street; WP-YH/STBLS=West Park Stables; WP-HORT= West Park Horticulture Center.

LEPIDOPTERA: PAPILIONOIDEA															
TAXON	AND-1	BMR	CTHDRL-1	CTHDRL-2	PPE-1	PPE-2	PPE-MDW	GRG-LT	GRG-MDW	RR-MDW	TABOR/RRMDW	RHWN-1	RHWN-2	WP-YH/STBLS	WP-HORT
Papilio glaucus (Linnaeus)	X	X*	X*	X*	X	X*	X*	X*	X	X	X*	X*	X*	X*	X*
Papilio troilus (Linnaeus)			X	X	X		X	X*	X						
Pieris rapae (Linnaeus)	X*	X*	X*	X*	X*	X*	X*	X*	X*	X*	X*	X*	X*	X	X
Colias eurytheme Boisduval			X*	X			X		X	X		X*			
Colias philodice Godart				X*					X	X					
Eurema lisa (Boisduval & Leconte)									X*	X					
Phoebis sennae (Linnaeus)										X					
Harkenclenus titus (Fabricius)				X											
Satyrium calanus falacer (Godart)	X														
Calycopis cecrops (Fabricius)			X	X			X	X	X	X			X		
Strymon melinus Hübner									X						
Everes comyntas (Godart)	X		X	X			X*		X	X		X	X		
Celastrina sp.			X	X*	X						X	X			
Feniseca tarquinius (Fabricius)														X	
Libytheana carinenta bachmanii (Kirtland)	**NOTE:**	[this species was photographed in Tacony Park by C. Younger during 1998 and probably occurs locally in association with Hackberry (*Celtis* spp.)]													
Speyeria cybele (Fabricius)			X	X					X	X					
Euptoieta claudia (Cramer)									X	X*					
Phyciodes tharos (Drury)				X*					X	X					
Polygonia interrogationis (Fabricius)	X*				X*						X*				
Polygonia comma (Harris)	X*				X						X*				
Nymphalis antiopa (Linnaeus)	X*				X		X			X	X*				
Vanessa atalanta (Linnaeus)	X							X*	X		X*	X*			

Appendix A-5.1 (continued). Documented occurrence of target-group Lepidoptera by sample site - Fairmount Park system Terrestrial Insect Survey (* indicates sight record). Abbreviations are: AND=Andorra; BMR=Bell's Mill; CTHDRL=Cathedral Meadow; PPE=Pennypack Environmental Center; PPE-MDW= Pennypack Meadow; GRG-LT=Gorgas light trap; GRG-MDW=Gorgas Meadow; RR-MDW=Rail Road Meadow; TABOR/RRMDW=Tabor Road Meadow; RHWN=Rhawn Street; WP-YH/STBLS=West Park Stables; WP-HORT= West Park Horticulture Center.

TAXON	AND-1	BMR	CTHDRL-1	CTHDRL-2	PPE-1	PPE-2	PPE-MDW	GRG-LT	GRG-MDW	RR-MDW	TABOR/RRMDW	RHWN-1	RHWN-2	WP-YH/STBLS	WP-HORT
Vanessa virginiensis (Drury)				X*											
Junonia coenia (Hübner)										X*					
Limenitis arthemis astyanax (Fabricius)					X*										
Limenitis archippus (Cramer)				X*											
Megisto cymela (Cramer)			X	X											
Cercyonis pegala alope (Fabricius)			X	X			X								
Danaus plexippus (Linnaeus)				X*			X		X	X					
LEPIDOPTERA: HESPERIOIDEA: HESPERIIDAE															
Epargyreus clarus (Cramer)			X	X	X		X*		X	X		X			
Achalarus lyciades (Geyer)			X												
Thorybes bathyllus (J.E. Smith)			X												
Thorybes pylades (Scudder)			X												
Erynnis icelus (Scudder & Burgess)				X*											
Erynnis brizo (Boisduval & Leconte)															
Erynnis juvenalis (Fabricius)				X											
Erynnis horatius (Scudder & Burgess)			X	X					X	X				X	
Erynnis zarucco (Lucas)				X					X	X				X	
Erynnis baptisiae (Forbes)				X*											
Pyrgus communis (Grote)										X					
Pholisora catullus (Fabricius)			X												
Nastra l'herminier (Latreille)										X					
Ancyloxipha numitor (Fabricius)							X	X	X			X	X		
Hylephila phyleus (Drury)				X*											

Appendix A-5.1 (continued). Documented occurrence of target-group Lepidoptera by sample site - Fairmount Park system Terrestrial Insect Survey (* indicates sight record). Abbreviations are: AND=Andorra; BMR=Bell's Mill; CTHDRL=Cathedral Meadow; PPE=Pennypack Environmental Center; PPE-MDW= Pennypack Meadow; GRG-LT=Gorgas light trap; GRG-MDW=Gorgas Meadow; RR-MDW=Rail Road Meadow; TABOR/RRMDW=Tabor Road Meadow; RHWN=Rhawn Street; WP-YH/STBLS=West Park Stables; WP-HORT= West Park Horticulture Center.

TAXON	AND-1	BMR	CTHDRL-1	CTHDRL-2	PPE-1	PPE-2	PPE-MDW	GRG-LT	GRG-MDW	RR-MDW	TABOR/RRMDW	RHWN-1	RHWN-2	WP-YH/STBLS	WP-HORT
Hesperia metea Scudder			X	X											
Hesperia sassacus Harris															
Polites peckius (Kirby)				X			X								
Polites themistocles (Latreille)				X*			X								
Polites origenes (Fabricius)				X*											
Pompeius verna (W.H. Edwards)				X											
Atalopedes campestris huron (W.H. Edwards)	X		X	X			X		X	X		X	X		
Anatrytone logan (W.H. Edwards)				X											
Poanes hobomok (Harris)			X						X				X		
Poanes zabulon (Boisduval & Leconte)	X		X*	X*	X	X	X	X	X	X*	X	X	X		
Euphyes vestris metacomet (Harris)				X*											
Atrytonopsis hianna (Scudder)				X*											
LEPIDOPTERA: GEOMETROIDEA: GEOMETRIDAE: ENNOMINAE															
Lomographa semiclarata (Walker)				**X**											
Lomographa vestaliata (Guenée)	**X**			**X**	**X**										
Antepione thisoaria (Guenée)				**X**											
Besma quercivoraria (Guenée)		**X**	**X**	**X**											
Pero sp. 1 [nr. *hubneraria* (Guenée)]	**X**		**X**	**X**	**X**										
Biston betularia cognataria (Guenée)		**X**	**X**	**X**											
Campaea perlata (Guenée)	**X**	**X**		**X**	**X**	**X**									
Ectropis crepuscularia (D. & S.)														**X**	
Euchlaena serrata (Drury)				**X**											

Appendix A-5.1 (continued). Documented occurrence of target-group Lepidoptera by sample site - Fairmount Park system Terrestrial Insect Survey (* indicates sight record). Abbreviations are: AND=Andorra; BMR=Bell's Mill; CTHDRL=Cathedral Meadow; PPE=Pennypack Environmental Center; PPE-MDW= Pennypack Meadow; GRG-LT=Gorgas light trap; GRG-MDW=Gorgas Meadow; RR-MDW=Rail Road Meadow; TABOR/RRMDW=Tabor Road Meadow; RHWN=Rhawn Street; WP-YH/STBLS=West Park Stables; WP-HORT= West Park Horticulture Center.

TAXON	AND-1	BMR	CTHDRL-1	CTHDRL-2	PPE-1	PPE-2	PPE-MDW	GRG-LT	GRG-MDW	RR-MDW	TABOR/RRMDW	RHWN-1	RHWN-2	WP-YH/STBLS	WP-HORT
Epimecis hortaria (Fabricius)	**X**	**X**		**X**	**X**									**X**	
Euchlaena amoenaria (Guenée)	**X**	**X**		**X**											
Xanthotype urticaria Swett	**X**														
Eutrapela clemataria (J.E. Smith)		**X**			**X**										
Cabera erythemaria Guenée				**X**											
Heliomata cycladata G. & R.			**X**	**X**											
Hypagyrtis unipuctata (Haw.)	**X**	**X**	**X**		**X**	**X**							**X**		
Iridopsis larvaria (Guenée)				**X**											
Itame pustularia (Guenée)			**X**												
Metarranthis hypochraria (H.-S.)	**X**														
Metarranthis sp. 1 [nr. *lateritiaria* (Guenée)]		**X**		**X**											
Plagodis serinaria H.-S.	**X**														
Plagodis alcoolaria (Guenée)			**X**												
Semiothisa aemulataria (Walker)				**X**	**X**								**X**		
Semiothisa ocellinata (Guenée)										**X**					
Eusarca confusaria Hübner				**X**						**X**					
Tetracis cachexiata (Guenée)	**X**			**X**											

NOTE: locality codes in bold type indicate primary light-trap sites (sampled every month iv-ix); codes in italics indicate 2° sites (not sampled every month);

Appendix A-5.2a. Butterflies and skippers (Papilionoidea, Hesperioidea) documented during the 1998 field season in the Fairmount Park system, Philadelphia Co., Pennsylvania. * indicates non-native (introduced) species.

SUPERFAMILY PAPILIONOIDEA (TRUE BUTTERFLIES)

FAMILY PAPILIONIDAE (SWALLOWTAILS)

Papilio glaucus (Linnaeus)	["tiger swallowail", "eastern tiger swallowtail"]
Papilio troilus (Linnaeus)	["spicebush swallowtail"]

FAMILY PIERIDAE (WHITES & SULPHURS)

Pieris rapae (Linnaeus)*	["cabbage butterfly", "cabbage white"]
Colias eurytheme Boisduval	["alfalfa butterfly", "orange sulfur"]
Colias philodice Godart	["clouded sulfur"]
Eurema lisa (Boisduval & Leconte)	["little yellow", "little sulfur"]
Phoebis sennae (Linnaeus)	["cloudless sulfur"]

FAMILY LYCAENIDAE (HARVESTERS, COPPERS, HAIRSTREAKS, & BLUES)

Harkenclenus titus (Fabricius)	["coral hairstreak"]
Satyrium calanus falacer (Godart)	["banded hairstreak"]
Calycopis cecrops (Fabricius)	["red-banded hairstreak"]
Strymon melinus Hübner	["gray hairstreak"]
Everes comyntas (Godart)	["eastern tailed-blue"]
Celastrina sp.	[a species of "azure"]
Feniseca tarquinius (Fabricius)	["harvester"]

FAMILY NYMPHALIDAE (BRUSH-FOOTED BUTTERFLIES)

SUBFAMILY LIBYTHEINAE (SNOUT BUTTERFLIES)

Libytheana carinenta bachmanii (Kirtland)	["snout butterfly", "American snout butterfly"]

Appendix A-5.2a (continued). Butterflies and skippers (Papilionoidea, Hesperioidea) documented during the 1998 field season in the Fairmount Park system, Philadelphia Co., Pennsylvania. * indicates non-native (introduced) species.

SUBFAMILY HELICONIINAE (LONGWINGS & FRITILLARIES)

Speyeria cybele (Fabricius)	["great spangled fritillary"]
Euptoieta claudia (Cramer)	["variegated fritillary"]

SUBFAMILY NYMPHALINAE (NYMPHS)

Phyciodes tharos (Drury)	["pearl crescent"]
Polygonia interrogationis (Fabricius)	["question mark"]
Polygonia comma (Harris)	["comma", "eastern comma"]
Nymphalis antiopa (Linnaeus)	["mourning cloak"]
Vanessa atalanta (Linnaeus)	["red admiral"]
Vanessa virginiensis (Drury)	["American painted lady", "American lady"]
Junonia coenia (Hübner)	["buckeye", "common buckeye"]

SUBFAMILY LIMENITIDINAE (VICEROY, ADMIRALS, & SISTERS)

Limenitis arthemis astyanax (Fabricius)	["red-spotted purple"]
Limenitis archippus (Cramer)	["viceroy"]

SUBFAMILY SATYRINAE (SATYRS & WOOD NYMPHS)

Megisto cymela (Cramer)	["little wood-satyr"]
Cercyonis pegala alope (Fabricius)	["common wood-nymph"]

SUBFAMILY DANAINAE (MILKWEED BUTTERFLIES)

Danaus plexippus (Linnaeus)	["monarch"]

SUPERFAMILY HESPERIOIDEA (SKIPPERS)

FAMILY HESPERIIDAE (SKIPPERS)

SUBFAMILY PYRGINAE (OPEN-WINGED SKIPPERS)

Appendix A-5.2a (continued). Butterflies and skippers (Papilionoidea, Hesperioidea) documented during the 1998 field season in the Fairmount Park system, Philadelphia Co., Pennsylvania. * indicates non-native (introduced) species.

Epargyreus clarus (Cramer)	["silver-spotted skipper"]
Achalarus lyciades (Geyer)	["hoary edge", "hoary-edged skipper", "frosted skipper"]
Thorybes bathyllus (J.E. Smith)	["southern cloudywing"]
Thorybes pylades (Scudder)	["northern cloudywing"]
Erynnis icelus (Scudder & Burgess)	["dreamy duskywing"]
Erynnis brizo (Boisduval & Leconte)	["sleepy duskywing"]
Erynnis juvenalis (Fabricius)	["juvenal's duskywing"]
Erynnis horatius (Scudder & Burgess)	["Horace's duskywing"]
Erynnis zarucco (Lucas)	["zarucco duskywing"]
Erynnis baptisiae (Forbes)	["wild indigo duskywing"]
Pyrgus communis (Grote)	["common checkered skipper"]
Pholisora catullus (Fabricius)	["common sootywing"]

SUBFAMILY HESPERIINAE (BRANDED SKIPPERS)

Nastra l'herminier (Latreille)	["swarthy skipper"]
Ancyloxipha numitor (Fabricius)	["least skipper"]
Hylephila phyleus (Drury)	["fiery skipper"]
Hesperia metea Scudder	["cobweb skipper"]
Hesperia sassacus Harris	["indian skipper"]
Polites peckius (Kirby)	["Peck's skipper"]
Polites themistocles (Latreille)	["tawny-edged skipper"]
Polites origenes (Fabricius)	["crossline skipper"]
Pompeius verna (W.H. Edwards)	["little glassywing"]
Atalopedes campestris huron (W.H. Edwards)	["sachem", "field skipper"]
Anatrytone logan (W.H. Edwards)	["Delaware skipper"]
Poanes hobomok (Harris)	["hobomok skipper"]
Poanes zabulon (Boisduval & Leconte)	["zabulon skipper"]
Euphyes vestris metacomet (Harris)	["dun skipper"]
Atrytonopsis hianna (Scudder)	["dusted skipper"]

Appendix A-5.2b. Inchworm moths (Lepidoptera: Geometridae) documented during the 1998 field season in the Fairmount Park system, Philadelphia Co., Pennsylvania.

SUBFAMILY ENNOMINAE [target group for survey]:

Antepione thisoaria (Guenée)
Besma quercivoraria (Guenée)
Biston betularia cognataria (Guenée) ["Peppered Moth", "Pepper-and-Salt Moth"]
Cabera erythemaria Guenée
Campaea perlata (Guenée)
Ectropis crepuscularia (Dennis & Schiffermüller)
Epimecis hortaria (Fabricius)
Euchlaena serrata (Drury)
Euchlaena obtusaria (Hübner)
Euchlaena amoenaria (Guenée)
Eusarca confusaria Hübner
Eutrapela clemataria (J.E. Smith)
Heliomata cycladata Grote & Robinson
Hypagyrtis unipuctata (Haworth)
Iridopsis larvaria (Guenée)
Itame pustularia (Guenée)
Lomographa semiclarata (Walker)
Lomographa vestaliata (Guenée)
Metarranthis hypochraria (Herrich-Schäffer)
Metarranthis sp. 1 [nr. *lateritiaria* (Guenée)]
Pero sp. 1 [nr. *hubneraria* (Guenée)]
Plagodis serinaria Herrich-Schäffer
Plagodis alcoolaria (Guenée)
Semiothisa aemulataria (Walker)
Semiothisa ocellinata (Guenée)
Tetracis cachexiata Guenée
Xanthotype urticaria Swett

SUBFAMILY STERRHINAE

Scopula limboundata (Haworth)
Haematopis grataria (Fabricius)

SUBFAMILY LARENTIINAE:

Dyspteris abortivaria (Herrich-Schäffer)
Eulithis diversilineata (Hübner)
Eupithecia sp. 1
Euphyia unangulata intermediata (Guenée)
Lobophora nivigerata Walker
Orthonama obstipata (Fabricius)

Appendix A-5.3. List of putative extirpated Lepidoptera species with historical distribution in the Fairmount Park system. KEY: W = Wissahickon ; P = Pennypack; C = Cobb's Creek; T = Tacony; WP = West Park; FP = "Fairmount Park system" (specific section undeterminable from available data).

FAMILY	TAXON NAME	LAST RECORD	W	P	C	T	WP	FP
Papilionidae	*Eurytides marcellus*	1962	X					
Papilionidae	*Papilio cresphontes*	1917*	X		X			X
Lycaenidae	*Lycaena hyllus*	1962	X					
Lycaenidae	*Incisalia niphon*	1889						X
Nymphalidae	*Speyeria idalia*	1930s		X				X
Nymphalidae	*Boloria selene*	1920s						X
Nymphalidae	*Phyciodes* sp. [other than *P. tharos* ; possibly *P.batesii*]	1980	X					
Nymphalidae	*Euphydryas phaeton*	1965	X	X				
Nymphalidae	*Satyrodes eurydice*	1967	X				X	
Nymphalidae	*Satyroides appalachia*	?	X					
Hesperiidae	*Poanes massasoit*	1889					X	
Hesperiidae	*Euphyes conspicuus*	1965	X				X	
Hesperiidae	*Euphyes bimacula*	1965	X					

*Breeding populations of this species are known to have occurred in the Delaware Valley (Montgomery Co., Unami Creek drainage) as recently as the early 1960s.

Appendix A-5.4. List of host plants (†) and adult nectar sources (*) of Lepidoptera for propagation in advance of rehabilitation/reintroduction program.

Family	Latin Name	Common Name
Annonaceae	*Asimina triloba*†	pawpaw
Asclepiadaceae	*Asclepias tuberosa**†	butterfly-weed
Asclepiadaceae	*Asclepias syriaca**†	common milkweed
Asclepiadaceae	*Asclepias viridifolia**†	green milkweed
Asteraceae	*Cirsium discolor**	field thistle
Asteraceae	*Cirsium pumilum**	pasture thistle
Asteraceae	*Eupatorium purpureum**	joe-pye-weed
Asteraceae	*Krigia biflora**	dwarf dandelion
Asteraceae	*Liatris spicata**	Kansas gayfeather
Asteraceae	*Vernonia gigantea**	ironweed
Asteraceae	*Vernonia glauca**	tawny ironweed
Lamiaceae	*Prunella vulgaris**	heal-all; self-heal
Poaceae	*Schizachyrium scoparium* † [formerly *Andropogon scoparius*]	little bluestem
Rosaceae	*Potentilla canadensis**	cinquefoil
Rutaceae	*Zanthoxylum americanum* †	northern prickly-ash
Scrophulariaceae	*Chelone glabra*†	turtlehead
Violaceae	*Viola pedata*†	birdfoot violet
Violaceae	*Viola sagittata*†	ovate-leaved violet

Appendix A-6.1. Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
NATIVE SPECIES						
Sea lamprey	1	0	0	0	Common in Delaware River	A
American brook lamprey	0	0	0	0	-	in lower Delaware drainage
Atlantic sturgeon	0	0	0	0	Common lower Delaware River	A
Shortnose sturgeon	1	0	0	0	A few specimens from lower Delaware River	
Longnose gar	0	0	0	0	Common lower Delaware River (Bean 1892); Common (Barton 1792)	
American eel	5	4	44	0	Present	LVS
Blueback herring	0	0	0	0		A
Alewife	3	0	+	0	Common in Delaware River	A, R
American shad	4	0	++	4	Common in Delaware River	A, R

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
Gizzard shad	0	0	+	0	Present in brackish and fresh water	
Rainbow smelt	0	0	0	4	Common in Delaware and Schuylkill Rivers	A
Brook trout	0	0	19	8	Local distribution unclear	
Eastern mudminnow	1	0	0	0	Common near Philadelphia (Cope)	
Redfin pickerel	5	7	8	17	Present	
Chain pickerel	0	0	3	0	Abundant in Delaware River	R
Rosyside dace	0	0	4	0	Present, not common in Delaware drainage	
Cutlips minnow	0	0	8	17	Not mentioned in region	
E. silvery minnow	8	0	+	4	Present	R
Golden shiner	5	39	14	25	Common	
Comely shiner	1	0	8	17	Not mentioned	

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
Satinfin shiner	1	54	20	33	In Delaware	
Bridle shiner	2	21	+	25	Abundant in tributaries of Delaware River	
Ironcolor shiner	0	0	0	4	Delaware River and tributaries, "especially in dams and ponds" (Cope)	Historical from type locality, before 1870
Common shiner	0	64	49	38	Common	
Spottail shiner	7	0	23	8	Abundant in Delaware River	
Swallowtail shiner	0	4	18	21	Abundant in tributaries of Delaware River	
Spotfin shiner	0	0	27	21	Not mentioned; probably confused with satinfin shiner	
Bluntnose minnow	0	0	19	21	Present	
Blacknose dace	0	43	77	50	Present	

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
Longnose dace	0	0	48	8	Present	LVS
Creek chub	0	0	56	25	Common	
Fallfish	0	29	31	4	Extremely common in Delaware River and tributaries	
Quillback	0	0	2	0	No regional reference	R
White sucker	1	39	81	33	Common	
Creek chubsucker	6	39	14	8	Slow muddy streams	
Northern hog sucker	0	0	1	0	Uncommon in Delaware drainage	
White catfish	1	0	1	0	Abundant in Schuylkill River	HR, 1966
Yellow bullhead	0	0	19	0	Not east of Alleghenies	HR, 1966
Brown bullhead	7	11	21	8	Common	

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
Tadpole madtom	3	0	0	0	In tributaries of Delaware River	
Margined madtom	3	0	19	0	In Delaware River	LVS, HR 1950
Banded killifish	11	0	24	33	Present	
Mummichog	3	0	2	0	Found in the Delaware River, but primarily estuarine	
Pirateperch	2	0	0	0	Present in lower Delaware River	
Atlantic needlefish	0	0	0	0	Marine, ascends Delaware River	
Threespine stickleback	0	0	0	0	Abundant in pools and ditches along Delaware River	
Fourspine stickleback	3	0	0	0	Abundant in tidewater streams and ditches of the Delaware River (Cope)	HR 1951

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
White perch	5	0	0	0	Very common in Delaware River	A or R
Striped bass	4	0	0	0	Present	A
Banded sunfish	0	0	0	0	Rare in southeastern Pa.	
Bluespotted sunfish	2	0	0	0	Very common in Southeastern Pa. (Cope)	
Redbreast sunfish	3	21	47	46	Abundant	
Pumpkinseed	5	4	54	21	Common	
Tessellated darter	7	36	62	58	Common	
Yellow perch	1	0	2	0	Present	
Shield darter	0	0	5	4	No local records	LVS
Slimy sculpin	0	0	3	4	Not mentioned in Delaware drainage	LVS
Number of species		15	39	29		

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
INTRODUCED SPECIES						
Bowfin	0	0	+	0	Eastern (cf. Atlantic drainage) Pa. south	
Rainbow trout	0	0	22	0	Introduced in Pa., rarely established	
Brown trout	0	0	46	0	Introduced in Pa.	
Northern pike	0	0	+	0	Not mentioned in Delaware drainage	R
Muskellunge	0	0	+	0	Not mentioned in Delaware drainage	R
Tiger muskellunge	0	0	3	0		R
Goldfish	0	0	7	0	Abounds in Delaware and Schuylkill rivers (Cope 12881)	HR 1966
Common carp	0	0	15	0	Not mentioned in Delaware drainage	HR 1950

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
Fathead minnow	0	0	4	0	Not mentioned in Delaware drainage	HR 1966
Channel catfish	0	0	3	0	Not present	HR 1944
Rock bass	0	0	34	0	Well established in Delaware River, especially upper	
Green sunfish	0	0	52	0	Not present	HR 1955
Bluegill	0	0	43	4	Recorded from the Delaware River (Abbott)	
Smallmouth bass	0	0	38	17	Introduced Delaware River (Easton) 1870	First record 1911
Largemouth bass	0	0	30	0	Local introductions not mentioned	HR 1956
White crappie	0	0	3	0	Not mentioned in Delaware drainage	
Black crappie	1	0	5	4	Not mentioned in Delaware drainage	First record 1912

Appendix A-6.1 (continued). Comparison of recent and historical frequency (% of samples) of occurrence of 60 taxa of fish in Fairmount Park. Recent data derived from 1976-1994 collections (see methods); historical data are from museum and published records prior to 1931. For historical data, some sites with small sample sizes are aggregated to provide samples more comparable with recent data. Historical records are based on 16 groups of sites, and 24 different waterbodies. For recent data, + indicates a frequency of 0.3% (occurrence at one of the 307 sites) and ++ indicates a frequency of 0.7% (occurrence at 2 sites). A = anadromous, LVS = low vulnerability to seine netting, R = riverine. Common names are consistent with those in Robins et al. (1991). HR = historical specimen record.

	Delaware River	**Pennypack Drainage**	**Schuylkill River Drainage**		**Regional Occurrence**	
Species	**Historical <1931**	**Historical < 1931**	**Recent**	**Historical (24 streams) < 1931**	**Bean (1892) or as noted**	**Notes (included specimen records)**
	# of Records*	**Frequency**	**Frequency**	**Frequency**		
Walleye	0	0	1	0	Not mentioned in Delaware drainage	R
Median # of fish			-	13		
Minimum # of fish			-	1		
Maximum # of fish			-	289		

Appendix A-6.2. Total numbers of individuals in fish collections from selected sites in Pennypack drainage before 1931. Common names are consistent with Robins et al. (1991).

Species	Site				
	Pennypack Creek at Holmesburg	**Sandy Run**	**Willit's Run at Rowlands**	**Tributary of Willit's Run at Rowlands**	**Tributary of Pennypack at Bustleton**
American eel		1			
redfin pickerel	2				
common shiner	16	7			
satinfin shiner	26	7	1	1	
bridle shiner	8	2	1		
swallowtail shiner	1				
golden shiner	11	2	1		
blacknose dace	5	11			1
fallfish	6	4			
white sucker	8	7	1		
creek chubsucker	6	3	1	1	
brown bullhead	2	1			
redbreast sunfish	4	1	1		
pumpkinseed	1				
tessellated darter	10	2	1	1	
Number of species	14	12	7	3	1

Appendix A-6.3. Numbers of individuals of fish caught in Cobbs Creek Park, East/West Parks (Fairmount) and FDR Park in the 1998-2000 ANSP inventory. All samples were taken by backpack electroshocking. Common and scientific names are consistent with Robins et al. (1991).

	Park:	**Cobb's Creek**								**Tacony Creek**	
	Station:	**CC5**	**CCF**	**CC1**	**CC2**	**CC3**	**CC4**	**CIR**	**WLR**	**TC**	**TC2**
	Waterbody:	**Cobb's Creek**						**W Br. Indian Creek**	**Naylor's Run**	**Tacony Creek**	
Species	**Location:** **Common Name**	**Grange (above City Ave.)**	**above City Avenue**	**below Marshall Rd**	**by Fernwood Cem.**	**above Woodland dam**	**below Woo d-land dam**		**mouth**	**ab. Rising Sun**	**ab. Hunting Park**
	Date:	**6/10/00**	**12/9/99**	**6/2/98**	**12/9/99**	**5/5/00**	**5/4/00**	**6/2/98**	**6/2/98**	**6/4/98**	**5/9/00**
Alosa pseudoharengus	alewife										
Ambloplites rupestris	rock bass										
Ameiurus catus	white catfish										
Ameiurus natalis	yellow bullhead										
Ameiurus nebulosus	brown bullhead				2	3	5				7
Anguilla rostrata	American eel	2	15	6	8		30		19	13	7
Carassius auritus	goldfish										
Carpiodes cyprinus	quillback										
Catostomus commersoni	white sucker	16	190	19	20		1	10		118	
Cyprinella analostana	satinfin shiner						4			118	
Cyprinella spiloptera	spotfin shiner										
Cyprinus carpio	common carp										
Dorosoma cepedianum	gizzard shad										
Etheostoma olmstedi	tesselated darter						5				
Fundulus diaphanus	banded killifish				74		29				5
Fundulus heteroclitus	mummichog			16	171	1	35		75	6	393
Gambusia holbrooki	mosquitofish										
Hybognathus regius	eastern silvery minnow										

Appendix A-6.3 (continued). Numbers of individuals of fish caught in Cobbs Creek Park, East/West Parks (Fairmount) and FDR Park in the 1998-2000 ANSP inventory. All samples were taken by backpack electroshocking. Common and scientific names are consistent with Robins et al. (1991).

	Park:	Cobb's Creek								Tacony Creek	
	Station:	CC5	CCF	CC1	CC2	CC3	CC4	CIR	WLR	TC	TC2
	Waterbody:	Cobb's Creek						W Br. Indian Creek	Naylor's Run	Tacony Creek	
Species	Location:	Grange (above City Ave.)	above City Avenue	below Marshall Rd	by Fernwood Cem.	above Woodland dam	below Woo d-land dam		mouth	ab. Rising Sun	ab. Hunting Park
	Common Name										
	Date:	6/10/00	12/9/99	6/2/98	12/9/99	5/5/00	5/4/00	6/2/98	6/2/98	6/4/98	5/9/00
Ictalurus punctatus	channel catfish										
Lepomis auritus	redbreast sunfish				31	8	5		2	14	
Lepomis cyanellus	green sunfish								1		3
Lepomis gibbosus	pumpkinseed	2	14	1	2	5			7		
Lepomis hybrid	hybrid sunfish						1				
Lepomis macrochirus	bluegill						1				
Lepomis species	sunfish spp.										
Luxilus cornutus	common shiner	5	415	52	1		9		21	5	
Micropterus dolomieu	smallmouth bass										
Micropterus salmoides	largemouth bass										
Morone americana	white perch										
Morone saxatilis	striped bass										
Notemigonus crysoleucas	golden shiner										
Notropis hudsonius	spottail shiner			3	1		4			117	
Notropis procne	swallowtail shiner		5	145	49		26		549	183	
Oncorhynchus mykiss	rainbow trout										
Pimephales promelas	fathead minnow				48	1	5				1
Pomoxis annularis	white crappie										
Pomoxis nigromaculatus	black crappie										
Pylodictis olivaris	flathead catfish										

Appendix A-6.3 (continued). Numbers of individuals of fish caught in Cobbs Creek Park, East/West Parks (Fairmount) and FDR Park in the 1998-2000 ANSP inventory. All samples were taken by backpack electroshocking. Common and scientific names are consistent with Robins et al. (1991).

	Park:	**Cobb's Creek**								**Tacony Creek**	
	Station:	**CC5**	**CCF**	**CC1**	**CC2**	**CC3**	**CC4**	**CIR**	**WLR**	**TC**	**TC2**
	Waterbody:	**Cobb's Creek**						**W Br. Indian Creek**	**Naylor's Run**	**Tacony Creek**	
Species	**Location:**	**Grange (above City Ave.)**	**above City Avenue**	**below Marshall Rd**	**by Fernwood Cem.**	**above Woodland dam**	**below Woo d-land dam**		**mouth**	**ab. Rising Sun**	**ab. Hunting Park**
	Common Name										
	Date:	**6/10/00**	**12/9/99**	**6/2/98**	**12/9/99**	**5/5/00**	**5/4/00**	**6/2/98**	**6/2/98**	**6/4/98**	**5/9/00**
Rhinichthys atratulus	blacknose dace	14	652	59	48		8	86	333	42	
Rhinichthys cataractae	longnose dace										
Salmo trutta	brown trout										
Semotilus atromaculatus	creek chub	2	48		1			7			
TOTAL FISH		41	1339	301	456	18	168	103	1007	616	416
Number of species		6	7	8	13	5	14	2	8	9	6
	Crayfish species	1									
Cambarus bartonii	Crayfish							1			
Orconectes limosus	Crayfish				1						
Eurycea bislineata	twolined salamander										
Eurycea bislineata larvae	twolined salamander								1		
Plethodontidae	salamander species										
Rana catesbiana	bullfrog				1				2		1
Rana clamitans	green frog										
Ranidae tadpole	frog tadpole								1		

No fish:

Trib Cobbs at Cobbs Creek Golf Course

Gorgas Lane Trib.

Carpenters Woods Trib.

Wise's Mill Trib. (*R. atratulus* observed outside sampling area)

Appendix A-6.3 (continued). Numbers of individuals of fish caught in Cobbs Creek Park, East/West Parks (Fairmount) and FDR Park in the 1998-2000 ANSP inventory. All samples were taken by backpack electroshocking. Common and scientific names are consistent with Robins et al. (1991).

	Park:	**Wissahickon Creek**				**FDR Park**		
	Station:	**WCC**	**WCM**	**WIBW**	**WPW**	**FGC**	**FTC**	**HC**
	Waterbody:	**Cresheim Creek**	**Wissahickon Creek**			**Shedbrook Creek**		**Hollander Creek**
Species	**Location:**	**below dam**	**mouth**	**below Wise's Mill trib**	**pool at mouth of Wise's Mill trib**	**in golf course**	**near tennis courts**	
	Common Name							
	Date:	**6/4/98**	**6/2/00**	**11/6/98**	**11/6/98**	**6/10/98**	**6/11/98**	**6/10/98**
Alosa pseudoharengus	alewife							
Ambloplites rupestris	rock bass		5	3				
Ameiurus catus	white catfish							
Ameiurus natalis	yellow bullhead							
Ameiurus nebulosus	brown bullhead					106		
Anguilla rostrata	American eel	2	13					2
Carassius auritus	goldfish							
Carpiodes cyprinus	quillback							
Catostomus commersoni	white sucker		2		2			
Cyprinella analostana	satinfin shiner			2				
Cyprinella spiloptera	spotfin shiner			11	14			
Cyprinus carpio	common carp							
Dorosoma cepedianum	gizzard shad							
Etheostoma olmstedi	tesselated darter		1	4				
Fundulus diaphanus	banded killifish				10			
Fundulus heteroclitus	mummichog							
Gambusia holbrooki	mosquitofish							
Hybognathus regius	eastern silvery minnow							
Ictalurus punctatus	channel catfish							
Lepomis auritus	redbreast sunfish		3	2				

Appendix A-6.3 (continued). Numbers of individuals of fish caught in Cobbs Creek Park, East/West Parks (Fairmount) and FDR Park in the 1998-2000 ANSP inventory. All samples were taken by backpack electroshocking. Common and scientific names are consistent with Robins et al. (1991).

	Park:	**Wissahickon Creek**				**FDR Park**		
	Station:	**WCC**	**WCM**	**WIBW**	**WPW**	**FGC**	**FTC**	**HC**
	Waterbody:	**Cresheim Creek**	**Wissahickon Creek**			**Shedbrook Creek**		**Hollander Creek**
Species	**Location:**	**below dam**	**mouth**	**below Wise's Mill trib**	**pool at mouth of Wise's Mill trib**	**in golf course**	**near tennis courts**	
	Common Name							
	Date:	**6/4/98**	**6/2/00**	**11/6/98**	**11/6/98**	**6/10/98**	**6/11/98**	**6/10/98**
Lepomis cyanellus	green sunfish	17				1	1	
Lepomis gibbosus	pumpkinseed	11	1	1		13	1	3
Lepomis hybrid	hybrid sunfish							
Lepomis macrochirus	bluegill		6				16	3
Lepomis species	sunfish spp.					27		
Luxilus cornutus	common shiner			77	78			
Micropterus dolomieu	smallmouth bass		1	4				
Micropterus salmoides	largemouth bass		1			2		
Morone americana	white perch							
Morone saxatilis	striped bass							
Notemigonus crysoleucas	golden shiner		2		3			
Notropis hudsonius	spottail shiner		1	32				
Notropis procne	swallowtail shiner							
Oncorhynchus mykiss	rainbow trout			2				
Pimephales promelas	fathead minnow				25			
Pomoxis annularis	white crappie							
Pomoxis nigromaculatus	black crappie							
Pylodictis olivaris	flathead catfish							
Rhinichthys atratulus	blacknose dace	89		1	5			
Rhinichthys cataractae	longnose dace			2				

Appendix A-6.3 (continued). Numbers of individuals of fish caught in Cobbs Creek Park, East/West Parks (Fairmount) and FDR Park in the 1998-2000 ANSP inventory. All samples were taken by backpack electroshocking. Common and scientific names are consistent with Robins et al. (1991).

	Park:	**Wissahickon Creek**				**FDR Park**		
	Station:	**WCC**	**WCM**	**WIBW**	**WPW**	**FGC**	**FTC**	**HC**
	Waterbody:	**Cresheim Creek**	**Wissahickon Creek**			**Shedbrook Creek**		**Hollander Creek**
Species	**Location:**	**below dam**	**mouth**	**below Wise's Mill trib**	**pool at mouth of Wise's Mill trib**	**in golf course**	**near tennis courts**	
	Common Name							
	Date:	**6/4/98**	**6/2/00**	**11/6/98**	**11/6/98**	**6/10/98**	**6/11/98**	**6/10/98**
Salmo trutta	brown trout		1	3				
Semotilus atromaculatus	creek chub				10			
TOTAL FISH		119	37	144	147	149	18	8
Number of species		4	12	13	8	5	3	3
	Crayfish species							
Cambarus bartonii	Crayfish	1						
Orconectes limosus	Crayfish							
Eurycea bislineata	twolined salamander							
Eurycea bislineata larvae	twolined salamander							
Plethodontidae	salamander species							
Rana catesbiana	bullfrog							
Rana clamitans	green frog							
Ranidae tadpole	frog tadpole							

No fish:

Trib Cobbs at Cobbs Creek Golf Course

Gorgas Lane Trib.

Carpenters Woods Trib.

Wise's Mill Trib. (*R. atratulus* observed outside sampling area)

Appendix A-6.4. Numbers of individuals of fish caught in Pennypack, Tacony and Wissahickon Valley parks in the 1998-2000 ANSP inventory. Samples were taken by backpack electroshocking (bp), boat electroshocking (bs) or net. Common and scientific names are consistent with those in Robins, et al. (1991).

	Park:	**Fairmount (E/W) Park**				**Pennypack Creek**					**Misc. Schuylkill River**			
	Station:	**CEL**	**COL**	**HCS**	**JGC**	**PPC**	**PPW**	**PR**	**RL**	**SF**	**AFL**	**BHR**	**FL**	**MC**
	Waterbody:	**Centen-nial Lake**	**Con-course Lake**	**Trib. N of Hort. Center**	**Trib. By Jap. Garden**	**Penny-pack Ck**	**Penny-pack Ck**	**Pauls Run**	**Rock-ledge Ck**	**Sandy Run**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**
Species	**Location:**				**above Garden**	**tidal**	**Created wetland at mouth**			**below Ryan Ave.**	**Above fish ladder**	**Boat House Row**	**Fish Ladder**	**Mana-yunk Canal**
	Common Name													
	Date	**6/13/98**	**6/12/98**	**6/13/98**	**6/12/98**	**5/21/99**	**5/21/99**	**6/1/98**	**6/1/98**	**6/1/98**	**5/26/00**	**5/26/00**	**5/20/00, 5/26/00, 7/28/00**	**4/25/00**
	Technique:	**bp**	**bp**	**bp**	**bp**	**bs**	**bs**	**bp**	**bp**	**bp**	**bs**	**bs**	**net**	**bs**
Alosa pseudoharengus	alewife												2	
Ambloplites rupestris	rock bass					1								
Ameiurus catus	white catfish					1							11	
Ameiurus natalis	yellow bullhead													2
Ameiurus nebulosus	brown bullhead													
Anguilla rostrata	American eel					1	3	6	3		3		32	1
Carassius auritus	goldfish													6
Carpiodes cyprinus	quillback												8	
Catostomus commersoni	white sucker					8	2	21	28				1	1
Cyprinella analostana	satinfin shiner						1	1						
Cyprinella spiloptera	spotfin shiner								31					
Cyprinus carpio	common carp					3	1					4	22	25
Dorosoma cepedianum	gizzard shad					1						7	59	
Etheostoma olmstedi	tesselated darter							1	7					
Fundulus diaphanus	banded killifish					24	16	25	1					
Fundulus heteroclitus	mummichog					1	3							
Gambusia holbrooki	mosquitofish	1	2		11									

Appendix A-6.4 (continued). Numbers of individuals of fish caught in Pennypack, Tacony and Wissahickon Valley Parks in the 1998-2000 ANSP inventory. Samples were taken by backpack electroshocking (bp) or boat electroshocking (bs). Common and scientific names are consistent with those in Robins, et al. (1991).

	Park:	**Fairmount (E/W) Park**				**Pennypack Creek**					**Misc. Schuylkill River**			
	Station:	**CEL**	**COL**	**HCS**	**JGC**	**PPC**	**PPW**	**PR**	**RL**	**SF**	**AFL**	**BHR**	**FL**	**MC**
	Waterbody:	**Centen-nial Lake**	**Con-course Lake**	**Trib. N of Hort. Center**	**Trib. By Jap. Garden**	**Penny-pack Ck**	**Penny-pack Ck**	**Pauls Run**	**Rock-ledge Ck**	**Sandy Run**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**
Species	**Location:**				**above Garden**	**tidal**	**Created wetland at mouth**			**below Ryan Ave.**	**Above fish ladder**	**Boat House Row**	**Fish Ladder**	**Mana-yunk Canal**
	Common Name													
	Date	**6/13/98**	**6/12/98**	**6/13/98**	**6/12/98**	**5/21/99**	**5/21/99**	**6/1/98**	**6/1/98**	**6/1/98**	**5/26/00**	**5/26/00**	**5/20/00, 5/26/00, 7/28/00**	**4/25/00**
	Technique:	**bp**	**bp**	**bp**	**bp**	**bs**	**bs**	**bp**	**bp**	**bp**	**bs**	**bs**	**net**	**bs**
Hybognathus regius	eastern silvery minnow					21	22							
Ictalurus punctatus	channel catfish					2	2						99	
Lepomis auritus	redbreast sunfish					8			4	6	3		1	
Lepomis cyanellus	green sunfish		2								1			17
Lepomis gibbosus	pumpkinseed	42	21		7	5					1	4		285
Lepomis hybrid	hybrid sunfish													2
Lepomis macrochirus	bluegill	3			12						25	13	24	544
Lepomis species	sunfish spp.													
Luxilus cornutus	common shiner								3					
Micropterus dolomieu	smallmouth bass										7		2	10
Micropterus salmoides	largemouth bass	1	5		11	4					3	3	1	48
Morone americana	white perch					5	5						8	
Morone saxatilis	striped bass						1						2	
Notemigonus crysoleucas	golden shiner													9
Notropis hudsonius	spottail shiner						1	1	1					
Notropis procne	swallowtail shiner								26					
Oncorhynchus mykiss	rainbow trout					1								
Pimephales promelas	fathead minnow						1		1					
Pomoxis annularis	white crappie				2							2		

Appendix A-6.4 (continued). Numbers of individuals of fish caught in Pennypack, Tacony and Wissahickon Valley Parks in the 1998-2000 ANSP inventory. Samples were taken by backpack electroshocking (bp) or boat electroshocking (bs). Common and scientific names are consistent with those in Robins, et al. (1991).

	Park:	**Fairmount (E/W) Park**				**Pennypack Creek**					**Misc. Schuylkill River**			
	Station:	**CEL**	**COL**	**HCS**	**JGC**	**PPC**	**PPW**	**PR**	**RL**	**SF**	**AFL**	**BHR**	**FL**	**MC**
	Waterbody:	**Centen-nial Lake**	**Con-course Lake**	**Trib. N of Hort. Center**	**Trib. By Jap. Garden**	**Penny-pack Ck**	**Penny-pack Ck**	**Pauls Run**	**Rock-ledge Ck**	**Sandy Run**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**
Species	**Location:**				**above Garden**	**tidal**	**Created wetland at mouth**			**below Ryan Ave.**	**Above fish ladder**	**Boat House Row**	**Fish Ladder**	**Mana-yunk Canal**
	Common Name													
	Date	**6/13/98**	**6/12/98**	**6/13/98**	**6/12/98**	**5/21/99**	**5/21/99**	**6/1/98**	**6/1/98**	**6/1/98**	**5/26/00**	**5/26/00**	**5/20/00, 5/26/00, 7/28/00**	**4/25/00**
	Technique:	**bp**	**bp**	**bp**	**bp**	**bs**	**bs**	**bp**	**bp**	**bp**	**bs**	**bs**	**net**	**bs**
Pomoxis nigromaculatus	black crappie											3		
Pylodictis olivaris	flathead catfish												10	
Rhinichthys atratulus	blacknose dace			305				112	443					
Rhinichthys cataractae	longnose dace								10					
Salmo trutta	brown trout							1						
Semotilus atromaculatus	creek chub							31	78					
TOTAL FISH		47	30	305	43	86	58	199	636	6	43	36	282	950
Number of species		4	4	1	5	15	12	9	13	1	7	7	16	12

Appendix A-6.4 (continued). Numbers of individuals of fish caught in Pennypack, Tacony and Wissahickon Valley Parks in the 1998-2000 ANSP inventory. Samples were taken by backpack electroshocking (bp) or boat electroshocking (bs). Common and scientific names are consistent with those in Robins, et al. (1991).

	Park:	**Fairmount (E/W) Park**				**Pennypack Creek**					**Misc. Schuylkill River**			
	Station:	**CEL**	**COL**	**HCS**	**JGC**	**PPC**	**PPW**	**PR**	**RL**	**SF**	**AFL**	**BHR**	**FL**	**MC**
	Waterbody:	**Centen-nial Lake**	**Con-course Lake**	**Trib. N of Hort. Center**	**Trib. By Jap. Garden**	**Penny-pack Ck**	**Penny-pack Ck**	**Pauls Run**	**Rock-ledge Ck**	**Sandy Run**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**	**Schuyl. R**
Species	**Location:**				**above Garden**	**tidal**	**Created wetland at mouth**			**below Ryan Ave.**	**Above fish ladder**	**Boat House Row**	**Fish Ladder**	**Mana-yunk Canal**
	Common Name													
	Date	**6/13/98**	**6/12/98**	**6/13/98**	**6/12/98**	**5/21/99**	**5/21/99**	**6/1/98**	**6/1/98**	**6/1/98**	**5/26/00**	**5/26/00**	**5/20/00, 5/26/00, 7/28/00**	**4/25/00**
	Technique:	**bp**	**bp**	**bp**	**bp**	**bs**	**bs**	**bp**	**bp**	**bp**	**bs**	**bs**	**net**	**bs**
	Crayfish species													
Cambarus bartonii	Crayfish													
Orconectes limosus	Crayfish													
Eurycea bislineata	twolined salamander			5										
Eurycea bislineata larvae	twolined salamander							1	1					
Plethodontidae	salamander			2										
Rana catesbiana	bullfrog								1					
Rana clamitans	green frog									2				
Ranidae tadpole	frog tadpole							1						

Appendix A-6.5. The relationship between stream size and fish occurrence and species richness is shown in comparisons of the data from the ANSP 1998-1999 inventory of the Fairmount Park system, and local streams in watersheds ranging from rural to urban.

Park/Area Drainage	Stream	County	Site	Drainage Land Use	Drainage (km^2)	# Native Fish spp.	# Total Fish spp.	Notes
Brandywine	Jock's Reach	Chester	Meadow	suburban/ag	0.2	0	0	
Schuylkill (EW Park)	Roberts Hollow Tributary	Philadelphia		urban/park	0.5	0	0	
Schuylkill (EW Park)	Japanese Garden Tributary	Philadelphia		park	0.6	1	5	Below pond
Schuylkill (EW Park)	Hort Center Tributary	Philadelphia		park	0.7	1	1	
Brandywine	Hannum's Reach	Chester	Woods	ag/forest	0.7	2	2	
Brandywine	Hannum's Reach	Chester	Meadow	ag/forest	0.7	3	3	
Skippack	Eagleville Run	Montgomery	Meadow	urban/suburban	0.8	2	2	
Wissahickon	Carpenters Woods Tributary	Philadelphia		urban/park	0.9	0	0	
Skippack	Eagleville Run	Montgomery	Woods	urban/suburban	1.1	1	1	
Schuylkill (EW Park)	Chamounix	Philadelphia		urban/park	1.1	0	0	
White Clay	West Br White Clay Creek	Chester	Woods	ag/forest	1.3	9	10	
Brandywine	West's Run	Chester	Woods	ag/forest	1.4	2	2	
White Clay	West Br White Clay Creek	Chester	Meadow	ag/forest	1.5	8	8	
Wissahickon	Wise's Mill Run	Philadelphia		park/urban	0.0	0	0	
Brandywine	West's Run Run	Chester	Meadow	ag/forest	1.6	3	5	
White Clay	Morehead's Reach	Chester	Woods	ag/forest	1.6	9	9	
Wissahickon	Gorgas Lane Run	Philadelphia		urban	1.7	0	0	
White Clay	Teter's Reach	Chester	Woods	ag/forest	1.9	6	7	
Pennypack	Rockledge Run	Philadelphia		suburban	2.0	12	13	Near mouth
White Clay	Big Spring	Chester	Woods	ag/forest	2.1	6	7	
White Clay	Morehead's Reach	Philadelphia	Woods	ag/forest	2.2	8	9	
White Clay	Big Spring	Chester	Meadow	ag/forest	2.4	7	8	
White Clay	Teter's Reach	Chester	Meadow	ag/forest	3.0	7	8	
Elk Creek	Grammies Run	Cecil (Md.)	Woods	ag/forest	3.1	9	9	

Appendix A-6.5 (continued). The relationship between stream size and fish occurrence and species richness is shown in comparisons of the data from the ANSP 1998-1999 inventory of the Fairmount Park system, and local streams in watersheds ranging from rural to urban.

Park/Area Drainage	Stream	County	Site	Drainage Land Use	Drainage (km^2)	# Native Fish spp.	# Total Fish spp.	Notes
Skippack	W. Br. Skippack Creek	Montgomery	Meadow	suburban	3.4	7	11	
Perkiomen	Donny Brook	Montgomery	Woods	urban/suburban	3.5	6	8	
Elk Creek	Grammies Run	Cecil (Md.)	Meadow	ag/forest	3.5	10	10	
Skippack	W. Br. Skippack Creek	Montgomery	Woods	suburban	4.0	11	16	
Cobbs	West Branch Indian Creek	Philadelphia		suburban/urban	4.1	3	3	
Brandywine	Sharitz Reach	Chester	Meadow	ag/forest	4.2	9	12	
Brandywine	Sharitz Reach	Chester	Woods	ag/forest	4.5	8	8	
Wissahickon	Cresheim Creek	Philadelphia		urban/park	4.6	3	4	
Pennypack	Paul's Run	Philadelphia		urban/park	5.2	8	9	Near mouth
Pennypack	Sandy Run	Philadelphia		urban	5.3	1	1	Near mouth
Wissahickon	Papermill Run	Philadelphia	Rest	urban/suburban	6.1	5	9	
White Clay	White Clay Creek	Chester	Woods	ag/forest	6.6	8	9	
Brandywine	Birch Run	Chester	Meadow	ag/forest	7.0	10	12	
White Clay	White Clay Creek	Chester	Meadow	ag/forest	7.6	9	11	
Brandywine	Birch Run	Chester	Woods	ag/forest	8.1	10	11	
French Creek	Beaver Run	Chester	Woods	ag/forest	11.6	11	14	
Perkiomen	Trib Perkiomen (Bair)	Berks	Rest	ag/forest	11.8	13	18	
Wissahickon	Wissahickon Creek	Montgomery	Woods	urban/suburban	11.9	10	12	
Cobbs	Naylor's Run	Delaware		suburban/urban	12.1	7	8	Near mouth
Brandywine	Fisher's Reach	Chester	Woods	ag/forest	12.9	10	12	
French Creek	Beaver Run	Chester	Meadow	ag/forest	13.0	13	17	
Pennypack	Wooden Bridge Run	Philadelphia		urban/park	13.4	13	15	Near mouth

Appendix A-6.5 (continued). The relationship between stream size and fish occurrence and species richness is shown in comparisons of the data from the ANSP 1998-1999 inventory of the Fairmount Park system, and local streams in watersheds ranging from rural to urban.

Park/Area Drainage	Stream	County	Site	Drainage Land Use	Drainage (km^2)	# Native Fish spp.	# Total Fish spp.	Notes
Brandywine	Fisher's Reach	Chester	Meadow	ag/forest	13.7	11	12	
Delaware	Queen Anne Creek	Bucks	Woods	suburban	15.3	16	19	
Delaware	Queen Anne Creek	Bucks	Meadow	suburban	15.8	15	18	
Brandywine	Pocopsin Creek	Chester	Meadow	ag/suburban	21.1	17	22	
Brandywine	Pocopsin Creek	Chester	Woods	ag/suburban	21.5	9	10	
Brandywine	Buck Run (Doe Reach	Chester	Meadow	ag/forest	24.2	11	13	
Brandywine	Buck Run(Doe Reach	Chester	Woods	ag/forest	26.4	13	16	
Tacony	Tacony Creek	Philadelphia		suburban/urban	44.2	9	9	
Brandywine	Doe Run (Laurels Reach)	Chester	Woods	ag/forest	45.6	18	24	
Brandywine	Doe Run (Laurels Reach)	Chester	Meadow	ag/forest	56.3	16	21	
Brandywine	Buck and Doe Run	Chester	Meadow	ag/forest	121.1	16	21	
Brandywine	Buck and Doe Run	Chester		ag/forest	123.3	18	23	

Appendix A-7.1. The number of stream locations evaluated, by park, in the NLREEP Benthic Macroinvertebrate Survey. This does not include macroinvertebrate data collected for habitat screening associated with the streamalk phase of the study.

Park	Number of Streams Studied
Cobbs Creek	5
Poquessing Park	1
Tacony Park	1
Fairmount (West) Park	3
Pennypack Park	11
Wissahickon Park	11

Appendix A-7.2. Abundance (no./m^2) of benthic macroinvertebrates collected in quantitative samples from parks in the Fairmount Park system in 1998.

Park	Stream	Abundance
Cobbs	West Branch	134.67
Cobbs	East Branch Indian	160.00
Wissahickon	Cresheim Run	192.00
Wissahickon	Bell's Mill	204.00
Poquessing	Poquessing	218.00
Pennypack	Penney Trib 12/13	233.14
Pennypack	Sandy Run	286.61
Wissahickon	Wises Mill	290.91
Wissahickon	Wissahickon Trib 15	290.91
Pennypack	Slaters Run	304.76
Pennypack	Rock Ledge Run	320.00
Pennypack	Pennypack Cr.	412.00
Pennypack	Wooden Bridge	436.00
Wissahickon	Gorgas Lane	599.27
Wissahickon	Valley Green	684.80
Tacony	Tacony Cr.	711.11
Wissahickon	Carpenters Run	753.78
West Park	West Park Trib 6	800.00
Cobbs	Cobbs Trib-12	832.00
Wissahickon	Wissahickon Trib 7	864.00
Cobbs	Cobbs Trib-3	923.43
Pennypack	Ballard Cr.	923.43
Pennypack	Seddens Run	945.78
Pennypack	Three Springs	1173.33
West Park	West Park Trib 3	1248.00
Wissahickon	Thomas Mill	1305.60
Wissahickon	Wissahickon Trib 9	1333.33
Cobbs	Main Stem Indian Cr.	1408.00
Pennypack	Pauls Run	1600.00
West Park	West Park Trib 5	1904.00
Wissahickon	Monoshone	3029.33
Pennypack	Fox Chase Farm	5504.00
Mean		938.32
Standard Deviation		1039.42
Count		32.00
Confidence		360.13

Appendix A-7.3. Taxa richness of benthic macroinvertebrates collected in quantitative samples from parks in the Fairmount Park system in 1998.

Park	Stream	Taxa
Poquessing	Poquessing	3
Wissahickon	Thomas Mill	5
Cobbs	Cobbs Trib-12	6
Cobbs	Main Stem Indian Cr.	6
Wissahickon	Gorgas Lane	6
West Park	West Park Trib 5	6
Pennypack	Fox Chase Farm	7
Cobbs	East Branch Indian	7
Wissahickon	Monoshone	7
Pennypack	Pennypack Cr.	7
Pennypack	Slaters Run	7
Pennypack	Three Springs	7
West Park	West Park Trib 6	7
Wissahickon	Carpenters Run	8
Wissahickon	Cresheim Run	8
Cobbs	West Branch	8
Pennypack	Rock Ledge Run	8
Tacony	Tacony Cr.	8
Wissahickon	Valley Green	8
Wissahickon	Wises Mill	8
Wissahickon	Wissahickon Trib 15	8
Wissahickon	Wissahickon Trib 9	8
Pennypack	Pauls Run	9
West Park	West Park Trib 3	9
Wissahickon	Wissahickon Trib 7	9
Pennypack	Ballard Cr.	10
Cobbs	Cobbs Trib-3	10
Pennypack	Sandy Run	10
Pennypack	Penney Trib 12/13	12
Pennypack	Seddens Run	12
Wissahickon	Bell's Mill	15
Pennypack	Wooden Bridge	17
Mean		8.31
Standard Deviation		2.73
Count		32
Confidence		0.95

Appendix A-7.4. Diversity of benthic macroinvertebrates collected in quantitative samples from parks in the Fairmount Park system in 1998.

Park	Stream	Diversity
Poquessing	Poquessing	0.416
West Park	West Park Trib 5	0.668
Cobbs	East Branch Indian	0.828
Cobbs	Cobbs Trib-12	0.878
West Park	West Park Trib 6	0.919
Pennypack	Sandy Run	0.938
Pennypack	Fox Chase Farm	1.014
Wissahickon	Wises Mill	1.014
Wissahickon	Thomas Mill	1.016
Wissahickon	Valley Green	1.032
Cobbs	Main Stem Indian Cr.	1.108
Tacony	Tacony Cr.	1.133
Pennypack	Rock Ledge Run	1.188
Wissahickon	Gorgas Lane	1.281
Cobbs	Cobbs Trib-3	1.340
Pennypack	Slaters Run	1.383
Wissahickon	Carpenters Run	1.390
Pennypack	Wooden Bridge	1.391
Wissahickon	Monoshone	1.391
Wissahickon	Wissahickon Trib 7	1.404
West Park	West Park Trib 3	1.437
Cobbs	West Branch	1.501
Pennypack	Penney Trib 12/13	1.568
Pennypack	Pennypack Cr.	1.578
Wissahickon	Wissahickon Trib 9	1.624
Wissahickon	Cresheim Run	1.719
Wissahickon	Wissahickon Trib 15	1.719
Pennypack	Pauls Run	1.726
Wissahickon	Bell's Mill	1.865
Pennypack	Seddens Run	1.903
Pennypack	Ballard Cr.	1.909
Pennypack	Three Springs	2.229
Mean		1.328
Standard Deviation		0.403
Count		32.000
Confidence		0.140

Appendix A-7.5. Evenness of benthic macroinvertebrates collected in quantitative samples from parks in the Fairmount Park system in 1998.

Park	Stream	Evenness
West Park	West Park Trib 5	0.304
Poquessing	Poquessing	0.379
Pennypack	Sandy Run	0.408
Cobbs	East Branch Indian	0.425
Cobbs	Cobbs Trib-12	0.490
West Park	West Park Trib 6	0.513
Pennypack	Fox Chase Farm	0.521
Wissahickon	Wises Mill	0.521
Wissahickon	Valley Green	0.530
Tacony	Tacony Cr.	0.545
Pennypack	Rock Ledge Run	0.571
Cobbs	Cobbs Trib-3	0.582
Cobbs	Main Stem Indian Cr.	0.618
Pennypack	Penney Trib 12/13	0.631
Wissahickon	Thomas Mill	0.631
Wissahickon	Carpenters Run	0.668
Pennypack	Wooden Bridge	0.669
Wissahickon	Wissahickon Trib 7	0.675
Wissahickon	Bell's Mill	0.689
West Park	West Park Trib 3	0.691
Pennypack	Slaters Run	0.711
Wissahickon	Gorgas Lane	0.715
Wissahickon	Monoshone	0.715
Cobbs	West Branch	0.722
Wissahickon	Wissahickon Trib 9	0.739
Pennypack	Seddens Run	0.766
Pennypack	Pauls Run	0.786
Pennypack	Three Springs	0.787
Pennypack	Pennypack Cr.	0.811
Wissahickon	Cresheim Run	0.827
Wissahickon	Wissahickon Trib 15	0.827
Pennypack	Ballard Cr.	0.829
Mean		0.634
Standard Deviation		0.140
Count		32.000
Confidence		0.049

Appendix A-7.6. Ephemeroptera-Plecoptera-Trichoptera (EPT) Index of benthic macroinvertebrates collected in quantitative samples from parks in the Fairmount Park system in 1998.

Park	Stream	EPT
Cobbs	Cobbs Trib-12	0
Pennypack	Sandy Run	0
Pennypack	Fox Chase Farm	1
Wissahickon	Gorgas Lane	1
Pennypack	Penney Trib 12/13	1
Pennypack	Pennypack Cr.	1
Poquessing	Poquessing	1
West Park	West Park Trib 5	1
West Park	West Park Trib 6	1
Wissahickon	Carpenters Run	2
Wissahickon	Cresheim Run	2
Cobbs	Main Stem Indian Cr.	2
Cobbs	East Branch Indian	2
Cobbs	West Branch	2
Wissahickon	Monoshone	2
Pennypack	Pauls Run	2
Pennypack	Slaters Run	2
Tacony	Tacony Cr.	2
Wissahickon	Thomas Mill	2
West Park	West Park Trib 3	2
Wissahickon	Wissahickon Trib 15	2
Pennypack	Ballard Cr.	3
Wissahickon	Bell's Mill	3
Cobbs	Cobbs Trib-3	3
Pennypack	Rock Ledge Run	3
Pennypack	Seddens Run	3
Wissahickon	Valley Green	3
Wissahickon	Wises Mill	3
Wissahickon	Wissahickon Trib 7	3
Pennypack	Wooden Bridge	3
Wissahickon	Wissahickon Trib 9	4
Pennypack	Three Springs	5
Mean		2.09
Standard Deviation		1.09
Count		32
Confidence		0.38

Appendix A-7.7. Proportional Dominance of Chironomidae in quantitative benthic macroinvertebrate samples collected from parks in the Fairmount Park system in 1998.

Park	Stream	Proportional
Wissahickon	Wises Mill	0.01
Wissahickon	Thomas Mill	0.04
Pennypack	Ballard Cr.	0.18
Wissahickon	Carpenters Run	0.19
Wissahickon	Cresheim Run	0.27
West Park	West Park Trib 6	0.30
Pennypack	Pauls Run	0.32
Pennypack	Three Springs	0.33
Pennypack	Seddens Run	0.34
Wissahickon	Wissahickon Trib 15	0.34
Pennypack	Pennypack Cr.	0.35
Pennypack	Penney Trib 12/13	0.35
Wissahickon	Bell's Mill	0.42
Wissahickon	Wissahickon Trib 9	0.42
Pennypack	Wooden Bridge	0.45
Wissahickon	Gorgas Lane	0.47
West Park	West Park Trib 3	0.47
Wissahickon	Wissahickon Trib 7	0.47
Cobbs	Cobbs Trib-3	0.49
Cobbs	West Branch	0.49
Pennypack	Fox Chase Farm	0.57
Pennypack	Slaters Run	0.57
Wissahickon	Monoshone	0.57
Pennypack	Rock Ledge Run	0.63
Tacony	Tacony Cr.	0.63
Cobbs	Main Stem Indian Cr.	0.65
Wissahickon	Valley Green	0.69
Cobbs	Cobbs Trib-12	0.75
Pennypack	Sandy Run	0.78
Cobbs	East Branch Indian	0.80
West Park	West Park Trib 5	0.86
Poquessing	Poquessing	0.87
Mean		0.47
Standard Deviation		0.22
Count		32
Confidence		0.08

Appendix A-7.8. Proportion of non-insect taxa in quantitative benthic macroinvertebrate samples collected from parks in the Fairmount Park system in 1998.

Park	Stream	Proportion of Non-insect
West Park	West Park Trib 3	0.03
Pennypack	Wooden Bridge	0.06
Cobbs	Main Stem Indian Cr.	0.06
Wissahickon	Gorgas Lane	0.07
Cobbs	East Branch Indian	0.07
Pennypack	Rock Ledge Run	0.07
Wissahickon	Wissahickon Trib 9	0.07
Wissahickon	Valley Green	0.07
Wissahickon	Monoshone	0.08
Cobbs	West Branch	0.08
Pennypack	Seddens Run	0.10
West Park	West Park Trib 5	0.10
Poquessing	Poquessing	0.12
Wissahickon	Carpenters Run	0.12
Wissahickon	Cresheim Run	0.13
Wissahickon	Wissahickon Trib 7	0.14
Cobbs	Cobbs Trib-3	0.15
Pennypack	Pennypack Cr.	0.16
Pennypack	Sandy Run	0.17
Cobbs	Cobbs Trib-12	0.25
Tacony	Tacony Cr.	0.25
Pennypack	Ballard Cr.	0.27
Pennypack	Pauls Run	0.27
Pennypack	Slaters Run	0.29
Pennypack	Three Springs	0.29
Wissahickon	Wissahickon Trib 15	0.37
Wissahickon	Bell's Mill	0.40
Pennypack	Fox Chase Farm	0.41
Pennypack	Penney Trib 12/13	0.59
Wissahickon	Wises Mill	0.59
West Park	West Park Trib 6	0.68
Wissahickon	Thomas Mill	0.73
Mean		0.23
Standard Deviation		0.19
Count		32.00
Confidence		0.07

Appendix A-7.9. Hilsenhoff's Biotic Index (HBI) for quantitative benthic macroinvertebrate samples collected from parks in the Fairmount Park system in 1998.

Park	Stream	HBI
Pennypack	Penney Trib 12/13	3.37
Pennypack	Ballard Cr.	4.28
Wissahickon	Cresheim Run	4.38
Pennypack	Wooden Bridge	4.60
Wissahickon	Carpenters Run	4.60
Pennypack	Seddens Run	4.81
Wissahickon	Gorgas Lane	4.88
Pennypack	Three Springs	4.92
Wissahickon	Wissahickon Trib 9	4.95
Cobbs	West Branch	4.99
Pennypack	Pennypack Cr.	5.04
Wissahickon	Monoshone	5.16
Cobbs	Main Stem Indian Cr.	5.16
Cobbs	Cobbs Trib-3	5.18
West Park	West Park Trib 3	5.19
Wissahickon	Wises Mill	5.20
Pennypack	Rock Ledge Run	5.38
Wissahickon	Wissahickon Trib 7	5.40
Wissahickon	Valley Green	5.43
Pennypack	Pauls Run	5.58
Wissahickon	Thomas Mill	5.61
Wissahickon	Bell's Mill	5.63
Cobbs	East Branch Indian	5.64
Wissahickon	Wissahickon Trib 15	5.72
Cobbs	Cobbs Trib-12	5.89
West Park	West Park Trib 5	5.92
West Park	West Park Trib 6	5.96
Pennypack	Fox Chase Farm	6.00
Pennypack	Sandy Run	6.07
Tacony	Tacony Cr.	6.16
Pennypack	Slaters Run	6.19
Poquessing	Poquessing	6.21
Mean		5.30
Standard Deviation		0.64
Count		32.00
Confidence		0.22

Appendix A-7.10. Contribution of collector-gatherers in quantitative benthic macroinvertebrate samples collected from parks in the Fairmount Park system in 1998.

Park	Stream	Collector-Gatherers
Wissahickon	Gorgas Lane	0.53
Pennypack	Ballard Cr.	0.55
Pennypack	Pennypack Cr.	0.59
West Park	West Park Trib 3	0.60
Pennypack	Three Springs	0.64
Pennypack	Seddens Run	0.65
Wissahickon	Wissahickon Trib 9	0.66
Pennypack	Wooden Bridge	0.72
Wissahickon	Wissahickon Trib 15	0.78
Pennypack	Pauls Run	0.80
Wissahickon	Valley Green	0.83
Cobbs	West Branch	0.84
Wissahickon	Bell's Mill	0.85
Pennypack	Slaters Run	0.86
Wissahickon	Wissahickon Trib 7	0.86
Wissahickon	Cresheim Run	0.86
Wissahickon	Monoshone	0.88
Wissahickon	Carpenters Run	0.89
Pennypack	Rock Ledge Run	0.89
Pennypack	Penny Trib 12/13	0.89
Cobbs	East Branch Indian	0.90
Cobbs	Cobbs Trib-12	0.91
Tacony	Tacony Cr.	0.93
Cobbs	Main Stem Indian Cr.	0.94
Pennypack	Sandy Run	0.95
West Park	West Park Trib 5	0.96
Wissahickon	Wises Mill	0.96
Cobbs	Cobbs Trib-3	0.97
Pennypack	Fox Chase Farm	0.98
West Park	West Park Trib 6	0.98
Wissahickon	Thomas Mill	0.98
Poquessing	Poquessing	0.99
Mean		0.83
Standard Deviation		0.14
Count		32.00
Confidence		0.05

Appendix A-7.11. Contribution of collector-filterers in quantitative benthic macroinvertebrate samples collected from parks in the Fairmount Park system in 1998.

Park	Stream	Collector-Filterers
Wissahickon	Gorgas Lane	0.47
Pennypack	Ballard Cr.	0.43
Pennypack	Pennypack Cr.	0.30
West Park	West Park Trib 3	0.12
Pennypack	Three Springs	0.16
Pennypack	Seddens Run	0.30
Wissahickon	Wissahickon Trib 9	0.30
Pennypack	Wooden Bridge	0.28
Wissahickon	Wissahickon Trib 15	0.21
Pennypack	Pauls Run	0.13
Wissahickon	Valley Green	0.17
Cobbs	West Branch	0.13
Wissahickon	Bell's Mill	0.07
Pennypack	Slaters Run	0.05
Wissahickon	Wissahickon Trib 7	0.14
Wissahickon	Cresheim Run	0.13
Wissahickon	Monoshone	0.12
Wissahickon	Carpenters Run	0.10
Pennypack	Rock Ledge Run	0.07
Pennypack	Penney Trib 12/13	0.02
Cobbs	East Branch Indian	0.09
Cobbs	Cobbs Trib-12	0.00
Tacony	Tacony Cr.	0.06
Cobbs	Main Stem Indian Cr.	0.06
Pennypack	Sandy Run	0.01
West Park	West Park Trib 5	0.02
Wissahickon	Wises Mill	0.04
Cobbs	Cobbs Trib-3	0.02
Pennypack	Fox Chase Farm	0.01
West Park	West Park Trib 6	0.00
Wissahickon	Thomas Mill	0.02
Poquessing	Poquessing	0.01
Mean		0.13
Standard Deviation		0.12
Count		32.00
Confidence		0.04

Appendix A-8.1. Status of species of mammals in Philadelphia, as cited in Rhoads (1903), and occurrence in city after 1942, based on records of Ulmer and others (V=verbal report). Cetaceans not included.

Scientific Name	Common Name	Rhoads	Rhoads Notes (Unless Otherwise Referenced)	After 1942
Blarina brevicauda	Northern short-tailed shrew	Y	Most common mammal	Y
Canis lupus	Timber wolf	Y	Extirpated; once common and uniformly dist over state	
Castor canadensis	Beaver	Y	Probably extirpated or nearly so by 1700	Y
Cervus elaphus	Elk	Y	Originally casual in city in winter; mid 18th Century record from Kalm	
Condylura cristata	Star-nosed mole	Y	More sparingly in lowlands	Y
Cryptotis parva	Least shrew	Y		
Eptesicus fuscus	Big brown bat	Y	Universal distribution	Y
Felis concolor	Cougar	Y	Extirpated; originally present throughout state, less common in east	
Glaucomys volans	Southern flying squirrel	Y	Of uniform abundance	V
Lasionycteris noctivagans	Silver-haired bat	Y	Numerous all parts; more common Phila than Camden	Y
Lasiurus borealis	Red bat	Y	Everywhere abundant and apparently resident	Y
Lasiurus cinereus	Hoary bat	Y		Y
Lutra canadensis	River otter	Y		Y
Lynx rufus	Bobcat	Y	Originally present in area; extirpated	
Marmota monax	Woodchuck	Y	More or less abundant	Y
Mephitis mephitis	Striped skunk	Y	Mostly abundant and generally uniform dist	Y
Microtus pennsylvanicus	Meadow vole	Y	Cosmopolitan in all open situations	Y
Microtus pinetorum	Woodland vole	Y	Regionally abundant; records from Philadelphia	
Mus musculus	House mouse	Y	Widespread	Y
Mustela frenata	Long-tailed weasel	Y	More or less numerous	Y
Mustela vison	Mink	Y	Abundant to sparingly distributed in region	Y
Myotis lucifugus	Brown myotis	Y		Y
Odocoileus virginianus	White-tailed deer	Y	Originally abundant; extirpated by 1903	Y
Ondatra zibethicus	Muskrat	Y	Omnipresent	Y
Peromyscus leucopus	White-footed mouse	Y	Uuniversal abundance	Y

Appendix A-8.1 (continued). Status of species of mammals in Philadelphia, as cited in Rhoads (1903), and occurrence in city after 1942, based on records of Ulmer and others (V=verbal report). Cetaceans not included.

Scientific Name	Common Name	Rhoads	Rhoads Notes (Unless Otherwise Referenced)	After 1942
Phoca groenlandica	Harp seal	Y	Delaware River records above Philadelphia	
Phoca vitulina	Harbor seal	Y	Delaware River records above Philadelphia	
Pipistrellus subflavus	Eastern pipistrelle	Y	Abundant in lowlands	Y
Procyon lotor	Raccoon	Y	Uniformly numerous	Y
Rattus norvegicus	Norway rat	Y		Y
Scalopus aquaticus	Eastern mole	Y	Widely distributed in Pennsylvania	Y
Sciurus carolinensis	Gray squirrel	Y	Abundant	Y
Sciurus niger	Fox squirrel	Y	Rare in 1903; abundant in mid-19th Century	
Sorex cinereus	Masked shrew	Y		Y
Sylvilagus floridanus	Cottontail rabbit	Y	Abundant	Y
Tamias striatus	Chipmunk	Y	Abundant	Y
Tamiascurus hudsonicus	Red squirrel	Y	Abounding everywhere where forest, groves...	Y
Urocyon cineroargenteus	Gray fox	Y	Scattered distribution in region; Philadelphia distribution unknown	Y
Ursus americanus	Black bear	Y	Originally uniformly abudant in region	
Vulpes vulpes	Red fox	Y	Introduced from Europe; present in 1903	Y
Zapus hudsonius	Meadow jumping mouse	Y	Abundant; numerous specimens from southeastern Pennsylvania	Y

Appendix A-8.1 (continued). Status of species of mammals in Philadelphia, as cited in Rhoads (1903), and occurrence in city after 1942, based on records of Ulmer and others (V=verbal report). Cetaceans not included.

Scientific Name	Common Name	Rhoads	Rhoads Notes (Unless Otherwise Referenced)	After 1942
Species in range by Merritt (1987), but not recorded from the city				
Sorex fontinalis	Maryland shrew			
Sorex fumeus	Smoky shrew			
Myotis keenii	Keen's myotis			
Myotis leibii	Small-footed myotis			
Nycticeius humeralis+A65	Evening bat			
Sylvilagus transitionalis	New England cottontail			
Oryzomys palustris	Marsh rice rat			
Clethrionomys gapperi	Southern red-backed vole			
Synaptomys cooperi	Southern bog lemming			
Mustela erminea	Ermine			

Appendix A-8.2. Number of records of mammals in Philadelphia in notes of Fred Ulmer and others. Locations are: in or near Cobbs Creek Park (CCP), near Delaware River (Del), in or near Fairmount (East and West) Park (EWP), in or near FDR Park (FDR), general Philadelphia references (Phl), in or near Pennypack Creek Park (PP), in or near Poquessing Park (Pq), near the Schuylkill River (Sch), in Southwest Philadelphia (SW), in or near Tacony Creek Park (TC), and in or near Wissahickon Creek Park (W).

Scientific Name	Common Name	CCP	Del	EWP	FDR	Phl	PP	Pq	Sch	SW	TC	W	Total
Didelphus virginiana	Opossum	10	1	61	1	6	11		11	1	15	59	176
Scalopus aquaticus	Eastern mole	2		3			1	1	1			10	18
Condylura cristata	Star-nosed mole											2	2
Blarina brevicauda	Northern short-tailed shrew	1		1			1					14	17
Sorex cinereus	Masked shrew								1				1
Eptesicus fuscus	Big brown bat	10		25	1	8	6		6		3	14	73
Myotis lucifugus	Brown myotis			1									1
Lasiurus borealis	Red bat	1		2	4	4						4	15
Lasiurus cinereus	Hoary bat			1		1							2
Lasionycteris noctivagans	Silver-haired bat	1		2	1	6			2		2	1	15
Pipistrellus subflavus	Eastern pipistrelle			1								2	3
Procyon lotor	Raccoon	10		20	2	11	3		4		8	89	147
Mephitis mephitis	Striped skunk	2		6		1	9	1	3		1	31	54
Lutra canadensis	River otter								1			1	2
Mustela vison	Mink		1			1						1	3
Mustela frenata	Long-tailed weasel	1					1			2		4	8
Urocyon cineroargenteus	Gray fox	2		7		4			3	1	2	16	35
Vulpes vulpes	Red fox	1		2	1	2			3		2	1	12
Castor canadensis	Beaver		1	1									2
Marmota monax	Woodchuck			6		2	14	1	1	1	1	71	97
Ondatra zibethicus	Muskrat	2		52		4	1		6	2		21	88
Microtus pennsylvanicus	Meadow vole			10	1							9	20
Peromyscus leucopus	White-footed mouse											18	18

Appendix A-8.2 (continued).Number of records of mammals in Philadelphia in notes of Fred Ulmer and others. Locations are: in or near Cobbs Creek Park (CCP), near Delaware River (Del), in or near Fairmount (East and West) Park (EWP), in or near FDR Park (FDR), general Philadelphia references (Phl), in or near Pennypack Creek Park (PP), in or near Poquessing Park (Pq), near the Schuylkill River (Sch), in Southwest Philadelphia (SW), in or near Tacony Creek Park (TC), and in or near Wissahickon Creek Park (W).

Scientific Name	Common Name	CCP	Del	EWP	FDR	Phl	PP	Pq	Sch	SW	TC	W	Total
Zapus hudsonius	Meadow jumping mouse	1		2	1	2	1		2	2	2	5	18
Sciurus carolinensis	Gray squirrel	2		4	2	4			4		4		20
Tamiascurus hudsonicus	Red squirrel											15	15
Tamias striatus	Chipmunk	1		8					1		3	40	53
Rattus norvegicus	Norway rat	1		17						3	2	38	61
Sylvilagus floridanus	Cottontail rabbit	6		77	2	4	4		5		8	66	172
Odocoileus virginianus	White-tailed deer			8			5		3		3	37	56
Not all gray squirrel records compiled													

APPENDIX B

Stream/Stormwater Assessment

Fairmount Park System

Natural Lands Restoration

Master Plan

Appendix B-1

Screening-level Stream Assessment Methodology

Measurements:

Geomorphic Features

Channel Dimensions

Physical Habitat Features

Habitat Function

Riparian Zone Features

Other Various Observations (structures, sewage, trash, etc.)

Brief Description:

The ANSP walked all the streams in the Fairmount Park system as a screening-level assessment of their condition. The streamwalk took place during a 6-week period in the late winter of 1998. This time of year was chosen since it is the best season to collect macroinvertebrates and the absence of foliage was advantageous for using the Global Positioning System (GPS). The assessment was conducted on only the smaller tributary streams in the parks and on the Tacony Creek as this stream has no tributaries in the park. From the 1:24,000 USGS topographical maps, it was estimated that there were 56 miles of stream throughout the park system. However, the USGS maps do not include many of the smaller streams, and the streamwalk revealed many more miles of streams. Due to the shear length of streams, it was decided to sample the streams in segments, or reaches, using a reach length that varies with the width of the stream. Further, only every 5th reach along a stream was characterized. In cases where there were significant changes in the geomorphology of the stream between sampled reaches, additional samples were recorded. Reaches were characterized by their in-stream habitat, geomorphology, and riparian zone. The in-stream habitat parameters and the riparian zone classifications were modeled after the habitat assessment parameters contained in the Rapid Bioassessment Protocol for Use in Streams and Rivers (Barbour et al. 1997). The geomorphic classifications were based on the channel-reach morphology characteristics as described by Montgomery and Buffington (1997). In addition to performing an assessment of every fifth stream reach, the team sampled reaches when a significant change in geomorphology was noticed. As the stream team walked from one sampled reach to the next, they noted if the unsampled reaches were similar to the previous sampled reach and recorded some information on these unsampled reaches. The GPS recorded the exact location of every end of each reach segment.

Step-by-Step Procedures:

- The assessment starts at the downstream end of a tributary. A start location is chosen slightly upstream of the confluence of the tributary and the mainstem stream. An average bed width is measured to determine the reach length, which is 20 times the width. This reach length was subject to change on any one stream if the stream became significantly wider or narrower.
- A GPS reading is taken at the downstream end of the reach. A GPS reading was taken at each reach, regardless of whether it was a sampled or unsampled reach.

- At least one photograph was taken at each reach. Generally, the photo was shot looking upstream from the bottom end of the reach.
- The reach length was paced off by a calibrated walker, and the upstream endpoint was determined.
- All observations and selected descriptions were based on the average conditions of the entire reach. The biologist and the geomorphologist on the team both completed datasheets (Figs. B-1.1 and B-1.2) based on these average, reach-wide conditions.
- The information on the datasheets was transferred to an Access database, which enabled the formulation of the stream health indices.

Figure B-1.1. Data sheet for habitat observations and selected descriptions based on the average conditions of the entire reach.

Streamwalk Field Notes

Trib name: _____ Date: _____ Picture #: _____

Park name: _____ ID: _____ Time: _____ GPS file: _____

Physical Habitat

Embeddedness:	0-25%	25-50%	50-75%	75-100%				
Channel flow status:	100%	75-100%	25-75%	very little water				
Riffles:	none	slow	runs only	fast	complex	other		
Riffle quality:	optimal	suboptimal	marginal	poor				
Physical structures (fish):	complex	moderate	poor	none	complex manmade		other	
Bank stability:	optimal	suboptimal	marginal	poor				
Coarse woody debris								
amount:	none	some/few	moderate	abundant				
habitat/processing:	green	no bugs	no bugs/silt	chiros	EPT	hydropsychids	many	other
Coarse particulate organic material								
amount:	none	few	moderate	abundant				
processing:	no break	some break	moderate	high pro				
habitat:	no bugs (sand)	chiros	preds	tipulids	EPT	many	other	
Cobble-habitat:	no bugs	chiros	EPT	hydropsychids	many	other		
Diatoms and green algae:	none	patchy	uniform	some filament.	filament.	choke		
Blue green algae:	none	patchy	moderate	complete	choke			
Macrophytes:	yes	no	too deep					
Dominant riffle substrata:	boulders	cobbles	pebbles	gravel	snags	other	none	
Largest riffle substrata:	boulders	cobbles	pebbles	gravel	snags	other	none	
Portion of riffle dominated by sand/gravel:			75-100%	50-75%	25-50%	0-25%		

Notes:

Figure B-1.2. Data sheet for geomorphological observations and selected descriptions based on the average conditions of the entire reach.

Trib name: _____ Date: _____ Picture #: _____

Park name: _____ ID: _____ Time: _____ GPS file: _____

Geomorphology

Bed sediment

Size: sand (<2mm) Bedrock in channel: Y/N

cobble (>64mm) Areal exposure of fines: _____% sand/mud in bed

boulder (>256mm)

Bed morphology: cascade; step/pool; plane bed (cobble, boulder); pool/riffle; plane bed (sand)

Bed sediment storage features: alternate bars; mid-channel bars; point bars; none

Channel planform: meanders; sinuous/straight; braided; anastomosed

Floodplain classification: active; inactive(incised); anthropogenic(fill); unsure; none (colluvial/bedrock)

Width of bed: _____ Width at top of banks: _____ Height to top of banks: _____

Riparian Zone

Bank vegetation:

optimal	>90%, native, diverse
suboptimal	70-90%, native, one class of plants missing
marginal	50-70%, disrupted
poor	<50%, disrupted

Streamside vegetation type: conifer; deciduous; small trees/shrubs; grasses

Width of riparian vegetation:

	LB	RB
>18m (60ft)		
12-18m (40-60ft)		
6-12m (20-40ft)		
<6m (20ft)		

Exotics present: _____

Disturbance level:

optimal	no human impacts
suboptimal	minimal impacts
marginal	large impacts
poor	little-no riparian vegetation due to human impact

Observed: sewage lines; debris dams; trash; stormwater discharge; CSOs; sewage leakage; structures (dams, bridges, trails, buildings)

Notes:

Appendix B-2

Detailed-level Stream Assessment Methodology

Measurements:

Channel geomorphology

- Dimension
  - width
  - depth
  - cross-sectional area
- Pattern
  - sinuosity
  - meander wavelength
  - belt width
- Profile
  - slope/gradient
  - pool/riffle structure
- Substrate
  - particle size distribution

Brief Description:

A total of 20 sites was sampled throughout the Fairmount Park system. The number of sites per park was determined based on the total stream length of each park. The distribution was as follows: Pennypack, 5; Wissahickon, 5; Cobbs Creek, 4; Fairmount East-West, 2; Poquessing, 2; Tacony, 2. Reach lengths and locations were determined on site and were sized to include 5 sediment storage features, or sized to 20 times the bed width, if storage features were not present. The reach lengths were typically 100- to 200-m long. Once the top and bottom points were chosen, the reach was flagged for a longitudinal profile and the cross sections. The longitudinal profile and the cross sections were surveyed using a laser level. For the longitudinal profile, water surface and thalweg (the portion of channel with majority of flow - often the deepest part of channel) elevations were recorded at feature locations such as top of pool (TP), deep point of pool (DPP), and top of riffle (TR) along the entire reach. Occasionally, intermediate riffle and pool points were surveyed, if the distance between features was much greater than 10 m. Typically, five cross sections were surveyed within the study reach. Cross sections were equally spaced along the length of the reach. Each cross section was surveyed in 1-ft increments starting from the flood plain or valley slope on the left bank (looking downstream) and continuing over the stream bank and into the opposite flood plain/valley slope. Important aspects of the cross section were noted and surveyed such as water surfaces/edges, thalweg, edges of bed and vegetation, bank full, and top of banks. One cross section per site was chosen as a permanent site and rebar markers were installed. The Trimble ProXR Global Positioning unit (GPS) was used to get an accurate location on the rebar markers on both ends of the permanent cross section. GPS locations were also collected for the top and bottom of each reach. To further document the permanent cross section and the reach, four pictures were taken and detailed drawings were made. Finally, samples of the stream substrate particle size distribution were taken.

Step-by-Step Procedures:

1. A study reach is chosen by the field team. This section of the stream should include five storage features (alternate bars, points bars) or five pool/riffle sequences. If the stream does not have these characteristics, the length should be 20 times the bed width. The selected reach should be representative of the stream and any section with debris dams, structures, or other oddities should be avoided. The reach should start and end at the same type of feature (i.e., TR).
2. A tape is run from the top of the reach to the bottom of the reach following the thalweg to determine the total length. The interval for the cross sections can then be decided.
3. Beginning at the top the of reach (upstream end), the team starts by flagging the longitudinal features (TP, DPP, and TR) and the cross section locations. While flagging, the two-person team is also recording the longitudinal distance (along the thalweg) of each flag from the top of the reach. It helps to have two different color flags for the features and the cross sections. This requires two people, a fiberglass measuring tape, and flags.
4. Beginning at the top of the reach, the laser level is set up. At each flagged point, beginning at 0 m or the top of the reach, two elevations are measured using the laser level and a rod with a receiving eye: thalweg elevation and water surface elevation. Two people are needed for surveying, one with the telescoping rod and one person filling in the data forms.

   Note: It is important that the person taking notes records a description for each point in the longitudinal profile. For instance, each sample point will either be a special feature such as top of riffle, top of pool, or deep point in pool or an intermediate riffle or pool point in some cases.
5. Next, the team proceeds to the next sample point and again measures two elevations. This process continues down the reach until the team gets to a cross section (XS).
6. At each XS point a detailed cross-section must be surveyed.

   Detailed cross-sections methods:

   a. Place orange steel pins perpendicular to the stream on opposite banks of the channel, approximately level. The pins should be placed far enough past the bank tops to include a portion of the flood plain (10 ft past the top of bank is a good rule of thumb). Attach the measuring tape (30 m steel line or fiberglass tape) to opposite pins, taught, with the zero point at the location of the left pin (on left bank, looking downstream).
   b. Beginning at the left pin (0-ft marker) measure elevations at 1-ft intervals. In addition, elevations and horizontal distances should be recorded for special features such as left and right top of bank, bankfull, left and right edge of bed and vegetation, left and right water surface, thalweg, and any other significant features (i.e., islands, protruding rocks, etc.). For bankfull elevation, it is better to select one of the banks that has the best indicator and identify it as BF on the data sheet. On the opposite bank, the horizontal distance of the other bank full can be found using the known bankfull elevation. Left and right top of bank (LTOB, RTOB), left and right water surface (LWS, RWS) should be done independently.
   c. At the permanent cross section, monument the end points of the cross section using two 2-ft rebar. These rebar should be:

      - placed on opposite streambanks, perpendicular to the direction of stream flow
      - driven into the ground with approximately 4-6 inches exposed (depending on location)
      - placed beyond the tops of the banks and outside the active stream channel

- placed at similar elevations

- identified as left rebar and right rebar on the cross section data sheet, with an exact horizontal distance (e.g., 11 ft 2 in)

- tied with flagging tape and any nearby landmark can also be tied with flagging tape

7. While the 2-3 person team is surveying, one person is the designated artist.

   a. Drawings. Detailed drawings are made of the reach with a plan view and with two cross sections sketches. The plan view shows the shape of the channel, the locations of the cross sections and surveyed features, vegetation, woody debris, eroded banks, etc. The cross sections (the permanent and one other) are drawn as side views looking downstream. For the permanent cross section drawing, it is necessary to note the rebar markers and their distances to certain landmarks. The cross section drawings also have annotated pictures of the floodplain, bed material, vegetation, etc.

   b. Photos. Four photographs are taken of the permanent XS in the following order and the picture numbers are noted on the plan view drawing:

   - picture from left bank across the XS, standing over the left rebar
   - picture upstream, standing at center of stream within the XS
   - picture downstream, standing at center of stream within the XS
   - picture from right bank across the XS, standing over the right rebar

8. Pebble count. The team sampled the bed material of each reach by collecting 200 samples (sediment larger than sand) along the entire length of the reach. The sample size was determined based on the estimated percentage of sand in the channel. Therefore, the total number of samples collected was 200/(1 - % sand). The interval for the sample collection was simply the reach length divided by the total number of samples. In most cases, the reaches were sampled along a line parallel to the banks and in the center of the channel (Fig. B-2.1). At each interval, a grain is picked from the end of the sampler's toe without looking at it. If the grain is less than 2 mm, it is recorded as sand. For those sediments greater than 2 mm, sizes are determined using the gravelometer.

9. GPS. The exact locations of the top of the reach and the bottom of the reach were found using the GPS. The Trimble ProXR GPS unit was used and the location was recorded in the thalweg of these two points. The tops of the rebar markers on the permanent cross sections were also points logged by the GPS.

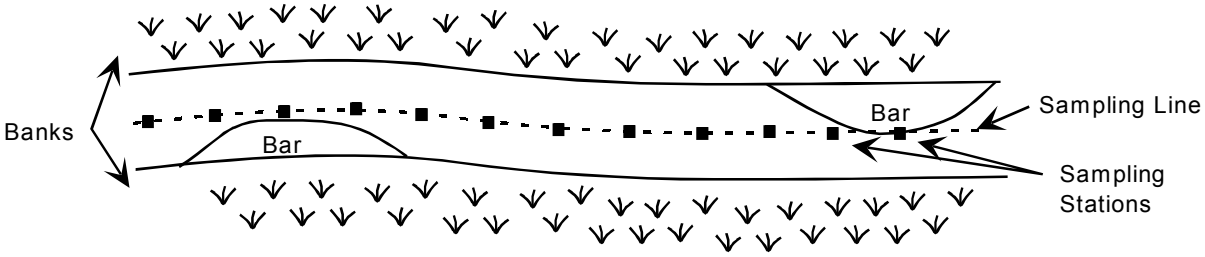

Figure B-2.1. Schematic of the location of sampling stations for the detailed stream assessment.

Appendix B-3

PCRUDS[1]: An Index of Urbanization-Related Stream Channel Degradation Based on Classification Data From Urbanized and Agricultural Watersheds

Brief Summary:

A cumulative index, PCRUDS, is developed by combining and weighting classification observations of bed morphology, planform, bar type, flood plain morphology, and dimensionless channel cross-sectional area. These parameters were collected for all Fairmount streams during the screening-level assessment. PCRUDS is scaled so values range from 0 to 1, with 0 reflecting large urbanization effects, and 1 reflecting no urbanization effects. PCRUDS is positively correlated with the percentage of impervious surfaces in a watershed. PCRUDS was derived from the observations collected at the detailed sites in the Fairmount Park system and the reference sites in Chester County. The raw differences in the frequency distributions of classification data for these two sets of sites can be seen in Figure B-3.1. For example, 60% of the reference sites had active flood plains, but only 20% of the detailed sites in the Fairmount Park system had active flood plains. Therefore, the difference shown in the Figure B-3.1 is 40% (or 60% - 20%). After testing the significance of these differences, we were able to construct the PCRUDS index.

Elements of PCRUDS:

The five classification elements used to calculate PCRUDS are bed morphology, planform morphology, bed material storage features, flood plain, and a dimensionless channel size. Comparisons made between the screening-level (classification) data and the detailed-level (surveyed or measured) verified that trends indicated by the classification measures are actually reflected in the measured data. The index is computed according to the following scheme. First, numerical values are assigned to the categories (see Tables B-3.1 and B-3.2 below). The dimensionless measure of channel size is obtained by dividing the estimated channel area by the drainage basin area. Next, the numerical values are summed and normalized to a value of 1 by dividing by the maximum value of 4.5. The urbanization index, here denoted as the PCRUDS index (short for the Patrick Center Regional Urbanization Delimiter for Streams), has values that range from 0 (100% probability of urbanization influence) to 1 (no probability of urbanization-related "degradation").

[1] PCRUDS: **P**atrick **C**enter **R**egional **U**rbanization **D**elimiter for **S**treams

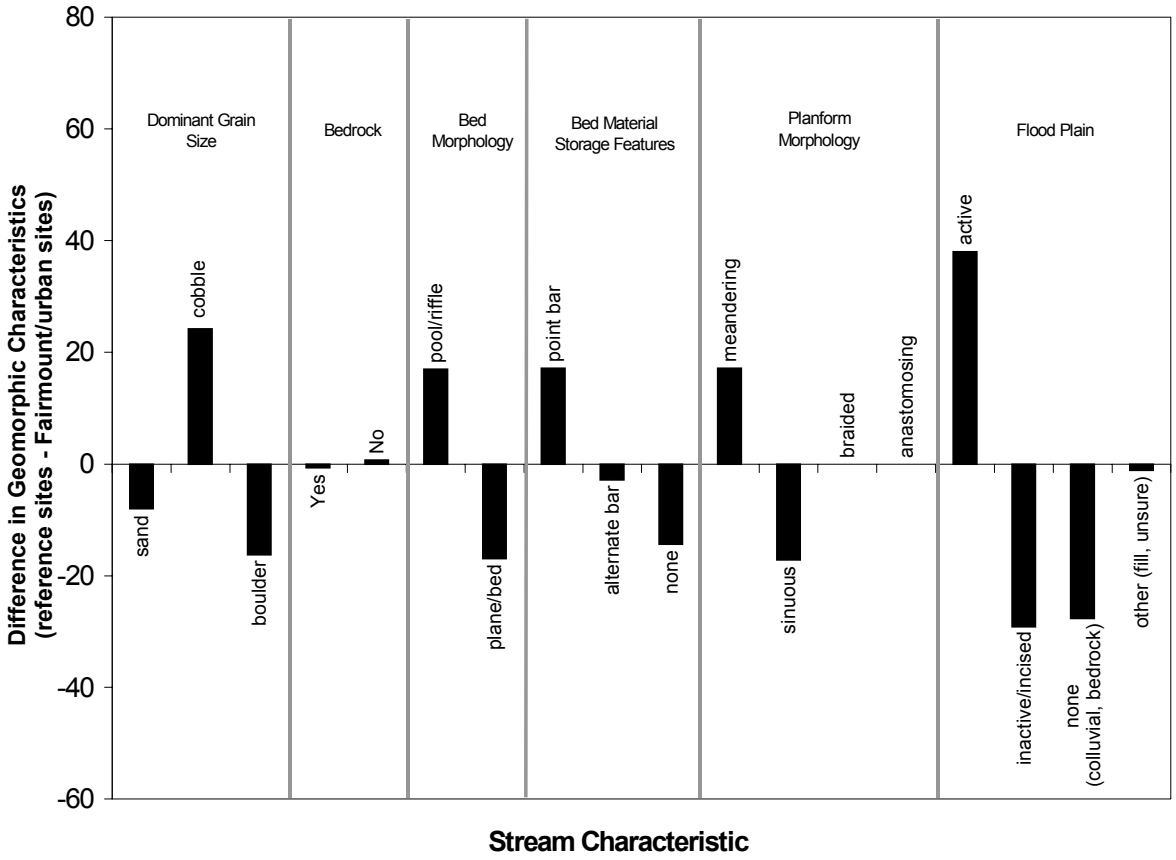

Figure B-3.1. Raw differences in the frequency distributions of classification data for observations collected at the detailed sites in the Fairmount Park system and the reference sites in Chester County.

Table B-3.1. Numerical values assigned to different categories in computing the PCRUDS index.

Classification	Category	Numerical Value
Bed morphology	Pool/riffle	1
	Plane/bed	0
Planform morphology	Meandering	0.5
	Sinuous/Straight	0.0
Bed Material Storage Features	Point Bars	1
	Alternate Bars	1
	None	0
Flood plain	Active	1
	Inactive/incised	0.5
	Anthropogenic/fill	0
	None	1

Table B-3.2. Numerical values and frequencies for different ranges of the dimensionless bankfull channel area.

Range of Channel Area (m^2)/Drainage Area (mi^2)	Numerical Value	# of Reference Sites in Class	# Fairmount Park Sites in Class
0-5	1	14	2
5-10	0.8	1	6
10-20	0.5	1	5
20-50	0.3	0	5
50-100	0.1	0	2
> 100	0	0	2

Appendix B-4

Habitat Evaluation from Screening-Level Assessment

Brief Summary:

The team approached the task of habitat assessment from two perspectives. Specifically, the physical condition of the habitat, and the "condition"or "health" of benthic communities were evaluated. For habitat assessment, a modified version of the Environmental Protection Agency's (EPA) Rapid Bioassessment Protocols (RBP) for Habitat Assessment (Barbour et al. 1997) was used. The key difference in the method is that Barbour et al. (1997) proposes the use of four condition categories, each with 5 subcategories, allowing scores from 1-20 for each habitat characteristic measured. The score for each characteristic is added together to provide an overall score that ranks the streams habitat. To expedite the assessment only the four broad categories were used. However, a few categories were added to fit purposes of this study. For example, one characteristic described was "physical structures." For this characteristic, "Complex" is considered the optimal condition. However a category "Complex, Manmade" was added to the "physical structure" rating criteria and was given a rank. The rationale is that although fish might find the cover provided by shopping carts as suitable as the cover provided by a tree's roots, human debris represents a degradation of the stream. Thus the "Complex, Manmade"was given a score intermediate to "optimal" and "sub-optimal". To accommodate such additional categories, the four original classifications were ranked evenly between zero and 6 (0, 2, 4, 6). The sum of the scores was used to rank and describe the physical condition of stream habitat. For a summary of the specific criteria used refer to Tables B-4.1 and B-4.2.

The general "condition" or "health" of benthic communities was assessed as a coarse measure of ecosystem function. The rationale for this measure is that if the habitat appears near-optimal, but the function appears severely degraded, there may be other influences impairing the development of a "healthy" biota. This is important information from a restoration point of view, because habitat restoration may not improve the function of streams with very poor water quality. Basically, the characteristics measured are descriptions of the colonization of various micro-habitats. The biota attached to rocks, logs, and leaf packs were examined. Additionally, the amount and condition of leaf material were estimated. The relative dominance of filamentous, and blue green algae were also used as indicators of stream function. These are important measures because small streams typically have low algal biomass and high levels of leaf litter biomass. Like physical habitat, habitat function characteristics were ranked evenly between zero and six with higher scores indicative of healthier communities. However, it is important to note that these surveys were very rapid and are not equivalent of a detailed assessment of ecosystem function.

Scoring Methodology:

Both "physical habitat" (Table B-4.1) and "habitat function" (Table B-4.2) assessments described eight characteristics. The scores for each characteristic were summed to provide ranking criteria. Typically, the scores of such an assessment would be contrasted against the scores of a "typical" reference stream. However, since all our streams are within the city of Philadelphia, a suitable reference is not available. Thus, the streams were arbitrarily ranked into four equally-sized rating categories: severely-impaired, impaired, moderately impaired, and slightly /non-impaired. Thus, very low scores represent degraded systems which probably suffer both habitat and water quality degradation. Sites suitable for restoration should be in the top three rating categories.

Table B-4.1. Physical Habitat Scoring.

	SCORE						
Physical Habitat Criteria	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Embeddedness	75-100%		50-75%		25-50%		0-25%
Channel Flow Status	very little water		25-75%		75-100%		100%
Riffles	none	other	runs only	slow		fast	complex
Riffle Quality	none	poor	marginal		suboptimal		optimal
Physical Structures (fish)	none/other	poor		moderate		complex manmade	complex
Bank Stability	poor		marginal		suboptimal		optimal
Dominant Riffle Substrata	none	gravel/ other/ snags		pebble		boulder	cobble
Portion of riffle dominated by sand/gravel	75-100%		50-75%		25-50%		0-25%

Table B-4.2. Functional Habitat Scoring.

	Scores of Criteria						
Habitat Function Criteria	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Coarse Woody Debris [Amount]	None	some/few		moderate			abundant
Coarse Woody Debris [Habitat]	green	chironomids		hydropsychids		EPT	many
	no bugs	other					
	no						
Course Particulate Organic Material [Amount]	none		few		moderate		abundant
Course Particulate Organic Material [Processing]	no break	some break		moderate			high processing
Course Particulate Organic Material [Habitat]	no bugs	chironomids	other	tipulids	predators	EPT	many
Cobble - habitat	no bugs	chironomids	other	hydropsychids		EPT	many
Primary production - green algae	choke	filamentous	some filamentous				none patchy
Primary prodution - diatoms	none			uniform			patchy

Additional Notes: If moss was present, the total habitat function score was increased by 1. If blue green algae were present and "patchy" the total habitat function score was decreased by 2, if "moderate" the score was decreased by 3, if "complete" the score was decreased by 5, and if "choke" the score was decreased by 7.

Appendix B-5

COMPARING GRAVEL-BED RIVERS IN PAIRED URBAN AND RURAL CATCHMENTS OF SOUTHEASTERN PENNSYLVANIA

Comparing gravel-bed rivers in paired urban and rural catchments of southeastern Pennsylvania

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ABSTRACT

Surveys in eight paired urban and rural watersheds illustrate how urbanization changes fluvial morphology and processes. Our data also provide quantitative criteria for evaluating stream-restoration projects in urban areas. Bankfull depth, reach-averaged bed slope, and median grain size are similar in urban and rural watersheds. The median width of urban channels is 26% larger than the median width of rural channels. The median sinuosity is 8% lower in urban channels and pools are 31% shallower. The median composite Manning's *n* based on median grain diameter, pool depth, and channel sinuosity is 10% lower in urban streams, while the median bankfull discharge per unit drainage basin area is 131% higher in urban channels. Histograms of bed sediment-size distributions in urban channels lack a secondary mode in the size range 2–64 mm characteristic of rural channels, indicating that these sizes tend to be selectively removed from urban channels. However, bankfull Shields stresses in urban and rural channels exceed typical threshold values at most sites, indicating significant bedload transport at bankfull stage. Apparently, increased peak discharges caused by decades of urbanization have not removed all the transportable sediment from these urban stream channels. We speculate that the supply of sediment to urban channels from hillslope processes and channel erosion remains significant, even though much of the upland surfaces of these urban catchments are covered with nonerodible impervious surfaces.

Keywords: sediment transport, geomorphology, rivers, urbanization, watersheds, restoration.

INTRODUCTION

The effects of urbanization on watershed hydrology and river channel morphology have been studied for decades. Urbanization increases peak discharges (Leopold, 1968; Hollis, 1975) and influences the volume of sediment supplied to stream channels. Wolman (1967) suggested that sediment supply to channels should increase greatly during active construction, and Trimble (1997) demonstrated that stream channel erosion could provide a substantial fraction of the sediment produced during urbanization. Wolman (1967) suggested that after a watershed has been developed, sediment yields should decline, a hypothesis supported by Dawdy (1967). Sediment-starved stream channels subjected to increased discharges enlarge their widths and cross-sectional areas (Hammer, 1972; Leopold, 1973; Morisawa and LaFlure, 1979). Bank erosion rates and rates of knickpoint migration may also increase (Neller, 1988). Where streams flow over an erodible substrate, incision may occur (Booth, 1990; Trimble, 1997). Streams flowing near competent bedrock could become scoured of readily transportable sediment, creating coarse, armored beds that offer poor habitat characteristics.

There is a growing interest in restoring urbanized stream channels (Riley, 1998). However, because most previous studies have focused on a limited number of fluvial morphologic variables, the empirical basis for restoration of urbanized channels is unclear. As part of a restoration program for Philadelphia's Fairmount Park (Goldenberg, 1999), we measured a wide range of variables in paired urban and rural catchments to quantify geomorphic differences that could be used to design and evaluate stream-restoration projects. Our results indicate that urban stream channels of southeastern Pennsylvania are wider, straighter, and smoother than their rural counterparts. We also demonstrate that the beds of urban channels have not been extensively scoured of transportable sediment, suggesting that bed material continues to be supplied to these channels even after decades of urbanization.

STUDY AREAS AND EXPERIMENTAL DESIGN

The study reaches are located in forested areas of the Piedmont Province of southeastern Pennsylvania (Hunt, 1974) (Fig. 1). The study reaches are self-formed alluvial channels with gravelly beds and cohesive banks of composed sandy mud. Paleozoic gneiss and schist at shallow depth limits channel incision. Precipitation is evenly distributed throughout the year; the annual average is 1170 mm (Dailey, 1971).

We adopted a paired watershed experimental design. We selected eight watersheds in Philadelphia ranging in size from 6 to 4010 ha (Table 1). These watersheds are highly urbanized, with impervious fractions ranging from 34% to 50%. For each urban watershed, we then found a corresponding rural watershed with a similar drainage basin area in southeastern Pennsylvania (Fig. 1; Table 1). Five of the pairs have catchment areas within 5% of each other and two of the pairs have catchments within 14% (Table 1). Only one pair (the smallest) is not nearly equivalent in size.

Rural watersheds of southeastern Pennsylvania are appropriate controls for this study because urbanization has typically expanded into rural agricultural areas. If urbanization had not occurred, these urban watersheds would probably still be farmed, and therefore the rural watersheds represent conditions in urban watersheds before urban development. Our rural study area, however, is hardly pristine: watersheds of southeastern Pennsylvania have been influenced by deforestation and centuries of agricultural land use (Jacobson and Coleman, 1986). Nonetheless,

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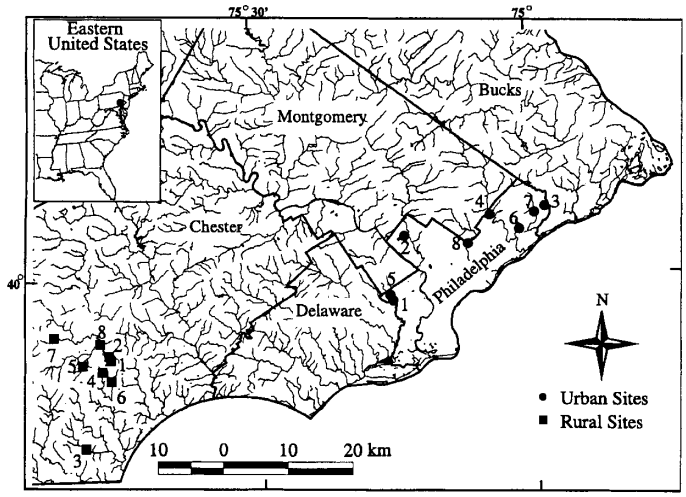

Figure 1. Locations of study areas. Site numbers correspond to pair numbers presented in Table 1.

streams in these rural watersheds are biologically healthy compared to urban streams and they therefore provide a useful reference condition for evaluating urban streams (Academy of Natural Sciences, 1999).

METHODS

In each catchment, we selected a study reach containing at least five riffle-pool pairs. All of the reaches were at least 100 m long. In each study reach, the longitudinal profile and five cross sections were surveyed during low-flow periods using a laser level and tape. The maximum water depth of each pool was also measured. The reach-averaged grain-size distribution was determined using the Wolman (1954) method. We collected samples of the bed material from the middle of the channel. The total sample size and sampling interval were varied to obtain a minimum of 200 gravel-sized clasts distributed evenly along the length of each study reach. Because sand was always present, the total sample size always exceeded 200 clasts. For example, if we estimated that the bed consisted of 50% sand, then a total sample of 400 clasts would be required. We used 200 as a minimum sample size for gravel because the results of Rice and Church (1996) suggest that this sample size should provide a precision of individual grain size percentiles within 10%. To determine the sinuosity of the channel we measured (1) the length of the channel using a tape measure and (2) the length of the valley along the study reach using a differential Global Positioning System. The length of the channel was divided by the length of the valley to obtain the sinuosity.

To better understand fluvial processes in urban and rural streams, we computed three parameters: the dimensionless Shields parameter based on the bankfull depth and the median sediment diameter, an estimated composite Manning's n, and an estimated bankfull discharge. The Shields parameter, τ_*, is defined as:

$$\tau_* = \tau/[(\rho_s - \rho)g\, d_{50}], \quad (1)$$

where τ is the shear stress exerted by the flow on the bed, ρ_s and ρ are the densities of the sediment and water, g is the acceleration of gravity, and d_{50} is the median diameter of the bed material. We used the normal flow approximation ρgDS (Chang, 1988, p. 39) to estimate τ (where D is the bankfull depth and S is the slope), and a constant value of 2650 kg/m^3 for ρ_s, providing a simple method for computing the Shields parameter:

$$\tau_* = DS/(1.65d_{50}). \quad (2)$$

We estimated Manning's n using a modified version of the Natural Resources Conservation Service method (NRCS, formerly Soil Conservation Service), described by French (1985), that divides Manning's n into components related to morphologic variables. We considered the median grain size, mean pool depth (representing varia-

TABLE 1. CHARACTERISTICS OF PAIRED URBAN AND RURAL STUDY REACHES

Pair	Basin Area (ha)	% Impervious	Bed Slope ($x10^{-2}$)	Width* (m)	Depth* (m)	Cross-sectional Area* (m^2)	d_{50}† (mm)	Sinuosity (m)	Pool Depth ($x10^{-2}$m)	Estimated n	Hammer number ($x10^{-6}$ m/s)	Shields parameter
Pair 1	6/12	50/0	0.90/3.1	3.4/1.8	0.4/0.2	1.3/0.2	32/63	1.18/1.09	0.1/0.7	5.2/6.9	19.4/1.5	0.06/0.06
Pair 2	69/59	41/0	3.2/3.0	5.7/3.9	0.4/0.3	2.3/0.7	65/66	1.11/1.26	0.2/0.2	6.0/6.5	5.3/1.2	0.12/0.08
Pair 3	131/133	49/7	0.40/1.2	5.7/4.3	0.4/0.3	2.4/0.7	13/12	1.00/1.16	0.3/0.4	4.7/6.0	1.4/0.5	0.08/0.21
Pair 4	170/161	27/3	0.30/0.95	5.6/4.9	0.4/0.6	2.4/1.0	29/19	1.33/1.46	0.4/0.5	7.0/6.9	0.6/0.6	0.03/0.17
Pair 5	438/448	34/1	1.9/0.70	9.8/5.5	1.4/0.5	10.2/1.4	71/13	1.04/1.13	0.3/0.7	5.2/5.9	7.8/0.3	0.23/0.17
Pair 6	673/656	43/1	0.70/0.53	10.2/9.8	0.5/0.7	4.8/2.1	16/17	1.16/1.32	0.4/0.4	6.0/5.7	0.6/0.3	0.12/0.13
Pair 7	731/811	44/1	0.30/0.70	8.9/7.5	0.3/0.6	2.9/1.9	9/40	1.03/1.01	0.4/0.4	5.4/5.8	0.2/0.2	0.07/0.06
Pair 8	4010/4560	35/2	0.16/0.15	17.6/16.8	0.7/0.9	12.3/16.5	16/30	1.03/1.07	0.5/1.1	5.2/6.3	0.2/0.2	0.04/0.03
median % difference ††	NA **	NA	NA	26	0	180	-4	-8	-31	-10	131	NA
p§	0.31	0.01	0.48	0.01	0.67	0.12	0.57	0.05	0.05	0.09	0.07	0.93

Note: Slash indicates urban/rural parameter values.

* Average of 5 bankfull values determined at each site.

† Median bed sediment diameter.

§ Probability that urban and rural values are from the same population based on paired Mann-Whitney test (Davis, 1986). Values less than 0.1 indicate that urban and rural values are significantly different.

** Not applicable.

†† Percent difference is computed as 100 (urban value-rural value)/rural value (as in Figure 2). Only variables in Figure 2 are included.

bility in bed topography), and sinuosity. Because the bed sediment in our study reaches is not well rounded, we used the Federal Highway Administration's formula for riprap to compute n_{grain}, the contribution to Manning's n related to grain size (Chang, 1988, equation 3.43). The contribution of irregular bed topography, n_{bed}, to the total resistance was computed using the following equation adapted from the NRCS method:

$$n_{bed} = 0.02 \text{ mean pool depth/D.} \quad (3)$$

Following NRCS recommendations, values of n_{bed} greater than 0.02 were reduced to 0.02. The contribution of sinuosity, P, to Manning's n is provided by a sinuosity factor, F_p:

$$F_p = 0.6\,(P - 1). \quad (4)$$

The NRCS recommends that F_p should not exceed 0.3. The estimated Manning's n is then computed from the three components described here:

$$n = F_p\,(n_{grain} + n_{bed}) + n_{grain} + n_{bed}. \quad (5)$$

We refer to the value of Manning's n computed from equation 5 as the estimated Manning's n because it was impractical to verify these estimated values using field measurements.

Once Manning's n has been obtained from equation 5, the estimated bankfull discharge, Q_{bf}, may be computed using the Manning equation (Chang, 1988, equation 3.5). We scale the bankfull discharge by D_A, the drainage basin area defined at the downstream end of each study reach:

$$H = Q_{bf} / D_A. \quad (6)$$

We refer to H as the Hammer number in recognition of Hammer's (1972) pioneering studies of urbanization-related channel enlargement in the Philadelphia area. The Hammer number H is the discharge per unit drainage basin area conveyed by the channel at bankfull flow. H is a property of the channel, not the catchment.

RESULTS

Comparisons of the morphology of the paired reaches are summarized in Table 1 and Figure 2. The slope of the bed and the bankfull depth are not significantly different. Median bankfull widths and areas are 26% and 180% larger for urban channels than for rural channels (Table 1). Median sinuosities of urban channels are 8% lower than rural channels, and median pool depths are 31% smaller in urban channels than in rural channels.

The median grain size is not significantly different for urban and rural channels. Other statistics of the grain-size distribution, such as the percentages of sand, pebbles and granules, cobbles, and boulders, or cumulative grain-size percentiles such as D_{16}, D_{84}, and D_{95}, showed no significant differences between urban and rural streams.

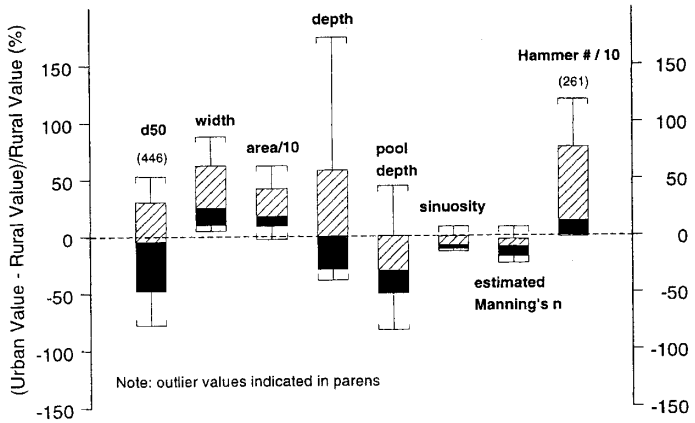

Figure 2. Box plots of percentage differences between selected variables at paired urban and rural watersheds. Boundary between two patterns in each box indicates median value. Top and bottom of each box correspond to medians of all values greater than and lesser than overall median. Error bars are defined by range of data within 1.5 $Q_3 - Q_1$ (Q_3 is upper quartile and Q_1 is lower quartile). Outlier values are indicated in parentheses. Cross-sectional areas and values of Hammer number are divided by 10 so they will fit on same scale as other variables.

When comparing grain-size histograms of urban and rural channels, however, we observed an important difference: rural channels often exhibit a secondary mode somewhere in the range of 2–64 mm, with a primary mode typically from 64 to 256 mm. Urban channels exhibit a similar primary mode, but the secondary mode from 2 to 64 mm is often absent (Fig. 3) (the difference in the percentages of sand in the two histograms of Fig. 2 is *not* significant). The secondary grain-size mode is present in data from six of eight rural channels, and it is absent in data from seven of eight urban channels. A Mann-Whitney test indicates that the absence of the secondary mode from the urban channel data is significant at the 97.5% level. These results suggest that the beds of urban streams are depleted within the size range of 2–64 mm relative to rural streams.

Median estimated Manning's n values are 10% lower in urban streams than in rural streams (Fig. 2; Table 1) due to lower pool depths and sinuosities. Lower Manning's n values, when combined with increased channel areas, lead to median Hammer numbers that are 131% larger in urban streams than in rural streams (note that

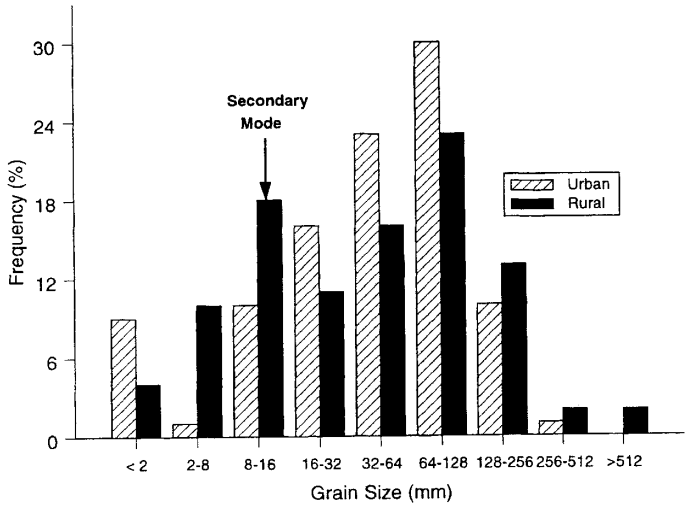

Figure 3. Typical grain-size histograms from urban and rural catchments. Urban data are from pair 1 and rural data are from pair 8. Secondary mode in range 8–16 mm is present at rural site, but not at urban site. Difference between percentages of sand between these two histograms is not significant.

values of the Hammer number are divided by 10 in Fig. 3 to facilitate plotting on the same scale as the other variables).

Shields parameters based on the bankfull depth and median grain size (equation 2) for urban and rural channels are not significantly different (Table 1). Furthermore, six of eight urban channels and seven of eight rural channels had Shields parameter values greater than 0.07, and several in each group had values greater than 0.1. These exceed values typically associated with the threshold of sediment motion. For example, Parker (1979) quoted a value of 0.03 for incipient motion of coarse gravel, and Buffington and Montgomery (1997) quoted a range of 0.03–0.07 for a variety of studies using visual methods to determine the threshold of sediment motion for gravel. These observations suggest that significant bedload transport should occur at bankfull stage in most of the urban and rural study reaches.

DISCUSSION AND CONCLUSIONS

The results presented here suggest that the urban stream channels of our study area have responded in a variety of ways to increased runoff caused by impervious surfaces. Urbanized channels have become wider, a result that has also been reported by many others (Hammer, 1972; Morisawa and LaFlure, 1979), but generally not deeper. We have also documented changes in other variables not as extensively demonstrated: urban channels have shallower pools and lower sinuosities, and they are therefore smoother, leading to lower values of estimated Manning's n in urban channels. All of these variables (including the median grain diameter) are combined when computing the Hammer number, which is significantly larger for urban than for rural channels, suggesting that urban channels have adjusted their size and overall frictional characteristics to convey increased peak discharges created by impervious surfaces.

When we began our study, we expected the finer size fractions of the bed to be greatly depleted in urban channels. We also expected the Shields parameter to be much lower, clearly indicating the development of threshold conditions in urbanized watersheds where channels are armored by large cobbles and boulders. Instead, our results indicate only a subtle difference in bed texture between urban and rural channels. The median grain sizes of the pairs are statistically indistinguishable, as are other grain-size statistics. The only significant difference is that urban channels lack a secondary mode in the range 2–64 mm, suggesting depletion of the bed sediment in this size range. Furthermore, Shields parameters for the urban and rural channels are larger than those characteristic of threshold gravel-bed rivers, indicating that bed material is likely to be transported during most bankfull discharge events.

After decades of urbanization, bedload transport can only remain significant if sediment continues to be supplied to the channel network. In particular, we speculate that erosion of the bed and banks and hillslope sources upstream provide enough sediment to keep the bed material sizes of urban streams nearly similar to those of rural streams. Field observations of eroding stream banks and hillslopes in Fairmount Park support this hypothesis, but further study is needed.

This study was motivated by a need to document the effects of urbanization on stream channels to guide and evaluate stream-restoration projects. If rural agricultural channels are accepted as the appropriate benchmark for comparison, then our results will help to achieve these goals. For example, Figure 2 suggests that restoration in Fairmount Park should attempt to decrease channel widths by 26% and increase pool depths and sinuosities by 31% and 18%, respectively. Resistance to flow, as summarized by Manning's n, should be increased by 10%. These changes should decrease the bankfull discharge per unit catchment area by ~131%.

These guidelines, however, cannot be used as a simple recipe for recreating stream channels: it would be futile to restore urban stream channels without considering the supply of water and sediment provided by the catchment upstream. Furthermore, our results do not provide any detailed blueprints for achieving the changes described here. However, by quantifying the differences between urban and rural stream channels, we have provided some useful measures for evaluating the results of stream-restoration projects in urbanized watersheds.

ACKNOWLEDGMENTS

This research was supported in part by grants to the Natural Lands Restoration and Environmental Education Program of the Fairmount Park Commission from the William Penn Foundation and a National Science Foundation grant (DEB 96-1388). We thank the Stream Team: N. Allmendinger, C. Cianfrani, N. Goodman, K. Jushchyshyn, B. Marshall, J. Reed, T. Trolley, and T. Trovitch, for field assistance. Very helpful reviews were provided by Derek Booth and an anonymous reviewer.

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Manuscript received July 8, 1999
Revised manuscript received September 22, 1999
Manuscript accepted September 28, 1999

APPENDIX C

Supporting Reports

Fairmount Park System

Natural Lands Restoration

Master Plan

Appendix C-1. Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
TREES				
Sugar maple	*Acer saccharum*	U		Late Successional; Mesic Woods (Near Southern Limit of Range)
Red maple	*Acer rubrum*	M		Early Successional or Mid Successional; Flood-plain Woods, Swamps, Seeps, Moist to Mesic Woods
Silver maple	*Acer saccharinum*			Early, Mid, or Late Successional; Stream-banks, Flood-plain Woods, Swamps
Box elder	*Acer negundo*	M		Early Successional; Stream-banks, Flood-plain Woods
Smooth shadbush	*Amelanchier laevis*		?	Early Successional; Swamp/Moist Woods Transition, Moist to Dry Fields/Moist to Dry Woods Transition
Downy juneberry	*Amelanchier arborea*			Mid Successional; Mesic to Dry Woods, Often on Slopes or Edges of Slopes
Gray birch	*Betula populifolia*			Early Successional; Dry Woods, Dry Fields/Dry Woods Transition
Black birch	*Betula lenta*	M		Late Successional; Mesic Woods
River birch	*Betula nigra*	M		Early, Mid, or Late Successional; Stream-banks, Flood-plain Woods, Swamps
Ironwood	*Carpinus caroliniana*			Mid Successional; Moist Woods
Mockernut hickory	*Carya tomentosa*	L		Mid or Late Successional; Dry Woods
Bitternut hickory	*Carya cordiformis*	M		Mid Successional; Stream-banks, Flood-plain Woods, Swamps, Moist to Dry Woods
Shagbark hickory	*Carya ovata*			Late Successional; Mesic Woods
Pignut hickory	*Carya glabra*	M		Late Successional; Mesic to Dry Woods
American chestnut	*Castanea dentata*	U		Late Successional; Mesic to Dry Woods (Severely Affected by Disease)
American hackberry	*Celtis occidentalis*	M		Early or Mid Successional; Flood-plain Woods, Moist to Dry Woods, Stream-banks
Flowering dogwood	*Cornus florida*			Mid Successional; Mesic Woods (Affected by Disease)
Alternate-leaved dogwood	*Cornus alternifolia*			Mid Successional; Moist Woods, Base of Wooded Slopes
Hawthorn	*Crataegus*	L		Early Successional; Mesic Fields/Mesic Woods Transition

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Persimmon	*Diospyros virginiana*			Early Successional; Dry Fields/Dry Woods Transition
Beech	*Fagus grandifolia*			Late Successional; Mostly on Slopes in Mesic Woods
White ash	*Fraxinus americana*	M		Mid Successional; Moist to Mesic Woods
Black ash	*Fraxinus nigra*		?	Mid Successional; Swamps, Flood-plain Woods
Red (green) ash	*Fraxinus pennsylvanica*	M		Early or Mid Successional; Stream-banks, Flood-plain Woods
American holly	*Ilex opaca*			Early Successional; Dry Woods (Primarily Coastal Plain)
Black walnut	*Juglans nigra*	L		Early or Mid Successional; Mesic to Moist Woods
Butternut	*Juglans cinerea*			Mid Successional; Moist Woods, Flood-plain Woods
Red cedar	*Juniperus virginiana*			Early Successional: Dry Fields/Dry Woods Transition
Sweet gum	*Liquidambar styraciflua*	L		Early Successional; Swamps, Moist to Mesic Woods, Moist to Mesic Fields/Moist to Mesic Woods Transition (Primarily Coastal Plain)
Tulip poplar	*Liriodendron tulipifera*	M		Mid Successional; Mesic Woods
Sweetbay magnolia	*Magnolia virginiana*		?	Early or Mid Successional; Mesic Woods
American crabapple	*Malus coronaria*			Early Successional; Mesic Fields/Mesic Woods Transition
Red mulberry	*Morus rubra*			Early Successional; Moist Woods, Flood-plain Woods, Stream-banks
Sour gum	*Nyssa sylvatica*	L		Mid Successional; Swamps, Moist to Mesic Woods
Hop hornbeam	*Ostrya virginiana*	L		Mid Successional; Moist to Mesic Woods
White pine	*Pinus strobus*			Early Successional; Mesic to Dry Woods, Mesic to Dry Fields/Mesic to Dry Woods Transition (Near Southern Limit of Range)
Virginia pine	*Pinus virginiana*		?	Early Successional; Dry Woods, Edges of Dry Woodland Slopes
Pitch pine	*Pinus rigida*		?	Early Successional; Dry Woods, Dry Fields/Dry Woods Transition (Primarily Coastal Plain)

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
American sycamore	*Platanus occidentalis*	U		Early or Mid Successional; Flood-plain Woods, Moist Woods (Affected by Disease)
Cottonwood	*Populus deltoides*			Early Successional; Stream-banks, Flood-plain Woods
Quaking aspen	*Populus tremuloides*			Early Successional; Mesic Fields/Mesic Woods Transition
Bigtooth aspen	*Populus grandidentata*			Early Successional; Dry Woods, Dry Fields/Dry Woods Transition
Black cherry	*Prunus serotina*	M		Early Successional; Mesic Woods, Mesic Fields/Mesic Woods Transition
Scarlet oak	*Quercus coccinea*			Mid or Late Successional; Slopes in Dry Woods
Red oak	*Quercus rubra*	M		Late Successional; Mesic Woods
Chesnut oak	*Quercus montana (prinus)*	M		Mid Successional; Slopes in Dry Woods
Pin oak	*Quercus palustris*	L		Early or Mid Successional; Flood-plain Woods, Swamps
Spanish oak	*Quercus falcata*			Mid Successional; Dry Woods (Near Northern Limit of Range)
Willow oak	*Quercus phellos*			Mid Successional; Swamps, Moist Woods (Primarily Coastal Plain)
Swamp white oak	*Quercus bicolor*			Mid Successional; Swamps, Flood-plain Woods, Stream-banks
Black oak	*Quercus velutina*	M		Mid to Late Successional; Dry Woods
White oak	*Quercus alba*	M		Mid or Late Successional; Dry Woods
Black willow	*Salix nigra*	M		Early Successional; Stream-banks
Sassafras	*Sassafras albidum*	M		Early Successional; Dry Woods, Dry Fields/Dry Woods Transition
American basswood	*Tilia americana*	L		Mid or Late Successional; Mesic Woods
Eastern hemlock	*Tsuga canadensis*	U		Late Successional; Slopes in Moist to Mesic Woods (Severely Affected by Disease)
American elm	*Ulmus americana*	U		Early Successional; Stream-banks, Flood-plain Woods (Severely Affected by Disease)
Slippery elm	*Ulmus rubra*	L		Early Successional; Stream-banks, Flood-plain Woods, Moist Woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
SHRUBS				
Smooth alder	*Alnus serrulata*	M	?	Early Successional; Stream-banks, Swamps/Moist Woods Transition
Oblongleaf juneberry	*Amelanchier canadensis*		?	
Hercules club	*Aralia spinosa*		?	Early Successional; Stream-banks, Moist to Mesic Fields/Moist to Mesic Woods Transition (often on steep slopes), Moist to Mesic Woods (Invasive)
Black chokeberry	*Aronia melanocarpa*		?	
Red chokeberry	*Aronia arbutifolia*		?	
Tall pawpaw	*Asimina triloba*	L		Mid or Late Successional; Moist Woods
Buttonbush	*Cephalanthus occidentalis*	L		Early Successional; Swamps
Redbud	*Cercis canadensis*			Mid or Late Successional; Moist to Mesic Woods
Sweet pepperbush	*Clethra alnifolia*		?	
Red-panicle dogwood	*Cornus racemosa*		?	
Silky dogwood	*Cornus amomum*	M		Early Successional; Stream-banks, Swamps/Moist Woods Transition
American hazelnut	*Corylus americana*	L		Mid Successional; Moist to Mesic Woods
Northern bush-honeysuckle	*Diervilla lonicera*		?	
American strawberry-bush	*Euonymus americanus*		?	
Black huckleberry	*Gaylussacia baccata*	SU	?	
Tall huckleberry	*Gaylussacia frondosa*			
Common witch-hazel	*Hamamelis virginiana*			Late Successional; Moist to Dry Woods
Wild hydrangea	*Hydrangea arborescens*			Mid or Late Successional; Moist to Mesic Woods
Common winterberry holly	*Ilex verticillata*			Early Successional; Swamps, Moist Woods
Sheep laurel	*Kalmia angustifolia*		?	
Mountain laurel	*Kalmia latifolia*			
Swamp sweetbells	*Leucothe racemosa*		?	
Common spicebush	*Lindera benzoin*			Mid or Late Successional; Flood-plain Woods, Moist to Mesic Woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Maleberry	*Lyonia ligustrina*		?	
Staggerbush	*Lyonia mariana*		?	
Ninebark	*Physocarpus opulifolius*		?	
Choke cherry	*Prunus virginiana*	L		Early Successional; Moist to Mesic Fields/Moist to Mesic Woods Transition, Moist to Mesic Woods
Swamp azalea	*Rhododendron viscosum*		?	
Great rhododendron	*Rhododendron maximum*			
Pinxster-flower	*Rhododendron periclymenoides*			Mid to Late Successional; Swamps/Moist Woods Transition, Moist to Dry Woods
Smooth sumac	*Rhus glabra*		?	
Staghorn sumac	*Rhus typhina*			Early Successional; Dry Fields/Dry Woods Transition
Winged sumac	*Rhus copallina*			
American black currant	*Ribes americanum*		?	
Carolina rose	*Rosa carolina*		?	
Swamp rose	*Rosa palustris*		?	
Prickly dewberry	*Rubus flagellaris*			Early Successional; Dry Fields/Dry Woods Transition
Bristly dewberry	*Rubus hispidus*		?	
Common blackberry	*Rubus allegheniensis*	L		Early Successional; Mesic to dry Fields/Mesic to Dry Woods Transition, Mesic to Dry Woods
Flowering raspberry	*Rubus odoratus*		?	
Black raspberry	*Rubus occidentalis*			Early Successional; Moist to Mesic Fields/Moist to Mesic Woods Transition, Moist to Mesic Woods
Blackberry	*Rubus pensylvanicus*		?	
Sand blackberry	*Rubus cuneifolius*		?	
Missouri willow	*Salix eriocephala*		?	Early Successional; Stream-banks, Swamps
Tall prairie willow	*Salix humilis*		?	
Silky willow	*Salix sericea*		?	Early Successional; Stream-banks, Flood-plain Woods
Sandbar willow	*Salix exigua (interior)*		?	Shore of Delaware River

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Elderberry	*Sambucus canadensis*	L		Early Successional; Swamps/Moist Woods Transition, Moist Fields/Moist Woods Transition, Moist Woods
Bladdernut	*Staphylea trifolia*			Early Successional; Moist to Mesic Fields/Moist to Mesic Woods Transition, Moist to Mesic Woods (Often at Upper Edge of Slopes)
Late low blueberry	*Vaccinium angustifolium*		?	
Southern low blueberry	*Vaccinium pallidum*	SU		
Tall deerberry	*Vaccinium stamineum*	SU		
Highbush blueberry	*Vaccinium corymbosum*	SU		
Northern arrowwood	*Viburnum recognitum*	M		Early Successional; Swamps, Moist Woods
Downy arrowwood	*Viburnum dentatum*	M		Early Successional; Marshes/Moist Woods Transition, Moist to Dry Fields/Moist to Dry Woods Transition, Moist to Dry Woods
Smooth blackhaw	*Viburnum prunifolium*	M		Early or Mid Successional; Mesic Fields/Mesic Woods Transition, Mesic Woods
Maple-leaved viburnum	*Viburnum acerifolium*			Late Successional; Moist to Dry Woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
WETLAND HERBS AND LOW SHRUBS				
Great ragweed	*Ambrosia trifida*			Wetland/Terrestrial; marshes, meadows, moist fields, moist woods, stream banks, disturbed sites
Beggar ticks	*Bidens frondosa*			Wetland/Terrestrial; marshes/fields, disturbed sites
False nettle	*Boehmeria cylindrica*			Wetland/Terrestrial; marshes/woods
Pennsylvania bitter cress	*Cardamine pensylvanica*			Wetland; marshes, swamps, stream margins
Spring cress	*Cardamine bulbosa*			Wetland; marshes, meadows, swamps, seeps
Blunt broom sedge	*Carex tribuloides*			Wetland/Terrestrial; swamps, moist woods
Owl fruit sedge	*Carex stipata*			Wetland; marshes, meadows, swamps
Shallow sedge	*Carex lurida*			Wetland; marshes, meadows, swamps
Fox sedge	*Carex vulpinoidea*			Wetland; marshes, meadows, swamps
Sweet wood reed	*Cinna arundinacea*			Wetland/Terrestrial; swamps, moist woods
Blunt spikesedge	*Eleocharis obtusa*			Wetland; marshes, meadows, disturbed sites
Purple leaved willow herb	*Epilobium coloratum*			Wetland; marshes, meadows
Fowl mannagrass	*Glyceria striata*			Wetland; swamps
Parsnip?	*Heracleum lanatum*			Wetland/Terrestrial; marshes, moist woods
Virginia waterleaf	*Hydrophyllum virginianum*			Wetland/Terrestrial; swamps, moist woods
Spotted jewelweed	*Impatiens capensis*			Wetland/Terrestrial; marshes, swamps, moist woods, seeps, disturbed sites
Pale jewelweed	*Impatiens pallida*			Wetland/Terrestrial; swamps, moist woods, seeps
Poverty rush	*Juncus tenuis*			Wetland/Terrestrial; meadows, moist fields, moist woods, trail edges, disturbed sites
Tapertip rush	*Juncus acuminatus*			Wetland; marshes, meadows, stream margins
Common rush	*Juncus effusus*			Wetland; marshes, meadows
Wood nettle	*Laportea canadensis*			Wetland/Terrestrial; swamps, moist woods, stream margins
Whitegrass	*Leersia virginica*			Wetland/Terrestrial; swamps, moist woods
Water purslane	*Ludwigia palustris*			Wetland; marshes, stream margins

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Virginia bugleweed	*Lycopus virginicus*			Wetland; marshes, meadows, swamps, stream margins
Fringed loosestrife	*Lysimachia ciliata*			Wetland/Terrestrial; meadows, swamps, moist woods, stream margins
Giant chickweed	*Myosoton aquaticum*			Wetland/Terrestrial; meadows, moist fields, moist woods, stream margins
Southern pond lily	*Nuphar advena*			Aquatic/Wetland; streams, ponds, marshes, seeps
Sensitive fern	*Onoclea sensibilis*			Wetland/Terrestrial; marshes, meadows, swamps, moist fields, moist woods
Cinnamon fern	*Osmunda cinnamomea*			Wetland/Terrestrial; swamps, moist woods
Fall panicgrass	*Panicum dichotomiflorum*			Wetland/Terrestrial; marshes, meadows, moist fields, disturbed sites
Beaked panicum	*Panicum anceps*			Wetland/Terrestrial; meadows, moist fields, disturbed sites
Arrow arum	*Peltandra virginica*			Aquatic/Wetland; marshes, stream margins
Reed canary grass	*Phalaris arundinacea*			Wetland/Terrestrial; marshes, meadows, moist fields, disturbed sites, invasive
Common reed	*Phragmites australis*	U		Wetland; marshes, disturbed sites, invasive
Clear weed	*Pilea pumila*			Wetland/Terrestrial; marshes, swamps, moist woods, disturbed sites
Nodding smartweed	*Polygonum lapathifolium*			Wetland/Terrestrial; meadows, moist fields, moist woods, stream margins, disturbed sites
Dotted smartweed	*Polygonum punctatum*			Wetland; marshes, meadows, swamps, stream margins, disturbed sites
Pink knotweed	*Polygonum pensylvanicum*			Wetland/Terrestrial; meadows, moist fields, moist woods stream margins, disturbed sites
Small flowered crowfoot	*Ranunculus abortivus*			Wetland/Terrestrial; swamps, moist woods, stream banks
Tall coneflower	*Rudbeckia laciniata*			Wetland/Terrestrial; swamps, moist woods, stream banks
Lizard's tail	*Saururus cernuus*			Wetland; swamps, stream margins, seeps
Mosquito bulrush	*Scirpus hattorianus*			Wetland; marshes, meadows, disturbed sites

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Wool grass	*Scirpus cyperinus*			Wetland; marshes, meadows, disturbed sites
Georgia bulrush	*Scirpus georgianus*			Wetland; marshes, meadows, disturbed sites
Skunk cabbage	*Symplocarpus foetidus*			Wetland; swamps, seeps
Tall meadow rue	*Thalictrum pubescens*			Wetland/Terrestrial; meadows, swamps, moist woods
Common cattail	*Typha latifolia*			Wetland; marshes
Pale early violet	*Viola affinis*			Wetland/Terrestrial; swamps, moist woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
TERRESTRIAL HERBS AND LOW-GROWING SHRUBS				
Three-seeded mercury	*Acalypha rhomboidea*			Terrestrial; early successional moist to dry open woods, fields, disturbed sites
Autumn bentgrass	*Agrostis perrenans*			Terrestrial; early to late successional dry open woods
Common ragweed	*Ambrosia artemisiifolia*			Terrestrial; fields, mostly on disturbed sites, invasive
Broom sedge	*Andropogon virginicus*			Terrestrial; dry fields, disturbed sites
Wood anemone	*Anemone quinquefolia*			Terrestrial; late successional moist woods
Indian hemp	*Apocynum cannabinum*			Terrestrial/Wetland; early successional moist to dry open woods, fields, stream-banks, disturbed sites
Wild sarsaparilla	*Aralia nudicaulis*			Terrestrial/Wetland; late successional moist to dry woods
Spikenard	*Aralia racemosa*			Terrestrial; late successional moist to mesic woods
Rock sandwort	*Arenaria stricta*			Terrestrial; dry, open, rocky edges of slopes and ledges
Purple milkweed	*Asclepias purpurascens*			Terrestrial/Wetland; early successional moist to dry woods, meadows, fields, disturbed sites
Common milkweed	*Asclepias syriaca*			Terrestrial; early successional dry open woods, fields, disturbed sites
Ebony spleenwort	*Asplenium platyneuron*			Terrestrial; moist to dry rocky ledges, cracks in rock walls

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
White wood aster	*Aster divaricatus*			Terrestrial; mid to late successional mesic to dry woods, often on slopes
Southern lady fern	*Athyrium filix-femina*			Terrestrial/Wetland; swamps, early to late successional moist woods, meadows, stream-banks
Cut-leaved toothwort	*Cardamine concatenata*			Terrestrial; mid to late successional moist to mesic woods
Sedge	*Carex annectens*			Terrestrial; moist to dry fields, disturbed sites
Sedge	*Carex normalis*			Terrestrial/Wetland; early successional moist to mesic woods, meadows
Sedge	*Carex digitalis*			Terrestrial; mid to late successional mesic to dry woods
Sedge	*Carex caroliniana*			Terrestrial/Wetland; early successional moist woods, flood-plain woods, meadows, moist fields
Sedge	*Carex blanda*			Terrestrial; mid to late successional moist to dry woods
Sedge	*Carex gracilescens*			Terrestrial; mid to late successional moist woods, flood-plain woods
Sedge	*Carex cephalophora*			Terrestrial; early to mid successional dry woods
Sedge	*Carex radiata*			Terrestrial/Wetland; mid to late successional moist to dry woods, swamps

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Sedge	*Carex amphibola*			Terrestrial/Wetland; early to late successional moist to mesic woods, flood-plain woods, meadows
Sedge	*Carex pensylvanica*			Terrestrial; early to mid successional dry open woods
Sedge	*Carex debilis*			Terrestrial/Wetland; early to mid successional moist to mesic woods, meadows
Sedge	*Carex hirsutella*			Terrestrial; early successional moist to dry woods, fields, meadows
Sedge	*Carex laxiculmis*			Terrestrial; late successional moist woods
Sedge	*Carex albicans*			Terrestrial; mid to late successional dry woods, often on slopes
Pigweed	*Chenopodium album*			Terrestrial; moist to mesic fields, mostly on disturbed sites
Spotted wintergreen	*Chimaphila maculata*			Terrestrial; late successional dry woods
Black snakeroot	*Cimicifuga racemosa*			Terrestrial; mid to late successional moist to mesic woods
Common enchanter's nightshade	*Circaea lutetiana*			Terrestrial/Wetland; mid to late successional moist to mesic woods, flood-plain woods
Spring beauty	*Claytonia virginica*			Terrestrial; early to mid successional moist woods, flood-plain woods, moist fields, disturbed sites
Richweed	*Collinsonia canadensis*			Terrestrial/Wetland; late successional moist to mesic woods, flood-plain woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Horseweed	*Conyza canadensis*			Terrestrial; dry fields, mostly on disturbed sites
Honewort	*Cryptotaenia canadensis*			Terrestrial/Wetland; mid to late successional woods, flood-plain woods, seeps
Umbrella-sedge	*Cyperus lupulinus*			Terrestrial; dry fields, disturbed sites
Brittle bladder-fern	*Cystopteris fragilis*			Terrestrial; rock crevices, cracks in rock walls
Poverty grass	*Danthonia spicata*			Terrestrial; early successional moist to dry open woods, fields
Hay-scented fern	*Dennstaedtia punctilobula*			Terrestrial; early to mid successional dry to moist open woods, fields
Hoary tick-trefoil	*Desmodium canescens*			Terrestrial; early successional dry open woods, fields
Fancy fern	*Dryopteris intermedia*			Terrestrial/Wetland; mid to late successional moist to mesic woods, swamps
Marginal shield fern	*Dryopteris marginalis*			Terrestrial; mid to late successional mesic woods, rocky slopes
Toothed wood fern	*Dryopteris carthusiana*			Terrestrial/Wetland; mid to late successional moist woods, swamps, seeps
Canada wild-rye	*Elymus canadensis*			Terrestrial/Wetland; early successional moist to dry open woods, flood-plain forests, fields, meadows, stream-banks
Bottlebrush grass	*Elymus hystrix*			Terrestrial; mid to late successional moist woods, flood-plain woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Beech-drops	*Epifagus virginiana*			Terrestrial; late successional mesic to dry woods, parasitic on *Fagus grandifolia*
Fireweed	*Erechtites hieracifolia*			Terrestrial/Wetland; early successional moist woods, flood-plain woods, stream-banks, fields, burned areas, disturbed sites
Philadelphia daisy	*Erigeron philadelphicus*			Terrestrial/Wetland; early successional moist to mesic woods, flood-plain woods, stream-banks, fields, disturbed sites
Rough fleabane	*Erigeron strigosus*			Terrestrial; dry fields, disturbed sites
Trout-lily	*Erythronium americanum*			Terrestrial/Wetland; mid to late successional moist woods, flood-plain forests, meadows
Purple-node joe-pye-weed	*Eupatorium purpureum*			Terrestrial; early to mid successional moist to dry woods, flood-plain woods, fields
White snakeroot	*Eupatorium rugosum*			Terrestrial; early to mid successional moist to mesic woods, fields, disturbed sites
Hyssop-leaved thoroughwort	*Eupatorium hyssopifolium*			Terrestrial; early successional dry open woods, fields
Common flat-topped goldenrod	*Euthamia graminifolia*			Terrestrial/Wetland; early successional moist to dry open woods, flood-plain woods, stream-banks, fields, disturbed sites
Red fescue	*Festuca rubra*			Terrestrial/Wetland; mid to late successional moist to mesic woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Sweet scented bedstraw	*Galium triflorum*			Terrestrial/Wetland; early to late successional moist to mesic woods
Wild geranium	*Geranium maculatum*			Terrestrial/Wetland; early to late successional moist to mesic woods, meadows, fields, sometimes on disturbed sites
White avens	*Geum canadense*			Terrestrial/Wetland; early to mid successional moist to mesic woods, flood-plain woods, stream-banks, disturbed sites
Thin-leaved sunflower	*Helianthus decapetalus*			Terrestrial/Wetland; early successional moist to dry open woods, fields, meadows, stream-banks
Alumroot	*Heuchera americana*			Terrestrial; early to mid successional mesic to dry woods, rocky slopes
Broad-leaved waterleaf	*Hydrophyllum canadense*			Terrestrial; mid to late successional moist woods, rocky slopes
Wild lettuce	*Lactuca canadensis*			Terrestrial/Wetland; early successional moist to mesic open woods, fields, meadows, disturbed sites
Wild peppergrass	*Lepidium virginicum*			Terrestrial; dry fields, disturbed sites
Field wood-rush	*Luzula multiflora*			Terrestrial/Wetland; early to mid successional moist to mesic open woods, flood-plain woods, fields, meadows, often on slopes, disturbed sites
Whorled loosestrife	*Lysimachia quadrifolia*			Terrestrial; early successional moist to dry open woods

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Dropseed	*Muhlenbergia schreberi*			Terrestrial/Wetland; early successional moist open woods, fields, mostly on disturbed sites
Common evening-primrose	*Oenothera biennis*			Terrestrial; dry fields, mostly on disturbed sites
Sweet cicely	*Osmorhiza longistylis*			Terrestrial/Wetland; early to late successional moist woods, flood-plain woods
Yellow wood-sorrel	*Oxalis stricta*			Terrestrial; dry fields, mostly on disturbed sites
Pokeweed, poke	*Phytolacca americana*			Terrestrial/Wetland; openings in flood-plain woods, stream-banks, moist to mesic fields, often on disturbed sites
Common plantain	*Plantago rugelii*			Terrestrial/Wetland; openings in flood-plain woods, stream-banks, meadows, moist to mesic fields, mostly on disturbed sites
May-apple, Mandrake	*Podophyllum peltatum*			Terrestrial; early to late successional moist to mesic woods
Greek valerian	*Polemonium reptans*			Terrestrial/Wetland; mid to late successional moist woods, flood-plain woods
Solomon's seal	*Polygonatum pubescens*			Terrestrial; mid to late successional mesic woods, rocky slopes
Solomon's seal	*Polygonatum biflorum*			Terrestrial/Wetland; early to late successional dry to moist woods, flood-plain woods, stream-banks, often on slopes

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Virginia jumpseed	*Polygonum virginicum*			Terrestrial/Wetland; early to late successional moist to mesic woods, flood-plain woods, disturbed sites
Christmas fern	*Polystichum acrostichoides*			Terrestrial; mid to late successional moist woods, rocky slopes
Cinquefoil	*Potentilla canadensis*			Terrestrial; early successional dry open woods, dry fields
Old-field cinquefoil	*Potentilla simplex*			Terrestrial; early successional moist to dry open woods, dry to moist fields, disturbed sites
Tall white lettuce	*Prenanthes altissima*			Terrestrial/Wetland; mid to late successional moist to mesic woods, flood-plain woods
Hispid buttercup	*Ranunculus hispidus*			Terrestrial/Wetland; mid to late successional moist to mesic woods, flood-plain woods
Bloodroot	*Sanguinaria canadensis*			Terrestrial; early to late successional moist to mesic woods, sometimes on disturbed sites
Canadian sanicle (snake-root)	*Sanicula canadensis*			Terrestrial; mid to late successional dry to moist open woods, rocky slopes
Yellow-flowered sanicle	*Sanicula odorata (gregaria)*			Terrestrial/Wetland; mid successional moist woods, flood-plain woods, stream-banks
Starry campion	*Silene stellata*			Terrestrial; mid to late successional mesic woods, rocky slopes

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Blue-eyed grasses	*Sisyrinchium angustifolium*			Terrestrial/Wetland; early successional moist open woods, flood-plain woods, meadows, moist fields
False solomon's-seal	*Smilacina racemosa*			Terrestrial; mid to late successional moist to mesic woods, slopes
Rough-stemmed goldenrod	*Solidago rugosa*			Terrestrial/Wetland; early successional moist to mesic woods, flood-plain woods, stream-banks, meadows, fields, disturbed sites
Blue-stemmed goldenrod	*Solidago caesia*			Terrestrial; early to late successional moist to mesic open woods
Broad-leaved goldenrod	*Solidago flexicaulis*			Terrestrial; early to late successional moist to mesic woods, rocky slopes
Canada goldenrod	*Solidago canadensis*			Terrestrial; early successional moist to mesic open woods, fields, disturbed sites
Star chickweed	*Stellaria pubera*			Terrestrial; mid to late successional moist to mesic woods, flood-plain woods, rocky slopes
Broad beech fern	*Thelypteris hexagonoptera*			Terrestrial/Wetland; mid to late successional moist woods, swamps, slopes
New York fern	*Thelypteris novaboracensis*			Terrestrial/Wetland; early to late successional moist to dry woods, swamps

Appendix C-1 (continued). Plant list using common names, based on 1998 field observations of native Fairmount Park system species, including successional stages and habitats. **Status Key:** M–likely species for planting in moderate numbers; L–likely species for planting in low numbers; U–species that are unlikely to be planted; unmarked–planting status not yet determined, but possible. **Occ**–? indicates current status in park uncertain; not found in inventory, but possible on basis of range or historical occurrence.

Common Name	Species Name	Status	Occ	Habitat
Spiderwort	*Tradescantia ohiensis*			Terrestrial/Wetland; early successional moist to mesic open woods, flood-plain woods, stream-banks, meadows, moist fields, disturbed sites
Purple-top	*Tridens flavus*			Terrestrial/Wetland; meadows, moist to dry fields, disturbed sites
Great nettle	*Urtica dioica*			Terrestrial/Wetland; early to mid successional moist to mesic woods, flood-plain woods, stream-banks, disturbed sites
Leconte's violet	*Viola affinis*			Terrestrial/Wetland; mid to late successional moist to mesic woods, flood-plain woods
Common blue violet	*Viola sororia*			Terrestrial/Wetland; early to late successional moist to mesic woods, flood-plain woods, meadows, fields, disturbed sites
Downy yellow violet	*Viola pubescens*			Terrestrial/Wetland; early to late successional moist to mesic woods, flood-plain woods, rocky slopes

Appendix C-2. Wissahickon Deer Browse Survey And Deer Browse Monitoring Protocol

Spring, 1999

April 13, 1999

The Patrick Center for Environmental Research
1900 Benjamin Franklin Pkwy.
Philadelphia, PA 19103

INTRODUCTION

Wissahickon Park is a 1,841 acre tract of forested land that is part of the Fairmount Park system. The park includes diverse forest vegetation and is located within the city of Philadelphia. The native forest vegetation, particularly understory plants, are negatively impacted by a large population of White-tailed deer that thrive within the park boundaries. Approximately 49 deer/sq mile of forested habitat existed within Wissahickon valley in spring 1994 (NRC 1996). Deer are known to alter diversity and structure of forests and in the Wissahickon their negative impacts "are both obvious and measurable" (NRC 1996).

This report details a proposed deer browse monitoring program that can be used to assess changes in impacts upon forest vegetation in areas within Fairmount Park. Data presented here are from a small-scale browse survey that was conducted in selected areas of Wissahickon during spring, 1999. The purpose of this report is to propose sampling protocols for monitoring deer browse in Fairmount Park (with Wissahickon as an example) and to provide a benchmark of browse impact in Wissahickon prior to deer herd reduction. These data cannot be used to estimate deer population size, deer density or other aspects of deer population dynamics. However, data from this study combined with additional browse surveys may provide insight into browse impact dynamics within selected sample areas in Fairmount Park.

METHODS

We counted browsed and unbrowsed twigs on 16 transects located in 6 different areas in Wissahickon Park during 15 - 23 March, 1999. These six areas included: Andorra Natural Area, the site of the Wigard St. Environmental Center, Cresheim Creek valley, Pachella field, Monastery stables, and Bluebell Picnic area. Four transects were sampled in Andorra and Wigard whereas 2 transects were sampled at the remaining locations. In each area, half of the transects were located on a slope and half on relatively level ground.

Transect start points were chosen randomly in areas identified as sample sites. We extended a tape measure from the start point due north for 100 meters (328 ft) and recorded start points with a GPS unit (Trimble Pro XR). Two people walked the length of the transect and examined all plants that had twigs within 1.5 m (4.9 ft) of the ground that intersected the tape measure. Only woody plants were counted; vines and dead plant material were excluded. Number of "not browsed" and number of "browsed" twigs for each individual plant were counted. A twig was a branch that was $\leq$7.5 mm diameter behind the terminal bud. A severed twig was considered browsed if it had a rough, frayed end as opposed to a clean cut. Plants that had twigs that intersected the transect were identified to at least a genus level in the field or samples were taken back to the Academy for subsequent identification. Each plant received an ID number consisting of Transect # - Point # (A - 4.2). The point corresponded to the place on the transect where the first twig intersected the tape measure. In each transect area we noted deer sign present including: pellet piles, beds, tree rubbings, trails, number of deer, and presence of an obvious browse line. A marker of blue plastic tape tied to a tent stake was left at the start point of each transect and photos of the understory at the start point were taken.

RESULTS

Approximately 31% of all twigs counted were browsed, and those sites browsed most heavily were in Andorra Natural Area and near the Wigard Environmental Center (Table C-2.1). Deer, deer scat, beds, and trails were observed at both of these areas on the transect sample day. We identified 24 different genera of plants (see Table C-2.2 for common for common and scientific names) that intersected transects in the six areas (Table C-2.2). Although spicebush was the most commonly encountered plant, black gum, oaks, birches, *Ailanthus*, sassafras and maples were the most heavily browsed. These species were rare in samples; they represented only 6% of the total number of plants counted on transects. On average, when a plant intersected a transect 35% of its twigs were browsed.

Table C-2.1. Browse transects (100-m) sampled during Spring 1999 in Wissahickon Park and proportion of twigs with browse evidence.

Transect	Location	Slope	Proportion browsed (#browsed/total twigs)
A	Andorra	Flat	0.68
C	Andorra	Slope	0.54
H	Wigard Env Center	Slope	0.51
G	Wigard Env Center	Slope	0.46
D	Andorra	Slope	0.38
F	Wigard Env Center	Flat	0.30
J	Bluebell Picnic	Flat	0.30
B	Andorra	Flat	0.27
E	Wigard Env Center	Flat	0.26
P	Monastery Stables	Slope	0.24
X[1]	Pachella Field	Slope	0.22
L	Cresheim Valley	Slope	0.21
K	Cresheim Valley	Flat	0.19
Y	Pachella Field	Flat	0.14
I	Bluebell Picnic	Slope	0.13
O	Monastery Stables	Flat	0.07
n = 16			Average proportion browsed = 0.31

[1]Transect was 42-m long.

Table C-2.2. Plants that intersected browse transects at six sample areas in Wissahickon Park. Percent browsed is expressed as number browsed twigs / total twigs counted on an individual plant.

GENERA	COMMON NAMES	NUMBER OF PLANTS	PROPORTION BROWSED
Nyssa sylvatica	Black gum	1	1.00
Quercus	Oaks	2	0.75
Betula	Birches	2	0.61
Ailanthus altissima	Tree-of-heaven	8	0.60
Sassafras albidum	Sassafras	7	0.57
Acer	Maples	4	0.57
Euonymous	Euonymus	7	0.55
Cornus florida	Flowering dogwood	6	0.51
Ligustrum	Privet	18	0.50
Lonicera japonica	Honeysuckles	1	0.48
Fraxinus	Ashes	4	0.43
Liriodendron tulipifera	Tulip tree	5	0.39
Viburnum	Viburnums	45	0.36
Rubus	Blackberry and Wineberry	63	0.36
Vaccinium	Blueberries	2	0.30
Rosa multiflora	Multiflora rose	40	0.23
Berberis	Japanese barberry	4	0.21
unidentified	unidentified	8	0.21
Malus	Apples	3	0.17
Prunus serotina	Black cherry	38	0.13
Magnolia	Magnolia	1	0.08
Fagus grandifolia	Beech	11	0.08
Lindera benzoin	Spicebush	125	0.08
Sambucus canadensis	Elderberry	1	0.00
Aralia	Devil's walking stick	2	0.00
Ribes	Gooseberry	1	0.00
n = 25 (identified genera)		n = 409	average = 0.35

DISCUSSION

Our results agreed with those of NRC (1996) who reported extensive deer browse impacts in Andorra Natural Area. The NRC (1996) deer survey also showed that Andorra Natural Area had the highest density of deer on a per day count and that, in general, there were more deer in the northern region of Wissahickon. In 1994, browse use rates were over 60% for all species combined in Andorra. We found a range of browse impacts throughout Wissahickon. Of the six most heavily browsed genera of plants, only one of these was present in our transects in Andorra, where the most intensive browse impacts were noted. Because of this type of difference in occurrence of plant species across the park, the ranking of amount of browse does not necessarily indicate relative vulnerability of different plants to deer browse.

The proposed browse monitoring protocol (see attached data sheets) worked well in the field and can easily be taught to field technicians at any level of expertise at this type of sampling. There was some subjectivity in the protocol for example, identification of "browsed" twigs might vary among observers. Recorded GPS locations will permit return to these nearly exact transect sites in subsequent years. Yearly or more widely spaced temporal monitoring of transects will provide a measurement of temporal variation in browse impacts and should detect changes in browse impacts in the park.

Locations: (assign locations and transect ID)

Sample Technique:

1. Use tape measure to create100-m transects oriented N-S.
2. Stratify choice of transect placement by placing half of the transects on a sloping area and half on a level area. Whether or not a transect is in a ravine is unimportant.
3. Choose transect start point randomly by throwing marker over shoulder then extend the tape measure due north to the end point.
4. Record location of start point of transects using GPS. Write a short description of the transect location for subsequent reference.
5. Examine all twigs within 1.5 m of the ground on all woody plants for which at least one branch extends across the tape measure.
6. A twig is ≤7.5 mm diameter measured behind the terminal bud; do not include vines or dead twigs. Use the reference card to measure twig diameter.
7. Count number of intact, "not browsed" twigs and number of browsed twigs for each individual plant examined. A browsed twig should have a rough, frayed end as opposed to a clean cut.
8. Identify all species that you can confidently ID and keep samples of those plants that you cannot ID.
9. Each bush receives an ID number consisting of Transect # - Point # (e.g., A - 4.2). The point corresponds to the place on the transect where the first twig intersected the tape measure.
10. Label all sample bags with date, location, ID number on internal tag and on outside of bag.
11. Note other deer sign in the area including: pellet piles, beds, tree rubbings, trails, number of deer, presence of obvious browse line.
12. Leave a marker for the transect start point.
13. Take photos of the transect area (at deer height through the understory).

Equipment:

100-m tapes
flagging
meter stick or other measuring rods
twig ID books
plastic bags for specimens
labels
stakes
first aid kit in vehicle
cell phone
park map
notched card for twig width
clip boards
Perm. Markers for labeling bags
pens
field sheets
clippers
hand lens
camera

PROJECT NUMBER: **CITY**: Philadelphia **COUNTY**: Philadelphia **STATE**: PA

DATE: **START TIME:** **END TIME:**

PARK: **Collectors:**

COMPASS/GPS LOCATIONS

ZERO MARK:

100-M MARK:

HABITAT:

Conditions	
Cloud Cover	
Weather	

TECHNIQUE: Browse Transects **NOTES:**

SERIAL NUMBER:

TRANSECT NUMBER:

Samples Taken	
# of Bags	
(Other)	

Count of the number of twigs on plants where at least one branch of the plant intersects the tape-measure transect line. Count twigs from ground level to 2 meters above ground. Brows able twigs are <7.5 mm diameter.Point is the initial point where the twig contacts the transect.

Transect____							
Point							
Not browsed							
Browsed							
ID No.							

Transect____							
Point							
Not browsed							
Browsed							
ID No.							

Notes:

Appendix C-3. Recommendations for Environmental Management of Golf Courses

The Academy of Natural Sciences of Philadelphia

General suggestions for the ecological improvement of golf courses have been outlined and are included within this document. The Storm Water, Vegetation and Biodiversity teams of the Academy of Natural Sciences of Philadelphia (ANSP) provided site specific suggestions for each of the courses (Juniata, Walnut Lane, FDR, Cobbs and Karakung) within Fairmount Park. As part of management, responsibilities need to be clearly defined, as it is difficult to discern from topographic maps whether Fairmount Park or the golf courses has responsibility for a given area.

This document contains recommendations for buffer zones for each course. These buffer zones are areas within each of the golf courses where a riparian zone could be established, lengthened and/or widened by mowing less frequently. Riparian zones are important in improving water quality and controlling erosion in tributaries, as well as providing wildlife habitat. If unmowed, riparian zones will eventually revert to trees, while periodic mowing can be used to maintain meadow or shrub vegetation. For example, edges along parts of Karakung Golf Course are currently maintained as meadows, and these provide good wildlife habitat. Mowing twice a year, in the spring and fall, will allow for a meadow riparian buffer, which can provide habitat for birds and insects. For each of the following areas, we calculated a 35 foot buffer from each stream as appropriate, based on standards that have been proposed by the Pennsylvania Department of Environmental Protection (1998). These calculations are included in the enclosed spreadsheet. A 35 foot buffer is ideal for any of these sites, but any increase in buffer zone area to these courses would be an ecological improvement. In each golf course there are areas where buffer zones currently exist and the ecological effects of these riparian strips are obvious.

All of the recommendations were made with consideration to existing fairways, and should not obstruct these areas of the golf courses. The enclosed recommendations will only serve to make the golf courses more aesthetically pleasing and ecologically sound. Also included are pictures, if any were available, of each of these sites and detailed site maps for each park indicating site number, suggested buffer zones, storm water recommendations and vegetation recommendations.

*Please see an attached table of figures, pictures and maps for details pertaining to each park.

General Suggestions

Vegetation

1. Leave the woodland understory intact.
2. Encourage native plants in the landscape.
3. Plant native species which serve as food sources for birds/butterflies. For example, Trumpet Creeper can be planted around structures. This plant is ideal for hummingbirds and is also very beautiful.
4. If dead trees do not serve as a safety hazard, leave them in place. Dead trees provide cover and food for a variety of wildlife.
5. Protect or enhance wetland areas whenever/wherever possible.
6. Promote native grasses in the rough. A 10 foot strip on the outside edge of rough could be dedicated to promoting native grasses and wildflowers.

Water Conservation/Erosion Control

1. Avoid watering turf grass at peak evaporation times (during the day, especially in warm months).
2. Only water areas adjacent to park slopes when necessary, to minimize run-off and slope erosion.

Pesticide/Fertilizer Use

1. Reduce herbicide, pesticide and insecticide use. Insects and other invertebrates are an important component of biodiversity, are a major food source for birds and are critical for the pollination of many plants.
2. Use nutrient products and practices that reduce the potential for contamination of ground and surface water. Strategies include: use of slow-release fertilizers and selected organic products.

Disposing of Waste

1. Turn an existing dump site into a compost pile. Do not, however, create a dump site in any un-maintained area of the park.
2. Leave grass clippings and other organic materials in place whenever agronomically possible. If clippings are removed, compost and, if possible, recycle them.
3. Other waste products, such as used motor oil, electric batteries, and unused solvents, should be recycled or disposed of according to the law and available community disposal techniques.

Promoting Habitat

1. Habitat for wildlife species (e.g., bats, birds, etc.) that help control pests should be protected. Additional habitat for these beneficial species should be created whenever feasible and environmentally desirable.
2. Install nest/roost boxes for bluebirds, tree swallows, wood ducks, kestrels, bats, etc.
3. Reduce mowed areas outside fairways by mowing as infrequently as twice a year.

4. Encourage native plants in water bodies; this provides cover, food for many birds, breeding and migratory and aquatic insects.
5. Encourage a 10 to15 foot buffer zone of native plants in golf course areas adjacent to forests. These zones will protect the forest from golf course impacts and can also provide habitat for wildflowers and butterflies.

Outreach

1. Organize a wildlife/conservation committee.
2. Provide a pamphlet for each course describing bird life; possibly placards at each tee (next to the ball washers) about particular species.
3. Become involved in earth day activities by sponsoring events which target local schools.
4. Become part of the "Audubon Cooperative Sanctuary System" by contacting:
   The Audubon Cooperative Sanctuary System (ACSS)
   c/o Audubon International
   46 Rarick Road
   Selkirk, NY 12158
   (518) 767-9051
   www.audubonintl.org

Site Specific Projects:

FDR Golf Course

Buffer Zones:

1. In this golf course, 11 sites could be considered for Riparian Zone widening/ improvement. Each of these areas should be mowed infrequently (biannually), and native plants should be encouraged. Please refer to the attached maps, photographs and spreadsheet for more site-specific site information concerning these buffer zones. These buffers are listed on the accompanying map, where 1" =100'.

Biodiversity Recommendations:

An excellent example of wildlife habitat exists in the middle of the course. This site is one of the only locations of ring-necked pheasant in Philadelphia. This bird relies on the cover provided by unmowed areas between holes and adjacent to the golf course. Other birds, such as sparrows (both breeding and wintering), swallows, flycatchers, and warblers also rely on these infrequently mowed areas.

Karakung Golf Course

Buffer Zones:

1. In this golf course, 11 sites could be considered for Riparian Zone widening/ improvement. At each of these sites, mowing should be ceased or done infrequently, and native plants should be encouraged. Please refer to the attached maps, photographs and spreadsheet for more site-specific information about the buffer zones. There is no accompanying map.

Vegetation Recommendations:

1. Located on the topographic map at coordinates P10-11, labeled as Vegetation site #1. This area, on the left bank of Indian Run, is an eroding slope that should be planted with native trees to stabilize.
2. Located on the topo map at coordinates O12-13, labeled as Vegetation site #2. This area needs to be planted with native herbaceous species to control erosion along the banks.
3. Located on the topographic map at coordinates O12, labeled as Vegetation site #3. This should be an infrequent mow zone, and wetland plantings are suggested.
4. Located on the topographic map at coordinates N15, labeled as Vegetation site #4. This is an existing wetland which should be encouraged through plantings. There should also be an infrequent mow zone surrounding this wetland.
5. Located on the topographic map at coordinates O-P 14-15, labeled as Vegetation site #5. This area is already a small wetland that should be protected by infrequent mowing and enhanced by native wetland plantings.

Storm Water Recommendations:

1. At Storm Water site #1, located on the topographic map at coordinates P 14-15. The headwaters of this tributary to Cobbs Creek originate from two low grassed swales within the fairway.

Where these swales reach the edge of the fairway an infrequent mow zone should be created, and native grasses/shrubs and possibly trees should be planted. Planting wetland species here should also be encouraged.

Cobbs Creek Golf Course

Buffer Zones:

1. In this golf course, 15 sites could be considered for Riparian Zone widening/ improvement. At each of these sites, mowing should be ceased or done infrequently, and native plantings should be encouraged. Please refer to the attached maps, photographs and spreadsheet for more site-specific information about the buffer zones. These buffers are listed on the accompanying map.

Vegetation Recommendations:

1. Left bank of Cobbs Creek near driving range at CC golf course, map cell: E11, labeled Vegetation site #1. In this area, Japanese knotweed has overrun the banks of Cobbs Creek and is particularly dense in the riparian zone. The Japanese knotweed should be controlled, and native species should be planted.
2. Located south of Farrington Road, on the topographic map at coordinates J-K1, labeled as Vegetation site #2. The yard waste dumping (clippings, bags, soil, etc.) should be stopped and the waste removed. The clippings should be composted. This is also an area where a 10 to 15 foot upland buffer is suggested to shield the surrounding high quality forest from direct golf course impacts.
3. Located at Cardington and 75th street, on the topographic map at coordinates O11, labeled as Vegetation site #3. This area has many exotic species which should be removed and planted with natives. The exotics are also found directly across Lansdowne Ave, at coordinates N11.

Storm Water Recommendations:

1. Labeled as Storm Water site # 1, a tributary to Cobbs Creek. In map cell I12, the stream runs through the maintained golf course area. The matting in the stream needs to be replaced. It appears to have been placed to stop a headcut advance with a natural step (basically a small waterfall built with native rock). The drop structure at the confluence of Cobbs Creek needs to be removed and replaced with a natural fall.
2. Labeled as Storm Water site #2, map cells I13, G13. Replace the three "low water" golf cart crossings with spanning bridges to prevent the buildup of debris in the channel around the island. The debris trapped behind the bridges should be periodically cleared. This will prevent further scouring and erosion of the stream channel.
3. Labeled as storm water site #3, map cells G13, H13. The riparian zone in this area needs to be restored. Again, a 35 foot buffer is recommended and native plants should be encouraged here. The design would need to take into consideration the fairway of the hole. Deteriorated walls would be removed, banks would be regraded where needed and stabilized with bio-engineering techniques.
4. Labeled as Storm Water site # 4, map coordinates L13-14 and M14-15. This tributary to Cobbs Creek is entirely within the golf course. It is incised and has no riparian buffer. An infrequent mow area within the fairway crossings needs to be maintained and planting of trees/shrubs in the zones not within fairways is also recommended. The stream is very downcut and some regrading might be required.

Walnut Lane Golf Course

Buffer Zones:

1. In this golf course, two sites could be considered for Riparian Zone widening/ improvement. At each of these sites, mowing should be ceased, and native plantings should be encouraged. Please refer to the attached maps, photographs and spreadsheet for more site-specific information about the buffer zones. These buffers are listed on the accompanying map.

Vegetation Recommendations:

1. Located north of Henry Avenue, labeled as Vegetation site #1. This area is highly impacted by golf course activities. The area is watered during the day causing erosion along the slopes. The slopes contain Norway maples, an exotic species which should be removed. To control erosion, native trees should be planted after removal of the Norway maples.

Juniata Golf Course

Buffer Zones:

1. In this golf course, nine sites could be considered for Riparian Zone widening/ improvement. At each of these sites, mowing should be ceased, and native plantings should be encouraged. Please refer to the attached maps, photographs and spreadsheet for more site-specific information about the buffer zones. These buffers are listed on the accompanying map, where 1" = 447'.

Vegetation Recommendations:

1. Located at map coordinates J25, labeled as Vegetation site #1. This site is a small wetland which could be expanded simply by not mowing the adjacent area and possibly planting some native wetland species.
2. Located at map coordinates J-K 24-25, labeled as Vegetation site #2. This area should be cleared of Japanese knotweed and a more suitable, native species should be planted.

Storm Water Recommendations:

1. Located between Ramona Street, Cayuga Street and the Creek. This site needs some slope repair and native plantings to stop any further erosion along the banks, caused by storm water run-off.

Cobbs Creek Golf Course

Buffer site #2*. North of RR, West of Lansdowne.

Buffer site #15. North of fairway #1.

Buffer site #4. Left bank of Creek, South of tee #4.

Buffer site #12. Next to parking lot.

*Buffer site # refers to the riparian sites, which can be found on maps.

Juniata Golf Course

Buffer site #6. Left bank of Frankford Creek, between fairways #16 and #19.

Buffer sites #4 and 5. Left bank of Frankford Creek, debris dam.

*Buffer site # refers to the riparian sites, which can be found on maps.

FDR Golf Course

Buffer site #4. In between holes #2 and 5, on Shedbrook Creek.

Buffer site #8. Parallel to hole #17.

Buffer site #13. Between holes #9 and 10.

*Buffer site # refers to the riparian sites, which can be found on maps.

Karakung Golf Course

Buffer site #7. North of fairway #15.

Buffer site #11. West of Carrington Rd.

Buffer site #8. North of fairway #14.

Buffer site #10. East of Lansdowne Ave.

*Buffer site # refers to the riparian sites, which can be found on maps.

Karakung Golf Course

Buffer site #2. Left bank of Indian Creek, North of fairway #2.

Buffer site #1. Left bank of Indian Creek, adjacent to Carrington Rd.

*Buffer site # refers to the riparian sites, which can be found on maps.

John F. Byrne Golf Course

Buffer site #1. Grant Ave. bridge.

Buffer site #3. West of hole #6, right bank of creek.

*Buffer site # refers to the riparian sites, which can be found on maps.

John F. Byrne Golf Course

Buffer site #4. South of hole #7, left bank.

Buffer site #8. West of hole #4, right bank.

*Buffer site # refers to the riparian sites, which can be found on maps.

John F. Byrne Golf Course

Buffer site #7. North of hole #3.

Buffer site #12. West of hole #18, right bank.

*Buffer site # refers to the riparian sites, which can be found on maps.

John F. Byrne Golf Course

Buffer site #9. South of hole #2, left bank.

Buffer site #6. South of hole #7, left bank.

*Buffer site # refers to the riparian sites, which can be found on maps.

APPENDIX D

Glossary of Terms

Fairmount Park System

Natural Lands Restoration

Master Plan

Age structure. The proportions of different ages of individuals within a population of plants or animals.

Alluvial valleys. Valleys resulting from the deposition of sediments previously deposited by flowing water.

Amphibian. A cordate class represented by three groups, of which the salamanders (Urodela) and frogs and toads (Anura) are the best known. They are vertebrates, and the majority are terrestrial but develop by a larval phase in water. Most are found in damp environments.

Anthropogenic. Applied to substances and processes of human origin or resulting from human activity.

Bar. A sand or gravel storage feature found on the bed of a stream that is often exposed during low-water periods.

Base Flow. The flow that a perennially (continuously) flowing stream reduces to during the dry season. It is supported by groundwater seepage into the channel. Runoff that reaches a stream or river by passing first through the underlying aquifer, rather than by flowing directly on the ground surface.

Bed. The bottom of the channel of a stream.

Benthic macroinvertebrates. Organisms lacking internal back bones (invertebrates) that are large enough to be observed with the unaided eye (macro) and live near the bottom of a body of water (benthic).

Binomial. A system of species classification introduced by Linnaeus which uses a Latin generic noun followed by a specific adjective.

Bioengineering. This term generally refers to engineering or restoration techniques that emphasize the use of plants or plant byproducts as major structural components.

Biodiversity. All aspects of biological diversity , including species richness, ecosystem complexity, and genetic variation.

Brackish. Water that is saline, but less so than sea water.

Canopy. The highest layer of vegetation in a woodland or forest community.

Centroid. The center of mass, inertia, or gravity of a body or system of bodies.

Climax community. The final stage of a plant succession in which vegetation changes minimally.

Coastal Plain. Region along the Atlantic Ocean and Gulf of Mexico characterized by low elevations, level terrain, few bedrock outcrops, and sedimentary deposits of sand and gravel. Most of southern New Jersey is in the Coastal Plain, as well as a narrow band along the Delaware and Schuylkill Rivers in Southeastern Pennsylvania. Because of differences in soil, hydrology, and climate (related to elevation and proximity to the ocean), the Coastal Plain supports ecological communities different from those of the adjacent Piedmont.

Colonization. Immigration and establishment of a species in an area.

Daylighting. A stream restoration practice that involves the excavation and restoration of a stream channel from an underground culvert, covering, or pipe.

Deciduous forest. Ecosystem dominated by trees which shed their leaves seasonally.

Deer exclosures. Sites from which deer are excluded by fences or other devices.

Depauperate. Falling short of the natural size, from being impoverished or starved, e.g., of low biodiversity.

Deposition. The accumulation of soil particles on the channel bed and banks.

Detention (or Retention) basin. A water storage device used to slow down the rate of surface water runoff. These devices delay the passage of water during storm events in order to reduce flood peaks.

Detritus. Litter formed from fragments of dead material.

Digitization. The process of transferring graphical or written data into computerized data, specifically used to translate shape data into computer graphics.

Ecosystem. The totality of interacting organisms and non-living components (e.g., soil, water) of an area.

Ecological communities. A grouping of populations of different organisms found living together in a particular environment.

Ephemeroptera. An order of insects, which includes the mayflies.

EPT. Ephemoroptera-Plecoptera-Trichoptera Index. This is the number of taxa of mayflies, stoneflies and caddisflies, which are generally considered pollution-sensitive insects.

Estuary. A tidal waterbody with freshwater inputs resulting in salinities less than those of seawater.

Exotic plants. Introduced (i.e., non-native) species of plants.

Extant. A taxon some of whose members are living at the present time. Used in the text for species extant within a given area of concern (e.g., within Fairmount Park).

Extirpation. Eradication of a taxon from a given area. Used in the text for taxon extirpated within a given area of concern (e.g., within Fairmount Park).

Family. A taxonomic group which comprises the principal division of an order and in turn is divided into genera.

Fauna. The animal life of a locality or region.

Fiber Logs and Mats. Materials made from plant fibers that are used to stabilize stream banks. They are typically made of coconut fiber.

Flood plain. The land bordering a stream that is inundated with water at time of high water.

Flora. The plant life of a locality or region.

Fluvial. Formed or produced by the action of a river or stream.

Fungi. Any of the large group of simple plants characterized by lack of chlorophyll. The molds, mildews and mushrooms belong to this group.

Gallery forest. A thin band of forest along a stream or river.

Geomorphologic. Characteristics of land forms (in this case streams) that describe their configuration and evolution.

Geomorphology. The geological study of the configuration and evolution of land forms.

Genus. A subdivision of a family which includes one or more closely related species.

Ground truthing. Verifying data and boundary lines from aerial mapping by walking a site and recording conditions.

Groundwater. All subsurface water that is distinct from surface water.

Groundwater recharge. The process by which water is added to the subsurface water reservoir to replenish an aquifer.

Habitat. The living place of an organism or species, as characterized by its physical or biotic properties.

Herb. A non-woody, seed-bearing plant.

Herbaceous. Herblike; resembling or having the characteristics of an herb.

Herbaceous cover. Area composed of small, non-woody, seed-bearing plants.

Herbivore. An animal which feeds on plants or plant products.

Herpetofauna. The reptile and amphibian life of a locality or region.

Hibernaculum. Describes sites where hibernation takes place.

Holarctic. Of or pertaining to the arctic and temperate regions of North America and Eurasia; designating a realm or region including the northern parts of the Old and the New World. It comprises the Palearctic and Nearctic regions or subregions.

Hydrology. The study of water in all its forms (liquid, gas and solid) on, in, and over the land areas of the earth.

Incised channel. A stream that has degraded and cut its bed into the valley bottom. Indicates accelerated and often destructive erosion.

Indicator species. A species that is of narrow ecological amplitude with respect to one or more environmental factors and which is, when present, therefore indicative of a particular environmental condition or set of conditions.

Inorganic. A substance which does not contain carbon or compounds of carbon. A substance which is not of plant or animal origin.

Impervious cover or surfaces. Surfaces of the earth that have been covered by impermeable materials such that water can no longer infiltrate into the soil. Examples: roofs, driveways, sidewalks, parking lots, and roads.

Infiltration. Movement of water into the soil.

Infiltration techniques. Any practice that encourages the movement of water into the ground. These can be earthen basins with no primary surface outlet, small depressions with porous soils and vegetation that encourages evaporation and transpiration, or the use of permeable pavements.

Keystone species. A species which has a dominant effect on the structure and function of an ecological community.

Larva. The young and immature form of an organism which is unlike the adult.

Larval. Of or pertaining to a larva.

Lepidoptera. An order of insects, which includes the butterflies and moths. They have broad wings, covered with minute overlapping scales, and are usually brightly colored.

Lichens. Organisms which consists of a fungus and an algae living in symbiotic association.

Malaise traps. A tent-like net used to trap and collect insects for scientific investigation.

Mature forest. A forest which has the characteristics of an old, well-developed forest. Typical characteristics of mature forest in the Philadelphia region are presence of large, old trees; presence of species of plants which grow in shady forests; presence of a well-developed herb layer; accumulation of fallen branches and logs, and organic soil and leaf litter.

Meadows. Vegetative communities containing few trees or shrubs, consisting largely of grasses and forbs.

Metric. Of or pertaining to the meter as a standard of measurement; of or pertaining to the decimal system of measurement of which a meter is the unit; as, the metric system; a metric measurement.

Morphology. The form and structure of individual organisms, as distinct from their anatomy.

Native plants. Species of plants that occur naturally in a particular area. Plants that have not been introduced to the area by humans either accidentally or intentionally.

Nonpoint source pollution. Pollution originating from diffuse areas (land surface or atmosphere) having no well-defined source or point. Examples: agricultural runoff, urban runoff, atmospheric deposition.

Nutrient. Materials, including minerals, necessary for growth of plants or animals.

Nutrient cycling. Patterns of physical movement and biological processing of nutrients in ecosystems. Nutrient cycling includes uptake of nutrients by plants, transfer of nutrients to plant consumers, transfer of nutrients to soil or water by decay of plants and animals and by excretion, and movement of nutrients (e.g., by air and water).

Old field. Vegetation community consisting of grasses, herbs, and shrubs, which typically develops after mowing or cropping is stopped.

Organic. Pertaining to, originating in, or derived from living organisms.

Ornithologists. Scientists who specialize in the study of birds and bird life.

Peak Flow. The maximum rate of water runoff during a storm event.

Piedmont. Region characterized by low hills (foothills). Much of Fairmount Park is in the Piedmont region.

Planform. The patterns or geometry exhibited by a stream channel when viewed from above.

Plants and animals. Used in the text in an informal sense to indicate all living organisms. Some taxonomic classification systems distinguish other groups of organisms at the same level as plants and animals (e.g., fungi), so that "plants and animals" is not all-inclusive in these classifications.

Plecoptera. An order belonging to class Insecta; it is comprised of the stoneflies.

Polygons. Areas which were plotted on the field maps that distinguish one type of plant community from another. Boundaries were based on aerial photography and ground truthing. Also used to outline recommended restoration sites.

Pool. A deep zone along the bed of a stream.

Population. Used in the text to indicate a group of individuals of a species living within an area.

Production. Used ecologically to mean the production of living material, including primary production (production by plants by photosynthesis) and secondary production (production by plant-eating animals and carnivores by consumption).

Refugia. Isolated areas where extensive changes have not occurred. Flora and fauna characteristic of the area find refuge from unfavorable conditions in such areas.

Regeneration. Establishment and growth of new seedlings of plant species present in a vegetation community.

Reptile. A member of the class Reptilia. They have a body covering of ectodermal scales, sometimes supported by bony plates. They are air breathing from hatching onwards. Turtles, lizards, snakes and crocodilians are the main living groups.

Restoration. Used here to mean modification of an area to increase or create ecological characteristics which are typical of self-sustaining ecological communities of the area now or at some point in the past. The ecological characteristics may pertain to ecological structure (e.g., types of habitats present, or amount of canopy and understory trees in a forest), biodiversity (e.g., species present in the area), or ecological processes (e.g., productivity, water-holding capacity, nutrient cycling).

Riffle. Stream habitat characterized by shallow water, rapid currents, and coarse substrates (e.g., gravel, cobbles and boulders).

Riparian zone. The land area that includes the stream as well as the land immediately adjacent to the stream channel.

Riprap. A layer, facing, or protective mound of rubble or stones randomly placed to prevent erosion, scour, or sloughing of a stream bank..

River drainage. A river and the group of tributaries which ultimately flow into that river.

Runoff. The portion of precipitation or snow melt that flows over and through the soil, eventually making its way to surface water supplies (streams, rivers, lakes).

Savannah. Ecological community containing a mix of meadow and trees (as single trees or small groups).

Scour. The erosive action of flowing water in streams that removes and carries away material from the bed and banks.

Seeps. Areas where groundwater emerges on the land surface.

Seine. A large net, one edge of which is provided with sinkers, and the other with floats. It hangs vertically in the water, and when its ends are brought together or drawn ashore encloses aquatic organisms.

Seining. The act of using a seine.

Spawn. To produce and deposit eggs, with reference to aquatic animals.

Species. A group of organisms that resembles one another closely. Under common taxonomic definitions, it is applied to one or more groups of individuals that can interbreed within the group but cannot exchange genes with other groups.

Stochastic. Random in nature.

Storm flow. Runoff that occurs asa result of a rainfall or snow melt event.

Substrate. The particles that make up the stream bed.

Succession. Sequential changes in vegetation either in response to an environmental change or induced by the intrinsic properties of the plants themselves. Within areas of similar environmental

conditions in a geographic region, there is often a consistent pattern of community types through succession. For example, starting from a field (e.g., abandoned agricultural field), a typical sequence in the Philadelphia area consists of: a) meadows with high proportion of annual species (old field); b) meadows with increasing proportion of perennial herbs and shrubs (old field); c) mixed meadows/woods with an increasing proportion of shrubs and small trees; d) woods with a characteristic group of species such as aspen, birches, maples, sassafras, ashes and tulip poplar; e) woods with increasing canopy cover, and loss of species which cannot regenerate in shady forests, and increase in shade-tolerant species, such as oaks and hickories (mature forest).

Taxon (Taxa). Member (members) of a single group of organisms, as defined by a taxonomic classification of the organisms. Taxa may be species, subspecies, varieties, or higher groupings such as taxonomic orders.

Transects. A line used in ecological surveys to provide a means of measuring an area representing the distribution of organisms.

Trichoptera. A suborder of insects called Neuroptera usually having wings covered with minute hairs. It comprises the caddisflies, and is considered by some to be a distinct order.

Understory species. The trees of the lower canopy levels in a woodland ecosystem.

Watershed. The land area that contributes runoff to a stream.

Wetlands. Term applied to open water habitats and seasonally or permanently waterlogged land areas, including lakes, rivers, swamps, and brackish and freshwater marshes.

APPENDIX E

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CORREGIENDA

The text contains some incorrect citations. These citations and the corresponding citations in the literature cited are as follows:

Brauning et al. (2000) see McWilliams and Brauning 2000

Collinson (1741 or 1751): see Collinson (1758)

Gebhart (1968): see Gebhart 1998

Genoways et al. (1985): see Genoways and Brenner (1985)

Harmon (1980): see Harmon (1981)

Johnson (1914): see Johnson (1915)

Mitch (1993): see Mitsch and Gosselink (1993)

Pecarsky, (1990): see Pecarsky et al. (1990)

Pennoni (1973): see J/C Associates (1973)

Plafkin (1989): see Plafkin et al. (1989)

Rhoads (1983): see Rhoads and Mellon (1983)

Siokalo (1945): see Siokalo, et al. (1988)

Sommer (1963): see McNeil (1963)

Still Phila. (1983): see Miller, et al. (1983)

Wherry (1969): see Wherry (1968)

APPENDIX F

Acknowledgments, Data Archival and Publication Dates

Fairmount Park System

Natural Lands Restoration

Master Plan

Appendix F-1

Acknowledgments

The master planning process was a group effort involving staff of the Academy of Natural Sciences of Philadelphia (ANSP), the Fairmount Park Commission, a number of agencies and other institutions, as well as many local citizens. We express our gratitude to everyone associated with the project.

The master plans and appendices were written by Richard Horwitz and Bradley Thompson (introductions, overviews, restoration techniques, individual restoration site write-ups and other sections), Nichole Coulter, A. Ernest Schuyler, Ann Rhoads and Timothy Block (including vegetation assessments, restoration techniques, and individual restoration site write-ups), W. Cully Hession, Maeve McBride, Christina Cianfrani, James Pizzuto, and Susan Herbert (including stormwater assessments, restoration techniques, and individual restoration site write-ups), Jon Gelhaus and Jason Weintraub (terrestrial insects), Gary Rosenberg (mollusks), Ned Gilmore (reptiles and amphibians), Andrew Ingersoll (birds), Brett Marshall (aquatic macroinvertebrates), Frank Acker (algae in FDR Park), David Velinsky (FDR water chemistry) and Mark Focht (community mapping). Maps were prepared by Maeve McBride, Christina Cianfrani, Linda Masiura, Mandy Reale, and W. Cully Hession. John Munro and Tom Witmer prepared the vegetation classifications from aerial surveys. Editing was done by Robin Davis and Richard Horwitz. Roger Thomas and Bradley Thompson were responsible for preparation of figures (historical maps, photographs, etc.). Patrick Cotter had primary responsibility for creation and maintenance of databases for the project. Daniel Snyder, Latoria Bonner, Alex Gino, Kate McGinty, Sandy Gordon and Mark Isakson provided extensive administrative support.

In addition, we thank the many other individuals associated with the Academy who assisted with study design, field surveys, data collection, specimen curation, specimen identification, data management/entry/analysis, digitization, editing assistance, text review, preparation for presentations, photographic assistance, location of specimens, specimen data and unpublished data, etc.: Kirsten Acker, Nick Allmendinger (University of Delaware), Don Azuma, Martin Bernstein, Rachel Betesh, Adam Boettner, Ray Bouchard, Will Bouchard, Jr., Karen Brown, Karen Bushaw-Newton, Don Charles, Rich Clark, Patti Connelly, Ted Daeschler, Clara Elias, Linda Fuselier, Noah Goodman, David Hart, Bob Heacock, Heidi Hertler, David Hewitt, Mike Hoffmann, Tom Johnson, Paul Kiry, Dan Kreeger, John LaPolla, Renata Malejki, Heather O'Connor, T. Kevin O'Donnell, Nate Orfe, Paul Overbeck, Ruth Patrick, Joseph Perillo, Joe Resnick, Nate Rice, Robert Ridgely, David Robinson, Keith Russell, Bill Saul, Heather Schultz, Sandy Sherman, Lauren Spearman, Kathleen Sprouffske, David Steckel (Natural Land Trust), Tom Trolley, Doug Wechsler, and Vivian Williams. We thank Eileen Mathias, Carol Spawn, Meg Lewis and Earl Spamer of the Academy's library and archives for assistance with obtaining information. We thank James McNair, Margot Bram, and Maureen Collins of the Academy's Adaptive Management program for information concerning invasive species.

We thank the William Penn Foundation for the vision to fund the extensive restoration embodied in the Natural Lands Restoration and Environmental Education Program. We thank the leadership of the Fairmount Park Commission, including F. Eugene Dixon, Jr., President and William E. Mifflin, Executive Director. We thank staff of the Natural Lands Restoration and Environmental Education Program for continual support and assistance; we owe particular thanks to Nancy Goldenberg, Mark Focht, Tom Witmer, Anna Kamstra, Debbie Harding, Nancy Smith-Fagan, Jacqueline Olson, Joseph Caesar, Tamara Green, David Bower, and Tom Dougherty. We thank other members of the staff of the Fairmount Park Commission for logistical support and information. We

owe special thanks to Barry Bessler, Debbie Carr, Joseph Carter, Crawford Clark, Stephanie Craighead, Patricia Crossan, Sam Curry, Jim Donaghy, Jack Eckenrode, Lori Hayes, Amy Freitag, Robert Hunter, Thomas Kline, Frances Koehler, Peter Kurtz, Peter Odell, Chris Palmer, Nancy Peter, Kate Lapszynski and Theresa Stuhlman for their many contributions to the study.

In addition to the Academy team and the Fairmount Park Commission staff, many other individuals were instrumental in the success of the project. Their assistance does not necessarily imply agreement with the goals, conclusions or recommendations presented in the Master Plans. We thank Ann Todd Bockarie, Louise Tritton, William Burch and Paul Jahnige of Yale/Community Resources for information and review of restoration goals, monitoring plans, etc. We thank David Robertson (Pennypack Ecological Restoration Trust), Claire Billett, Jason Lubar, Roger Latham, John Munro (Munro Ecological Services) and Paul Meyer (Morris Arboretum) for technical advice and for many stimulating discussions concerning restoration goals, planning and implementation. We thank the staff of the Philadelphia Water Department for providing GIS data, information on infrastructure, for reviewing restoration sites, and for assistance with field collections. Particular thanks go to Howard Neukrug, Brian Marengo, Drew Mihocko and Lance Butler. We thank the staffs of Andropogon Associates, Ltd., Thomas Cahill Associates, Biohabitats, Inc., and the Natural Lands Trust for discussions and information concerning restoration technologies, trail planning, restoration implementation, and protection of adjacent open lands. We thank Edgar David, Nathan Heavers, and Bruce Gebhardt for providing unpublished data on plants and fishes, Mike Boyer and Alan Everitt (Pennsylvania Department of Environmental Protection) for unpublished data on fishes and macroinvertebrates, and Chen Young (Carnegie Museum of Natural History) for data on insects. We made use of data developed by a variety of grants to the Academy of Natural Sciences of Philadelphia, including grants from the US Environmental Protection Agency, the US National Science Foundation, and the Natural Resource Conservation Fund of the Pennsylvania Fish and Boat Commission. We thank members of the NLREEP Technical Advisory Committee for insight into regional problems and solutions. We thank Carl Dupoldt (USDA Natural Resource Conservation Service), Stephen Hammill, Bill Lamark (Bowman's Hill Preserve), John Pedrick (Pennsylvania Fish and Boat Commission), Fred Suffian (US Environmental Protection Agency), Richard Widmann (US Forest Service) and Carmen Zappile (US Army Corps of Engineers) for technical advice and information. Staff of the Free Library of Philadelphia and the Swedish Museum were extremely helpful in obtaining historical information and maps. The American Entomological Society provided advertising for the first Bio-Blitz.

Finally, we thank the many Friends group members and other citizens who provided tremendous levels of local information and concern about problems and possibilities within the park system. Particular thanks go to Fred Mauer, Roland Williams, and Charles Younger, who provided information on specific sites and faunal occurrence in the park.

Appendix F-2

Data Archival

The databases and GIS data have been provided to the Natural Lands Restoration and Environmental Education Program of the Fairmount Park Commission. Selected specimens and specimen data from assessments have been deposited into the permanent biological collections of the Academy of Natural Sciences of Philadelphia. Other archival material, including field notes and photographs, have been deposited in the permanent archives of the Academy of Natural Sciences of Philadelphia.

Appendix F-3

Publication Dates

The master plans for individual parks were prepared at different times to allow more efficient implementation of restoration activities. Submission dates for sections are:

Volume I	September 9, 1999
Cobbs Creek Park (Chapter 1 of Volume II)	September 9, 1999
Tacony Creek Park (Chapter 2 of Volume II)	September 9, 1999
Fairmount (East/West) Park (Chapter 3 of Volume II)	June 14, 2000
Pennypack Park (Chapter 4 of Volume II)	June 22, 2000
FDR Park (Chapter 5 of Volume II)	August 30, 2000
Wissahickon Creek Park (Chapter 6 of Volume II)	April 30, 2001
Poquessing Creek Park (Chapter 7 of Volume II)	April 30, 2001
Volume III (original)	September 9, 1999
Volume III (revision)	May 11, 2001.