Appendix

Existing Parkland Ownership

Study Area Existing Parkland Ownership[1] Table A-1

Owner	Acres	% of Parkland	% of Study Area
M-NCPPC	6,381	82	10
State of Maryland	1,299	16	3
Revenue Authority	129	2	>1
Total	7,808	100	17

(1) GIS coverage of existing parkland, M-NCPPC 2002.

Environmentally Sensitive Areas

The sensitive areas mapped for purposes of this report were prepared with some limitations on both the information available and the level of effort associated with preparing the computer Geographic Information System (GIS) coverages. The sensitive areas mapped in Figure 10 and reported in Table 7 consist of a combination of several types of areas, many of which overlap. Sensitive areas are defined by the State Planning Act of 1992, which includes areas considered sensitive by the local government. For purposes of this report, wetlands and wetland buffers are added to the list defined by the legislation of 100-year floodplains, streams and their buffers, steep slopes, and habitats of rare, threatened, or endangered species. Since a comprehensive understanding of the locations of habitats of rare, threatened or endangered species is not mapped, this information was not included in the tables or maps.

The range of acreage and percentages used for stream buffers represent the highs and lows for buffer width applied consistently along the entire stream length. Slopes were not used directly to determine the buffer width as they would be when looking at individual sites. Steep slope acreages and percentages are based on a computerized analysis of the topography to determine areas with slopes greater than 25 percent. The wetlands coverage consists of information from the 1997 DNR wetlands identification project. The 100-year floodplain was mapped using two sources of information: 1) The M-NCPPC 1"=200' ultimate land use floodplain maps of major tributaries, and 2) the 1995 Soil Survey of Montgomery County which contains information on floodplain soils. The M-NCPPC floodplain maps cover portions of the mainstem and major tributaries of the Upper Great Seneca Creek and Middle Great Seneca Creek watersheds. The M-NCPPC floodplain maps provide the best level of detail and were designed to account for full buildout based on 1977 zoning. The soils maps are less accurate than the M-NCPPC floodplain maps, but they provide floodplain information on streams not covered by the M-NCPPC maps.

All these coverages were combined to obtain a single map of sensitive areas that incorporates stream buffers, steep slopes, the floodplain, wetlands, and wetland buffers as established in the *Environmental Guidelines*. The sensitive area coverage is approximate and only to be used for master planning purposes. Site specific planning and detailed design require more refined mapping and field investigation.

Countywide Stream Protection Strategy (CSPS)

Data Collection

The CSPS incorporates stream water quality data collected by state and county agencies, as well as volunteers from the Audubon Naturalist Society, and representatives of the development community.

Management Categories

The CSPS developed five categories that were based first on the existing stream quality and imperviousness combined with predominant land use. The special protection area and regular protection area were included as management approaches (along with a remedial protection approach) under a more general watershed protection category. Two

management categories were added to deal with the special conditions in agricultural and urban areas. The categories in the CSPS include:

Watershed Preservation Areas

- Stream condition is EXCELLENT.
- Projected land use is not expected to put significant stress on resource and projected imperviousness is generally less than 10 percent of the subwatershed area.
- Areas are generally protected by very low density zoning or parkland.

Watershed Protection Areas

- Stream condition is EXCELLENT or GOOD
- Existing and/or planned land use results in development patterns with imperviousness above 10 percent and protection of the resources from development impacts is necessary.
- Different management levels are applied based on the level and type of protection deemed necessary to protect the resource:

Special level: Due to the sensitivity of the resource and the magnitude of change between existing and planned development, some level of enhanced watershed management is necessary beyond typical environmental guidelines and sediment control and stormwater permitting requirements.

Regular level: Standard existing protection measures are expected to adequately protect the resource from existing and/or projected land use. Development activity is not expected to significantly increase impervious area over what already exists and accompanying development review requirements and stormwater controls would provide adequate mitigation.

Remedial level: Stream condition is good or excellent but problems are observed, usually in the habitat condition, that are attributable to previous land use impacts. Habitat conditions may be on the verge of, or in the process of deteriorating, but stream biological integrity has not yet deteriorated to fair or poor conditions requiring more comprehensive restoration efforts. The remedial level may be used in conjunction with a special level of protection, where existing habitat problems exist and projected land uses are expected to increase imperviousness significantly. In these areas it is particularly important to address existing channel instability so that stream reaches will be able to withstand small incremental impacts associated with change in land use. The remedial level under Watershed Protection Areas differs from Watershed Restoration areas by being applied as limited spot improvements to areas with good or excellent stream condition. Watershed Restoration areas have fair or poor stream condition and require more comprehensive restoration efforts.

Watershed Restoration Areas

- Stream condition FAIR or POOR.
- Contributing drainage generally has less than 55 percent ultimate impervious area.
- Significant areas of natural stream channel still exist.
- Most land abutting the stream is in conservation easements or public ownership.

Urban Watershed Management Areas

- Designation based on recognition that certain existing and planned land uses have a detrimental and unavoidable effect on subwatershed hydrology, stream habitat, water quality, and aquatic life that limits the potential for restoration.
- Stream condition is POOR.
- Land use generally consists of intense development (e.g. Central Business Districts, major commercial areas).
- Contributing drainage generally has 55 percent or greater ultimate impervious area and system presently does not support viable biological community.
- Significant portion of the drainage area is piped or channelized and habitat restoration is generally infeasible.

Agricultural Watershed Management Areas

- Stream condition is GOOD, FAIR, or POOR.
- Agriculture is the predominant land use.
- Some level of impairment is reflected in the monitoring data, as indicated by a resource condition of good, fair, or poor. (Excellent

agricultural subwatersheds would fall into the Watershed Preservation Area management category).

- The Montgomery Soil Conservation District would be the lead agency for developing management approaches and tools for Agricultural Watershed Management Areas

Existing Subwatershed Imperviousness

Existing imperviousness (see Figure 19) was obtained from the County-wide Stream Protection Strategy. The CSPS used the information from the county's geographic information system (GIS).

The GIS information represents conditions in the period 1993-1994 (different parts of the study area were photographed at different times). Land use conditions reflected by the planimetric data were assumed to closely represent present existing conditions. That is, available planimetric data were used to characterize existing conditions with respect to land uses and land cover.

GIS was used to measure all paved surfaces and building rooftops that are shown in the planimetric layers for each subwatershed. These layers include all features that are considered to be impervious surfaces except for sidewalks and driveways for single-family detached houses. (See below for the estimated impervious surface area attributable to sidewalks and residential driveways.)

In order to calculate the area of driveways not already accounted for, the building, road/street, and parking layers were evaluated and an approximate count obtained of the number of buildings (primarily residential single-family detached in subdivisions; rear yard structures assumed to be sheds and the like were not counted) for which a driveway existed but did not appear in the planimetric layer. This number was then multiplied by the average area for a driveway in each subwatershed, which was obtained from the required front-yard setback for the predominant residential zones within the watershed multiplied by an assumed width of 15 feet.

Sidewalks are a feature in the GIS data that are shown as lines and not as polygons. The area of sidewalks was determined by multiplying the length (taken from the planimetric layer) by an assumed width of 4 feet. In addition to the GIS layers for paved features (buildings, driveways, roads, streets and parking, cultural, and sidewalks) the impervious contribution of nonpaved land cover was calculated, based on the assumption that these surfaces also contribute to surface water runoff for some precipitation events. Remaining nonpaved land was categorized as either forested or nonforest-nonpaved. Nonforest-nonpaved land includes lawn, pasture, and crop fields and is referred to as meadow. Forest cover is assigned an imperviousness factor of one percent; nonforest green cover is assigned a factor of three percent. A one percent imperviousness factor for forest cover has been used in other studies that focus on land use imperviousness (Northern Virginia Planning District Commission, 1980; Galli, 1983; CH2M Hill, 1982). For nonforested green cover, a wider range of imperviousness factors have been used (i.e., 0 to 7 percent). The CSPS uses three percent imperviousness factor for nonforested green cover because it is roughly the middle of the range of values that have been used in other studies and it reflects the greater benefits of forest cover compared to meadow or grass cover on streams.

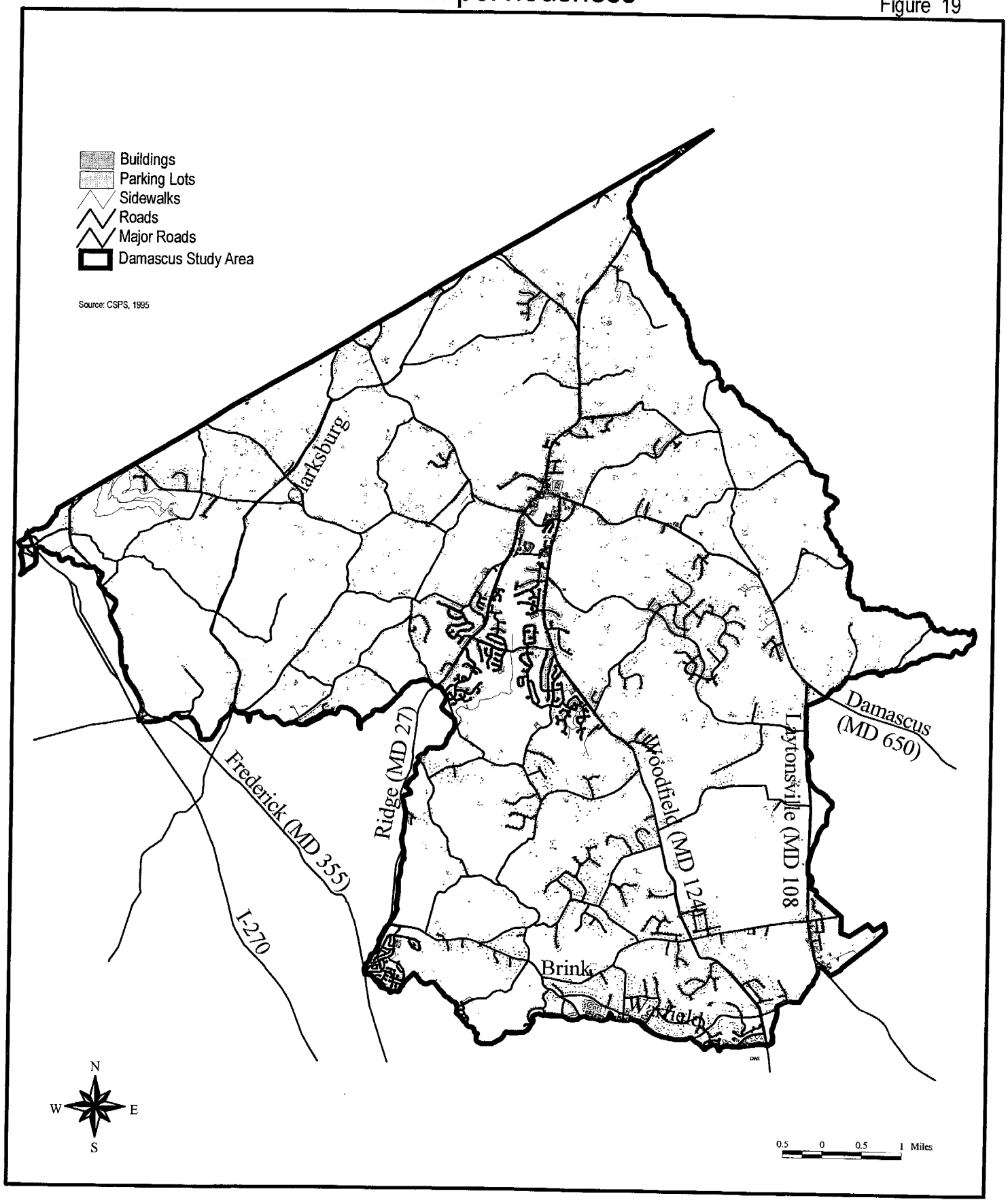
Fish Species of the Damascus Watersheds

The County-wide Stream Protection Strategy (MCDEP, 1997) lists fish collected in each watershed in Montgomery County that were identified during the

monitoring program (see Table A-2). While this information is based on a limited number of samples, it indicates the diversity of species for each watershed. The information will be updated through the CSPS as additional data is collected. Consult the most current copy of the CSPS for updated information.

Imperviousness

Figure 19



Fish Species Found in the Damascus Master Plan Area

Table A-2

Common Name	Scientific Name	Bennett Creek	Little Bennett Creek	Patuxent River	Upper Great Seneca Creek
American eel	Anguilla rostrata	X	X		X
Brown trout	*Salmo trutta*		X	X	X
Rainbow trout*	*Oncorhynchus mykiss*			X	X
Golden shiner	*Notemigonus crysoleucas*				X
Rosyside dace	*Clinostomus funduloides*	X	X	X	X
Creek chub	*Semotilus atromaculatus*		X	X	X
Fallfish	*Semotilus corporalis*	X	X	X	X
River chub	*Nocomis micrpogon*			X	X
Central stoneroller	*Campostoma anomalum*	X	X	X	X
Cutlips minnow	*Exxoglossum maxilingua*		X	X	X
Blacknose dace	*Rhinichthys atratulus*	X	X	X	X
Longnose dace	*Rhinichthys cataractae*	X	X	X	X
Common shiner	*Luxilus cornutus*	X	X	X	X
Spotfin shiner	Cyprinella spiloptera		X		
Bluntnose minnow	*Pimephales notatus*				X
Swallowtail shiner	*Notropis procne*				X
Silverjaw minnow	*Notropis buccatus*		X		X
White sucker	*Catastomus commersoni*	X	X	X	X
Northern hogsucker	*Hypentelium nigricans*	X	X	X	X
Creek chubsucker	*Erimyzon oblongus*				X
Yellow bullhead	*Ameiurus natalis*				X
Margined madtom	*Notorus insignis*			X	
Mottled sculpin	*Cottus bairdi*	X	X		X
Potomac sculpin	*Cottus giardi*	X	X		X
Smallmouth bass	*Micropterus dolomieu*		X		X
Largemouth bass	*Micropterus salmoides*		X		X
Rock bass	*Ambloplites rupestris*	X	X		X
Green sunfish	*Lepomis cyanellus*	X	X	X	X
Bluegill	*Lepomis macrochirus*	X	X	X	X
Pumpkinseed	*Lepomis gibbosus*	X	X		X
Redbreast sunfish	*Lepomis auritus*			X	X
Tessellated darter	*Etheostoma olmstedi*	X	X	X	X
Greenside darter	*Etheostoma blenioides*		X		X
Fantail darter	*Etheostoma fabellare*	X	X		X
Shield darter	*Percina peltata*			X	

* Rainbow trout are stocked in Great Seneca Creek and the Patuxent River. No naturally reproducing populations are know to exist in either watershed.
Source: CSPS. February 1998.

Little Bennett Regional Park – Wildlife Inventory

Table A-3

	Common Name	Genus species			Common Name	Genus species
Butterflies	Hoary Edge Skipper	*Achalarus lyciades*		**Mammals**	short-tailed shrew	*Blarina brevicauda*
	Hackberry Emperor	*Asterocampa celtis*			domestic dog	*Canis familiaris*
	Meadow Fritillary	*Boloria bellona*			eastern coyote	*Canis latrans*
	Olive Hairstreak	*Callophrys gryneus*			beaver	*Castor canadensis*
	Red-banded Hairstreak	*Calycopis cecrops*			star-nosed mole	*Condylura cristata*
	Spring Azure	*Celastrina ladon*			least shrew	*Cryptotis parva*
	Common Wood Nymph	*Cercyonis pegala*			opossum	*Didelphis virginianus*
	Monarch	*Danaus plexippus*			house cat (feral)	*Felis catus*
	Silver-spotted Skipper	*Epargyreus clarus*			southern flying squirrel	*Glaucomys volans*
	Dreamy Duskywing	*Erynnis icelus*			red bat	*Lasiurus borealis*
	Juvenal's Duskywing	*Erynnis juvenalis*			river otter	*Lutra canadensis*
	Baltimore checkerspot	*Euphydryas phaeton*			groundhog	*Marmota monax*
	Variegated Fritillary	*Euptoienta claudia*			striped skunk	*Mephitis mephitis*
	Eastern Tailed Blue	*Everes comyntas*			pine vole	*Microtis pinetorum*
	Common Buckeye	*Junonia coenia*			meadow vole	*Microtus pensylvanicus*
	American Snout	*Libytheana carinenta*			house mouse	*Mus musculus*
	Viceroy	*Limenitis archippus*			mink	*Mustela vison*
	Red-spotted Purple	*Limenitis arthemis*			little brown myotis	*Myotis lucifigus*
	Little Wood Satyr	*Megisto cymela*			white-tailed deer	*Odocoileus virginianus*
	Mourning Cloak	*Nymphalis antiopa*			muskrat	*Ondatra zibethicus*
	White M Hairstreak	*Parrhasius m-album*			white-footed mouse	*Peromyscus leucopus*
	Pearl Crescent	*Phyciodes tharos*			raccoon	*Procyon lotor*
	Eastern Comma	*Polygonia comma*			eastern mole	*Scalopus aquaticus*
	Question Mark	*Polygonia interrogationis*			gray squirrel	*Sciurus carolinensis*
	Banded Hairstreak	*Satryium calanus*			pigmy shrew	*Sorex hoyi*
	Great Spangled Fritillary	*Speyeria cybele*			southeastern shrew	*Sorex longirostris*
	Gray Hairstreak	*Strymon melinus*			eastern cottontail	*Sylvilagus floridanus*
	Southern Cloudywing	*Thorybes bathyllus*			eastern chipmunk	*Tamias striatus*
	Northern Cloudywing	*Thorybes pylades*			red squirrel	*Tamiasciurus hudsonicus*
	Red Admiral	*Vanessa atalanta*			gray fox	*Urocyon cinereoagenteus*
	Painted Lady	*Vanessa carduii*			black bear	*Ursus americanus*
	American Lady	*Vanessa virginiensis*			red fox	*Vulpes vulpes*
Amphibians	spotted salamander	*Ambystoma maculatum*		**Reptiles**	snapping turtle	*Chelydra serpentina*
	American toad	*Bufo americanus*			painted turtle	*Chrysemys picta*
	fowler's toad	*Bufo woodhousei*			spotted turtle	*Clemmys guttata*
	northern dusky salamander	*Desmognathus fuscus*			wood turtle	*Clemmys insculpta*

Little Bennett Regional Park – Wildlife Inventory (continued)

Amphibians	two-lined salamander	*Eurycea bislineata*		**Reptiles**	black racer	*Coluber constrictor*
	long-tailed salamander	*Eurycea longicauda*			ringneck snake	*Diadophis punctatus*
	gray treefrog	*Hyla versicolor*			black rat snake	*Elaphe obsoleta*
	eastern newt	*Notophthalmus viridescens*			eastern kingsnake	*Lampropeltis getulus*
	red-backed salamander	*Plethodon cinereus*			eastern milk snake	*Lampropeltis triangulum*
	Slimy Salamander	*Plethodon glutinosus*			northern water snake	*Nerodia sipedon*
	spring peeper	*Pseudacris crucifer*			brown snake (Dekay's)	*Storeria dekayi*
	bullfrog	*Rana catesbeiana*			eastern box turtle	*Terrapene carolina*
	green frog	*Rana clamitans*			eastern ribbon snake	*Thamnophis sauritus*
	pickerel frog	*Rana palustris*			eastern garter snake	*Thamnophis sirtalis*
	wood frog	*Rana sylvatica*				
Birds	Cooper's hawk*	*Accipiter cooperii*		**Birds**	barn swallow*	*Hirundo rustica*
(* = breeding species,	sharp-shinned hawk	*Accipiter striatus*		(* = breeding species,	yellow-breasted chat*	*Icteria virens*
** = breeding forest interior)	spotted sandpiper	*Actitis macularia*		** = breeding forest interior)	Baltimore oriole*	*Icterus galbula*
	red-winged blackbird*	*Agelaius phoeniceus*			orchard oriole*	*Icterus spurius*
	copperhead	*Agkistrodon contortrix*			dark-eyed junco	*Junco hyemalis*
	wood duck*	*Aix sponsa*			red-bellied woodpecker*	*Melanerpes carolinus*
	grasshopper sparrow*	*Ammodramus savannarum*			wild turkey*	*Meleagris gallopavo*
	Mallard*	*Anas platyrhynchos*			swamp sparrow	*Melospiza georgiana*
	ruby-throated hummingbird*	*Archilochus colubris*			song sparrow*	*Melospiza melodia*
	great blue heron	*Ardea herodias*			northern mockingbird*	*Mimus polyglottos*
	tufted titmouse*	*Baeolophus bicolor*			black-and-white warbler	*Mniotilta varia*
	cedar waxwing*	*Bombycilla cedrorum*			brown-headed cowbird*	*Molothrus ater*
	Canada goose*	*Branta canadensis*			great crested flycatcher*	*Myiarchus crinitus*
	great horned owl*	*Bubo virginianus*			Kentucky warbler**	*Oporornis formosus*
	red-tailed hawk*	*Buteo jamaicensis*			eastern screech-owl*	*Otus asio*
	red-shouldered hawk**	*Buteo lineatus*			northern parula**	*Parula americana*
	broad-winged hawk	*Buteo platypterus*			house sparrow*	*Passer domesticus*
	green heron	*Butorides virescens*			savannah sparrow	*Passerculus sandwichensis*
	whip-poor-will	*Caprimulgus vociferus*			fox sparrow	*Passerella iliaca*

Little Bennett Regional Park – Wildlife Inventory (continued)

Birds	northern cardinal*	*Cardinalis cardinalis*		Birds	indigo bunting*	*Passerina cyanea*
(* = breeding species,	pine siskin	*Carduelis pinus*		(* = breeding species,	ring-necked pheasant	*Phasianus colchicus*
** = breeding forest interior)	American goldfinch*	*Carduelis tristis*		** = breeding forest interior)	rose-breasted grosbeak	*Pheucticus ludovicianus*
	house finch*	*Carpodacus mexicanus*			downy woodpecker*	*Picoides pubescens*
	purple finch	*Carpodacus purpureus*			hairy woodpecker**	*Picoides villosus*
	turkey vulture	*Cathartes aura*			eastern towhee*	*Pipilo erythrophthalmus*
	veery*	*Catharus fuscescens*			scarlet tanager**	*Piranga olivacea*
	hermit thrush	*Catharus guttatus*			Carolina chickadee*	*Poecile carolinensis*
	wood thrush*	*Catharus mustelinus*			blue-gray gnatcatcher*	*Polioptila caerulea*
	Swainson's thrush	*Catharus ustulatus*			purple martin*	*Progne subis*
	brown creeper	*Certhia americana*			common grackle*	*Quiscalus quiscula*
	belted kingfisher*	*Ceryle alcyon*			ruby-crowned kinglet	*Regulus calendula*
	chimney swift*	*Chaetura pelagica*			golden-crowned kinglet	*Regulus satrapa*
	killdeer*	*Charadrius vociferus*			eastern phoebe*	*Sayornis phoebe*
	common nighthawk	*Chordeiles minor*			American woodcock	*Scolopax minor*
	northern harrier	*Circus cyaneus*			ovenbird**	*Seiurus aurocapillus*
	evening grosbeak	*Coccothraustes vespertinus*			Louisiana waterthrush**	*Seiurus motacilla*
	yellow-billed cuckoo*	*Coccyzus americanus*			American redstart*	*Setophaga ruticilla*
	black-billed cuckoo	*Coccyzus erythropthalmus*			eastern bluebird*	*Sialia sialis*
	northern flicker*	*Colaptes auratus*			red-breasted nuthatch	*Sitta canadensis*
	rock dove	*Columba livia*			white-breasted nuthatch*	*Sitta carolinensis*
	eastern wood-pewee*	*Contopus virens*			yellow-bellied sapsucker	*Sphyrapicus varius*
	black vulture	*Coragyps atratus*			American tree sparrow	*Spizella arborea*
	American crow*	*Corvus brachyrhynchos*			chipping sparrow*	*Spizella passerina*
	common raven	*Corvus corax*			field sparrow*	*Spizella pusilla*
	fish crow*	*Corvus ossifragus*			barred owl**	*Strix varia*
	blue jay*	Cyanocitta cristata			eastern meadowlark	*Sturnella magna*
	black-throated blue warbler	*Dendroica caerulescens*			European starling*	*Sturnus vulgaris*
	bay-breasted warbler	*Dendroica castanea*			tree swallow*	*Tachycineta bicolor*
	cerulean warbler	*Dendroica cerulea*			carolina wren*	*Thryothorus ludovicianus*
	yellow-rumped warbler	*Dendroica coronata*			brown thrasher*	*Toxostoma rufum*
	prairie warbler*	*Dendroica discolor*			solitary sandpiper	*Tringa solitaria*
	blackburnian warbler	*Dendroica fusca*			house wren*	*Troglodytes aedon*
	magnolia warbler	*Dendroica magnolia*			winter wren	*Troglodytes troglodytes*
	palm warbler	*Dendroica palmarum*			American robin*	*Turdus migratorius*
	chestnut-sided warbler	*Dendroica pensylvanica*			eastern kingbird*	*Tyrannus tyrannus*

Little Bennett Regional Park – Wildlife Inventory (continued)

Birds	yellow warbler*	*Dendroica petechia*		Birds	golden-winged warbler	*Vermivora chrysoptera*
(* = breeding species,	pine warbler*	*Dendroica pinus*		(* = breeding species,	Tennessee warbler	*Vermivora peregrina*
** = breeding forest interior)	blackpoll warbler	*Dendroica striata*		** = breeding forest interior)	blue-winged warbler*	*Vermivora pinus*
	Cape May warbler	*Dendroica tigrina*			yellow-throated vireo**	*Vireo flavifrons*
	black-throated green warbler	*Dendroica virens*			white-eyed vireo*	*Vireo griseus*
	pileated woodpecker**	*Dryocopus pileatus*			red-eyed vireo**	*Vireo olivaceus*
	gray catbird*	*Dumetella carolinensis*			blue-headed vireo	*Vireo solitarius*
	willow flycatcher*	*Empidonax traillii*			Canada warbler	*Wilsonia canadensis*
	Acadian flycatcher**	*Empidonax virescens*			hooded warbler	*Wilsonia citrina*
	horned lark	*Eremophila alpestris*			Wilson's warbler	*Wilsonia pusilla*
	American kestrel*	*Falco sparverius*			mourning dove*	*Zenaida macroura*
	common snipe	*Gallinago gallinago*			white-throated sparrow	*Zonotrichia albicollis*
	common yellowthroat*	*Geothlypis trichas*			white-crowned sparrow	*Zonotrichia leucophrys*
	worm-eating warbler**	*Helmitheros vermivorus*				

Sources: Atlas of the Breeding Birds of Maryland and the District of Columbia, 1996, "The Montgomery Parks Breeding Bird Mapping Project 1996" , and observations from Natural Resources Management staff.