July 2011

WILDLIFE OF ARLINGTON:
A Natural Heritage Resource Inventory Technical Report

ARLINGTON VIRGINIA

DEPARTMENT OF PARKS, RECREATION AND CULTURAL RESOURCES

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John White – red fox, green frog, cardinal, red-spotted purple.
Greg Zell – beaver lodge, northern dusky salamander, and hickory horned devil.

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Part I. INTRODUCTION

Red fox kits Photo by John White

Purpose

In 2008, county staff completed a three-year comprehensive Natural Heritage Resource Inventory (NHRI) of Arlington County, Virginia. The inventory project was initiated in response to recommendations made within the Public Spaces Master Plan (2005), which called attention to Arlington County's lack of contemporary knowledge or data regarding extant natural resources, and hence, its lack of the ability to effectively manage those resources. As part of the overall NHRI project, the occurrence of wildlife in Arlington was investigated. Most field studies were conducted primarily from 2007-2008. The establishment of a baseline wildlife database is considered a first step. Current wildlife records, when analyzed with other data sets collected as part of the NHRI, such as plant communities, wetlands, vegetation resources, forest types, invasive plants, stream quality and historical records, has formed the basis of discussions regarding habitat improvement and species restoration opportunities. The primary objectives of this report are four fold: (1) establish a contemporary post-urbanization scientific record of local wildlife occurrence and distribution; (2) document the historical changes to Arlington's wildlife relative to the impact of development; (3) address some of the issues relating to management, preservation and protection of local wildlife species and populations as a component of the natural environment in Arlington County; and (4) to educate both county staff and the general public about the urban wildlife resources within the local community.

Report Format

This report is the result of a collective effort by county staff, contract specialists, organizational partners and volunteers. Multiple researchers, identified on the inside cover, have contributed to the development of the report. Original contributor submissions (reports) have been edited by the principle

author in order to best organize content and provide consistency throughout the report.

Arlington's Natural Past

Arlington County's geographic position within both the mid-Atlantic region and within the Old Dominion itself point to an incredibly rich and diverse historical natural past. Northern Virginia is an area of overlapping ranges of the distributional limits of both northern and southern species of flora and fauna within the eastern United States. In addition, Arlington lies on the fall-line or fall zone, the meandering geological boundary between the Piedmont and Coastal Plain formations. As a result, the County historically supports species native to the rolling hill topography of the Piedmont in the northern and western parts of the County and supports species native to the bottomlands and sandy terraces of the Coastal Plain in the extreme southern section of the County.

Prior to European colonization, observers would have seen a land little disturbed by the resident Algonquian-speaking people with the exception of scattered villages along both sides of the Potomac River and limited subsistence farming in the rich soils of the wide river floodplain. Rich bottomland hardwood forest and tidal marsh lined the banks of the river in South Arlington, while the rocky cliffs of the Potomac bluffs to the north rose unblemished several hundred feet above the water below. Inland from the river, virgin forests of oak, American chestnut and hickory were complimented by many miles of fresh cold-water streams. The length of Four Mile Run and other larger streams were most likely flooded by seasonal beaver ponds and lined by depression swamps. Many dozens of freshwater springs, seeps and wooded wetlands provided refuge and habitat for a large number of water dependent plants and wildlife species.

Early Human History

The earliest records that describe the land now called Arlington were written by explorers of the new world, including Captain John Smith (1608), Samuel Argoll (1612), trader Henry Fleet (1632) and others. The various accounts of exploration identified such local landmarks as Little Falls, Anacostia River and Analostin Island (Roosevelt Island). These early explorers and traders were not scientists, but did provide a general view of a bountiful wilderness untouched by European hands and inhabited by "indians". It is assumed that the indigenous Native Americans had a minimal impact on local natural resources. By all historical accounts, wildlife was extremely abundant at the time of first contact and the lifestyle practiced by the relatively small native population supported the seasonal harvest of renewable plant and animal resources. Hunting with primitive weapons and the harvest and drying of anadromous fish from the Potomac River provided necessary protein. Nut and fruit-bearing woody plants furnished consumable mast, and vegetable needs were met through the harvest of small-cultivated gardens. Tobacco was raised for ceremonial purposes and herbs collected for medicinal and cooking needs. Permanent villages, located near waterways, were convenient for

fishing and cultivation. Vast tracts of virgin forest and high quality hunting grounds lay inland from the waterways. Local natural resources remained abundant until Europeans arrived in large numbers to settle the land. A number of historians argue that at the time of European settlement, local tribes living along the Potomac near Washington were at the periphery of influence by the larger Powhatan Indian Confederacy and were located at the boundary of the known wilderness at the time. With a degree of independence, local tribes appeared to largely escape European notice and avoided the years of warfare and turmoil that defined the relationship between the colonists and the unified tribes to the south of Arlington for most of the 17th century. For a number of decades after 1608, an active trading relationship most likely existed between local tribes and Europeans employed by the Virginia [Trading] Company. Beaver pelts and other animal skins would have been eagerly traded for desirable goods such as English iron tools, blades and cooking pots. By the middle of the century (1648), local tribes began to feel the pressure of increased colonial expansion and land re-appropriation. There are no written accounts to indicate exactly when or why the resident Native Americans disappeared from Arlington, but most authorities agree that by 1675 they were gone. Most likely, a combination of stressors – European expansion from the south and attacks from belligerent tribes to the north, convinced the native people to simply move on to more hospitable lands.

The 18th century brought increased numbers of settlers to the Washington area. The first signs of environmental degradation would have included the cutting of virgin timber for wood products, heating and cooking, and planting fields for cash crops (tobacco). Locally, the over-harvest of fish, game, and fur-bearing mammals for consumption, the fur trade and market was probably evident by the early 1700s. W. L. McAtee, in preparation for publishing his *A Sketch of the Natural History of the District of Columbia* in 1918, conducted considerable research about earlier historical accounts of natural history. In describing mammals, he states, "Among those which inhabited the vicinity of the District of Columbia within historic times, but which are now locally extirpated, are buffalo, elk, white-tailed deer, wild-cat, puma, gray wolf, black bear, pine martin, beaver and black rat" (McAtee, 1918. p. 52). It is apparent that not long after active European settlement, some native wildlife began to disappear as a result of market trapping, over-hunting and habitat loss. Prior to the 20th century, major impacts on the local environment included railroad construction in the mid 1800s, a lengthy period of quarrying stone along the Potomac Gorge, early and continuous development along the Po-

tomac River in South Arlington, and the construction of defensive forts and some large-scale forest removal during the Civil War. In spite of earlier land changes, the community of Arlington / Alexandria County in 1900 was still considered a rural community with only 6,430 residents, 379 small farms, several villages and few improved roads.

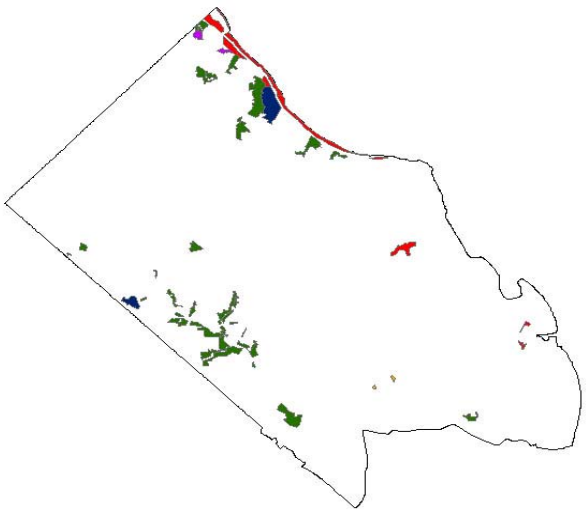
Impact of Urbanization

The twentieth century ushered in great change, and the period from the 1920s through the 1980s can be fairly described as an age of growth, development and environmental impact. The singular events and activities that most shaped the transition from a resource-rich rural community to an environmentally-impaired urban center can be directly tied to the periodic expansion of the federal government in nearby Washington, D.C.

Some of the notable impacts on the environment within that period were:

- Introduction of the electric trolley and expansion of local rail lines early in the century ushered in the age of commuting.
- Development associated with increased jobs and housing needs during WWI and the New Deal.
- Periodic growth of Arlington National Cemetery and Fort Myer Military Reservation.
- Construction of National Airport (1941)
- Rapid local expansion during WWII concurrent with the construction of the Pentagon (36,000 employees) and the Navy Annex (1944) and the resulting housing boom during the period.
- Construction of the George Washington Memorial Parkway from 1932-1960.
- Construction of Shirley Highway (opened in 1949) and I-66 from the late-1960s through the early 1980s.

Arlington County – a study site of 26 square miles



Approximately 700 acres remain as natural lands in Arlington County

The accumulated effects of 20th century development forever changed Arlington from a rural to a suburban to an urban community within a span of 60 years. Farmland, forest and field rapidly transformed into residential neighborhoods with all attendant infrastructure required, including roads, above and below ground utilities, schools and service industries (gas stations, office space, and shopping).

Study Area: Current Profile

Arlington is a highly urbanized community. At just under 26 square miles in size, with a 2008 resident population of 206,800, Arlington County has one of the highest population densities among counties nationwide. In addition to a large volume of residential housing units, there are more than 43 million square feet of office space either built or under construction. Two major interstate highways and a modern subway system pass through the County. The highest density of commercial growth has been in the southeastern quadrant of the County in a spider web fashion along major highways and the metro railway system. North and west Arlington largely remain residential communities with scattered commercial zones for shopping. With an estimated 40% of the County covered in impervious surface, Arlington is considered "built out."

Natural Lands: While 18% of the County (2,940 acres) is classified as Open Space, only 4.4% (738 acres) is recognized as "historical natural lands." A majority of the remaining natural lands are found within public parklands owned by Arlington County, the National Park Service and the Northern Virginia Regional Park Authority. Extant natural lands occur as several dozen isolated and fragmented parcels. The most ecologically significant parcels occur in stream valleys and portions where development would have been difficult or too costly, and were later protected as parkland. The most ecologically significant parcels remaining in Arlington are found in Barcroft Park, Glencarlyn Park, the northern section of the George Washington Memorial Parkway and Roaches Run Waterfowl Sanctuary.

Water Resources: Over half of Arlington's original surface streams have disappeared over the past 75 years. Those that remain are heavily impaired both physically and from a water quality standpoint. The water quality is such that only the most tolerant benthic species persist. Three-hundred-sixty miles of underground sewer pipes carry storm water to the remaining 30 miles of stream. A small number of natural springs and remnant wetlands can be found within the remaining natural lands. Three wetland communities, while small in size, have been classified as state and/or globally-rare plant communities and are considered to be historically and ecologically significant.

Forest Resources / Plant Communities: A majority of the extant natural lands in Arlington occur as mature hardwood forest, with virtually no early successional stages of growth or natural meadows and low quality edge. Forest communities range in age from 85 to 230 years, with most dating to abandonment of land cleared during the Civil War or as farmland abandoned from the late

1800s through the early 1900s. Over the past 30 years, as the County continued to develop, the forest canopy (overstory) decreased by over 40%. Most of the decrease in canopy trees occurred on private property. As part of the larger Natural Resource Inventory Project, existing plant communities have been identified and mapped within most of the natural lands. A large percentage of the natural forest communities have been typed as a variant of oak-hickory forest, with some remnant bottomland communities present. Unique communities include several wooded grass glades, upland seeps and swamps, terrace gravel bogs, and a small complex of historical tidal marsh.

Project Methodology

Based on limited funding, available staff resources and the time constraints, the wildlife inventory was limited to targeted faunal groups. The selected groups included birds, mammals, amphibians, reptiles and two categories of insects - dragonflies/damselflies (Odonata) and butterflies/moths (Lepidoptera). These particular insect groups were selected based on renewed public interest in these species and the fact that both may indirectly serve as indicators of environmental health (water quality and native flora).

Staff collecting salamander eggs Photo by Greg Zell

The documentation and field study of wildlife populations in a highly developed urban community such as Arlington presented a number of unique challenges, including size of study area (26 sq. miles), limited staff resources, simultaneous inventory of multiple animal groups, severe fragmentation and isolation of remaining natural lands, complex mix of land ownership (private, federal, state, regional, and County), inaccessibility to some study areas, varying quantity and quality of habitat, and persistent ambient noise (airplanes and vehicles) and artificial light. Inventory areas were pre-selected by GIS review of remaining natural lands, plant communities, forest types and occurrence of streams or wetlands. Both public and private properties (with owner permission) were inventoried. To facilitate the collection of data through trapping and capture/release methods, research permits were obtained from both the National Park Service and the Virginia Department of Game and Inland Fisheries.

In order to maximize available resources within a unique study environment, a number of approaches to data collection were applied. Elements used included time constrained surveys (observation), capture and release, live trapping, remote-sensing (cameras), audible surveys, a review of both contemporary and historical records, and available road-kill data. Field studies were seasonally scheduled to best match the active periods of species inventoried and resources available. Inventory activities were con-

ducted by utilizing a combination of Arlington County staff naturalists, contracted specialists, and the carefully managed use of trained volunteers. Unfortunately, due to the relatively small size of parcels inventoried, location within a highly urbanized community, and ease of access by the public, pit-fall traps could not be used and live-trapping (Sherman traps) was limited to a few isolated areas of Arlington where the risk of human interference with trap-lines was considered to be acceptable. Areas surveyed included parkland with natural areas and general open space (mature canopy with turfgrass, mowed areas, streams, hiker/biker trails, etc.), old rail lines, residential neighborhoods and urban backyards.

The use of volunteers was an important element that helped to generate support for the project, and deserves discussion within the report. A cadre of adult volunteers were solicited and trained by staff to assist in targeted inventory activities and data collection. The volunteer program allowed for public participation in an important project, leveraged limited staff resources and was carefully designed to insure accuracy and data integrity. Three volunteer programs were developed and managed by the project coordinator – Project Wildlife Watch, Salamander Search Team, and Citizen Sentinels. A description of each follows:

Project Wildlife Watch: This program involved the participation of several dozen adult residents who routinely spent at least several hours each week in a local park performing passive activities such as walking, biking, walking dogs, bird watching, etc. Requirements to join the program included attendance at a mandatory training session, willingness to participate for a 12-month period, and regular access to the internet. Two training sessions were offered and designed to provide volunteers the ability to identify by sight approximately twenty-five species of local common mammals, reptiles and amphibians that could be easily identified by the trained layperson. Examples of species selected included rabbits, raccoons, opossums, chipmunks, box turtles, snapping turtles and Rough Green Snakes. Volunteer observations were emailed directly to the Natural Resource Specialist who entered all observations (species, date and location) into a master data list. In total, over 350 wildlife observations (records) were provided by Project Wildlife Watch volunteers.

Salamander Search Team: Prior to the start of field surveys, staff identified approximately 500 acres of potential salamander habitat. Based on the estimated number of hours required to carefully survey these wooded tracts, it was determined that the use of trained volunteers would give staff the ability to inventory a greater acreage of parkland. . Most parks were inventoried multiple times during three seasons. One dozen adult volunteers were solicited to participate through networking and internet advertisement in cooperation with the Arlington County Volunteer Office. Requirements included the ability to walk in steep terrain, turn logs and carry field equipment, and have access to both the internet and a close-focus digital camera. Volunteers were encouraged to

work in teams of two. A training session was planned and conducted that included an overview of amphibian life history, field identification of possible local species, collecting and handling techniques, safety concerns (venomous snakes and yellow-jackets), and use of equipment. Each participant was issued an aquatic collecting net, plastic collection jar and a complete set of salamander photo flashcards laminated for field use. By established protocol, each volunteer would both email a completed data collection sheet for each field session and digital photos of collected specimens placed in the provided clear collection jar. The inclusion of digital photos allowed the project manager to verify each collection made. After being photographed, each specimen was released at the point of collection.

Citizen Sentinel Program: Listening surveys conducted at night during the breeding season are a preferred survey method for frogs and toads. Identification of species by sound or breeding call can be easily made by trained field staff, but the process is labor intensive with no assurance of activity on any given night. In order to maximize the efforts of a single staff member available to conduct surveys, the Citizen Sentinel Volunteer Program was implemented. The initial step was to identify possible remaining breeding habitat within Arlington County parks. A review of historical collection records and recent Geographic Information System (GIS) mapping of extant wetlands were used to delineate survey areas of interest. GIS was then utilized to identify and select address points that abutted selected parkland and were considered close enough to hear any nearby anuran activity. Letters were then sent to multiple addresses with an invitation to participate in the program. Homeowners who expressed interest in participating agreed to stand in their back yards for 10-15 minutes several times a week at night to listen for "noises" or sounds that could be frogs or toads. The period of participation ran from early March through mid-May of a single breeding season. A web-link to the Virginia Herpetological Society home page, which provides audio calls of each native frog and toad, was emailed to each participant. Each participating homeowner agreed to immediately email the project manager with an alert if any "unusual" sounds or calls were heard. Project staff would then respond to the alert and survey the site at night within 24 hours to verify or discount the presence of targeted species. This program was successful in allowing a single member of the inventory staff to concentrate efforts in areas of the County more distant from residential communities and to still be able to react to alerts from citizens.

Historical Records

In 1816, David Baillie Warden published what is considered to be the first scientific treatment of the natural history of the Washington D.C. area. His *"Chorographical and Statistical Description of the District of Columbia"* included both a formal list of flora and observational accounts of wildlife species present at the time. Prior to the 1850s, few professional scientists were engaged in natural field studies in or around the Washington area. However, due to tre-

mendous growth of the federal bureaucracy during and after the Civil War, the employment opportunities for botanists, entomologists and naturalists greatly increased. A number of scientific societies, such as the Potomac-Side Naturalists Club (founded 1858) and the Biological Society of Washington (founded 1880), provided an opportunity for intellectual camaraderie, socialization and study. Members routinely planned and participated in group nature outings around the local Washington area. As a result, a large number of historical accounts in the form of journal contributions, monographs or articles provide both a floral and faunal record of the past 150 years. Many of these early scientists were either employed by or affiliated with the Smithsonian Institution (founded 1846). According to Phillip J. Pauly, in *Biologists and the Promise of American Life*: "By the early 1880s more naturalists were working in and from Washington than any other place in the country" (Pauly, 2002). Active collecting and study activities appeared to ebb and flow. This was most likely related to the number of scientists stationed or residing in the Washington area at the time. Periods of high activity included the 1880s thru 1890s and just prior to the WWI, with renewed activity in the 1950s. Collection activities diminished during both World Wars.

At times, the accurate review of historical accounts and records presented a challenge because modern Arlington County (1920) was formerly a part of Alexandria County and prior to that, was included in the original District of Columbia. Specific location names and descriptions of historical collections were critical in order to place a particular record in Arlington County. Historical collection records of mammals, reptiles and amphibians generally cover the period from the 1870s to the 1950s and were obtained from the Smithsonian Institution, the Virginia Department of Game and Inland Fisheries, and select references or written accounts. When compared to contemporary data, historical records help to provide a picture of a more natural past and serve to illustrate the impact of urban development in terms of habitat change and species loss.

Part II. MAMMALS, REPTILES AND AMPHIBIANS

White-footed Deer Mouse (P. leucopus)

Photo by John White

Introduction

Initially, a target list of species was developed through the review of a series of published range maps from multiple sources. Not all range maps were in precise agreement in regards to distribution of Virginia species. This was most likely because Arlington County occurs on the extreme edge of north-south and east-west distribution of a number of native mammals, reptiles and amphibians. For example, some species may theoretically range into the Piedmont of North Arlington, but not be found in the coastal plain to the south and vice-versa. Additional elements to consider in regard to range maps are that they are often based on a combination of documented historical occurrences, contemporary records, and probability of occurrence based on surrounding distribution. As a result, some species included in the target list based on range maps were determined to either be no longer present (extirpated) or not within the historic range of the animal. As a final note, even if the presence of a particular species was considered likely based on known past distribution, required or suitable habitat must be available to them. A number of species are suspected of disappearing in urban areas statewide due to the loss of or changes in habitat. Hopefully, the following species accounts will serve to update the occurrence and distribution of native mammals, reptiles and amphibians in Arlington, and highlight those faunal species or groups that may require additional future study or immediate protection. Unless otherwise noted, the relative abundance (rare to abundant) shown under the Current Status for each species indicates frequency within remaining natural habitats, not necessarily within the whole County. A status of "unknown" indicates that no contemporary records were found nor current collections/observations were made.

Species Accounts

Mammals (Class Mammalia)

Opossum (Order Marsupialia)

Virginia Opossum *Didelphis virginiana virginiana.* The common opossum was variously described by early explorers, but most often as a cat-sized animal with a rat's tail. It was common then and remains so. The opossum is the only native representative of the Marsupialia (pouched animals) in North America and one of the species that has embraced urban life and thrived. Historical collections are sparse, most likely because it was so commonplace. However, between the years 2005 -2007, local animal control officers collected 363 specimens from yards, businesses and streets (AAWL 2005-2007). **Current Status:** Abundant throughout the County in all habitats.

Shrews and Moles (Order Insectivora)

Moles and shrews are small mammals that feed primarily on insects, arthropods and worms. They are largely fossorial, living beneath the leaf litter and tunneling in soft soils. As a result, they are difficult to observe and cannot be identified from a distance. Historical records and range maps indicate that up to seven (7) species may be present in Arlington. Of those, only two species, Kirtland's Short-tailed Shrew and the Eastern Mole are documented as currently present. Unfortunately, the scope of the survey conducted did not allow for the use of pit-fall traps in local parks. Pit-falls are recognized as the most effective method for collecting insectivores in conjunction with long-term studies. The only insectivore attracted to small mammal live traps (Sherman) used in this project was Kirtland's Short-tailed Shrew. Additionally, the field identification between similar species can be very difficult without an examination of skull and dental features. Skull features cannot be adequately examined in live specimens. Local occurrence of insectivores is clearly an area for future specialized studies.

Ashen Masked Shrew *Sorex cinereus cinereus.* Mostly found in western and northern Counties in Virginia, often at higher elevations. No historic or current records for this species in Arlington. Occurrence would be restricted to deep stream valleys in North Arlington based on published habitat criteria. **Current Status:** Unknown. Most likely not present.

Southeastern Shrew *Sorex longirostris longirostris.* Handley (Smithsonian Institution), indicated in 1982 that S. longisrostris was "common and widespread" in Northern Virginia (Linzey, 1998). Only a single historical record was found from a specimen collected in 1938 in Little Pimmit Run. However, current records do exist from Great Falls Park in Fairfax County (Steury, email communication). If still present, it would most likely be found at lower elevations in disturbed areas with dense vegetation. **Current Status:** Unknown, may be present.

Pygmy Shrew *Sorex hoyi winnemana.* Range maps indicate statewide distribution for the pygmy shrew, the smallest mammal in

North America. *S. hoyi* is considered to be rare in Virginia. Historical records of this species include collections from southern Fairfax County, and a single collection from Prince Georges County in Maryland prior to 1969 (date unknown). **Current Status:** Unknown, but not likely based on rarity and degree of local disturbance.

Kirtland's Short-tailed Shrew *Blarina brevicauda kirtlandi.* One of the most abundant small mammals in Arlington, it is still frequently found in field, forest, and urban back yard. Most often observed after heavy rains force them to the surface or delivered home by domestic cats. *B. brevicauda* has the distinction of being one of only three mammals in the world to produce poison – delivered to prey through saliva as a method of preserving and storing food for later consumption. The risk to humans is negligible. A large number of historical collections were made between1890 -1977. **Current Status:** Abundant across the County. [Note – Three specimens of Blarina brevicauda churchi reported to be collected in Arlington in 2002 (BOVA Booklet) are most likely based on incorrect identification. According to most sources, this sub-species is only known from a single site at higher elevations in western Virginia.]

Least Shrew *Cryptotis parva parva.* Little is known about the life and distribution of this small, secretive shrew. The lack of historical records indicates that this species may be difficult to trap. Habitat preferences are dry, open grassy fields, unlike most other shrews. Little of this habitat type remains today in Arlington. Historical records include a 1925 account where a nest of 25 least shrews were found in Virginia near Washington (Paradiso, 1996) and one verified record from Fairfax County. When Arlington County was primarily agricultural, it is likely that this species was present in some numbers. For example, an examination of barn owl pellets collected at the Smithsonian tower in 1890 recorded the presence of 21 Least Shrew skulls (Bailey, 1896). Some of these prey items may have been hunted in Arlington, only a short flying distance away. **Current Status:** Unknown, but not likely.

Eastern Mole *Scalopus aquaticus aquaticus.* This rather large insectivore is well known to Arlingtonians, but not often observed on the surface. Most evident are the raised tunnels and molehills left behind in urban yards by underground activity. Multiple habitats are used, but soft soil (moist sand or loam) is preferred for ease of tunneling. Multiple historical records were found between the years 1894-1943. Bailey indicated that this species was common in the Washington area in 1896 (Bailey, 1896). **Current Status:** Common throughout the County in woodlands, parks and urban yards.

Star-nosed Mole *Condylura cristata cristata.* A rare Virginia species found in wetlands with soft marshy ground and swamps. This semi-aquatic species readily takes to water and swims easily. No historical Arlington records found nor collections made. Bailey describes a single collection on the Maryland side of the Potomac River, one mile north of Georgetown (Bailey, 1896) and at least ten

historical collections were made in the District of Colombia (Paradiso, 1996). Arlington County has little to no remaining habitat suitable for this species. **Current Status:** Unknown, but not likely.

Bats (Order Chiroptera)

Bats represent a group of mammals that are often misunderstood by the public and understudied by the scientific community. Bats are unique in several respects – they are the only mammal that is capable of true flight, that possesses the complex ability to echolocate and that can live a long life of up to 30 years. Much is unknown about bats, particularly in regards to distribution, migration and hibernation at a local or regional level. Some of Virginia's bats are known to hibernate in the state while others are only observed during the migration seasons of spring and fall. A few species may do both – a portion of the population may hibernate locally and others will migrate a short distance prior to hibernation. As insectivores, bats are a welcome addition to urban fauna and are capable of feeding on large numbers of insect pest species, including mosquitoes. Fifteen species of bats are considered native to Virginia. Seven species were investigated for past or current local presence.

Without specialized staff, equipment and generous time, bats are a difficult mammal group to inventory. A traditional inventory method includes the physical capture of specimens by mist netting. This process is time consuming. It requires a specialist who can rapidly identify bats "in the hand," and would require pre-immunization (rabies vaccine) for any contractor, staff or volunteer participant who may have direct contact with specimens. New technology is available, in the way of electronic field equipment, which when used in conjunction with a laptop computer, can identify bats in flight by their acoustic signature. This type of equipment would allow staff or trained volunteers to remotely identify and document species occurrence in future inventory work. The current inventory of *Chiroptera* in Arlington County was restricted to the research of literature, reliable reports of recent bat occurrence, and documented historical and contemporary field collections. Of seven species on the target list, only three were determined to have a local occurrence of common to abundant – big brown bat, eastern red bat, and the eastern pipistrelle.

Little Brown Bat *Myotis lucifugus lucifugus.*
Affectionately called "Lucy" by biologists, this small bat appears to occupy a more constant range to the west of Arlington. However, the little brown bat is considered to be one of the "building bats," known to occupy human dwellings and structures. In 1896, Bailey reported that large numbers of this bat were captured roosting between the timbers of the Long Bridge (Bailey, 1896). One additional historical record from Four Mile Run in 1896 exists. No other historical or contemporary records for Arlington were found. However, not far from the Arlington boundary in McLean, a documented breeding colony of *M. lucifugus* persists at the Linway Terrace Park (Sturges, personal communication). Great Falls Park has also

recorded breeding colonies (Steury, email communication). While not currently documented, little brown bats are judged to be rare – uncommon locally. **Current Status:** Unknown, most likely present in small numbers.

Northern Myotis *Myotis septentrionalis septentrionalis.* M. *septentrionalis* can be found roosting singly or in small groups under the loose bark of trees or behind house shutters. No historical or contemporary records were found for Arlington County. Around a half-dozen collections have been reported from nearby Fairfax Station, where several specimens were found roosting beneath a porch umbrella (Sturges, personal communication). **Current Status:** Unknown, rare if present.

Silver-haired Bat *Lasionycteris noctivagans.* *Lasionycteris* is considered an uncommon migrant in the spring and fall. They prefer to roost in hollow trees, beneath tree bark or in buildings as individuals or in small groups. Like most other species, feeding occurs along streams, rivers and ponds. Several contemporary records were found for Arlington County. Two specimens collected by animal control officers in 2006-2007 (AAWL 2005-2007) and sent to Richmond for rabies testing were confirmed to be *L. noctivagans,* and Bat World Nova received a single specimen from Arlington for rehabilitation and release (Sturges, personal communication). **Current Status:** Present, but uncommon during migration seasons.

Eastern Pipistrelle *Pipistrellus subflavus subflavus.* The smallest bats in the eastern United States, *P. subflavus* normally hibernate in caves or rock crevices. While no historical or contemporary records were located, multiple sources indicate that the Eastern Pipistrelle should be common in Arlington. This species is known to occur in Fairfax County from the Pohick Bay area. **Current Status:** Unknown, but most likely seasonally uncommon - common.

Big Brown Bat *Eptesicus fuscus fuscus.* Historical records indicate that *E. fuscus* was common in the late 19th century. Contemporary records show the Big Brown Bat is still commonly found in Arlington. Between the years 2005-2007, 80 individual bats were collected by animal control officers with identification verified by the Virginia Department of Health (AAWL 2005-2007). The large collections are best explained by the Big Brown's propensity to roost in buildings and hibernate locally. **Current Status:** Common in urban structures.

Evening Bat *Nycticenius humeralis humeralis.* No historical or contemporary records were found for *N. humeralis*. The evening bat is primarily a southern species that may wander north into the Virginia and Maryland region. A lack of knowledge exists in regard to their movements and migration patterns. While this species is known to establish maternal colonies in buildings, there are no collection records by the local animal control agency. **Current Status:** Unknown, rare if present.

Eastern Red Bat *Lasiurus borealis borealis.* Multiple historical records exist between the years 1897-1991, and two confirmed collections were made in 2008 by animal control officers. This species is known to roost in the open foliage of trees and at least a portion of the population hibernates in hollow trees during the winter. This species is probably under-reported locally. **Current Status:** Assumed to be common throughout the County.

Hoary Bat *Lasiurus cinereus cinereus.* The largest local bat, *L. cinereus* is a migrant in Virginia and prefers to roost singly in conifers. The only historical record from Arlington was from Ballston in 1917. Bailey reported a single record from Maryland in 1892 (Bailey, 1896). **Current Status:** Unknown, rare if still present.

Rabbits (Order Lagomorpha)

Eastern Cottontail *Sylvilagus floridanus mallurus.* The eastern cottontail is the only subspecies of rabbit that naturally occurs in Arlington. Multiple historical records date from 1890-1971. Cottontails were described as common in "brushy areas" in the late 1800s (Bailey, 1896). Local populations appear to have been relatively stable (common) from 2005-2006 with over 84 direct observations and 45 responses from animal control to road kills, injuries or reported abandonment. In 2007, both observations and responses dropped dramatically. This was most likely in response to the growing number of red foxes observed over the same period of time. As primary predator and prey, fox and rabbit populations are expected to move in cycles. In Arlington, *S. floridanus* prefers to occupy residential backyards, dense thickets, forest edges and meadows where available. **Current Status:** Uncommon - common within variable population cycles.

Rodents (Order Rodentia)

Rodents represent the largest and most diverse group of mammals in Arlington. Of twenty species sought, only twelve were documented as still present today. The inventory of small mammals presented a particular challenge with three limiting conditions, including: (1) the decision to use only live traps (Sherman) as opposed to kill traps (museum specials) meant less traps used per trapping night and less potential captures; (2) difficulty of live field identification between similar species ; and (3) the placement of trap lines on public properties was restricted by high risk of disturbance or loss of equipment in a highly populated urban environment. Loss of habitat, in the form of natural meadows, early successional forests and wetlands, undoubtedly contributed to the inventory results.

Fisher's Eastern Chipmunk *Tamias striatus fisheri.* Chipmunks were described by early explorers and many were collected in Arlington by scientists from 1937- 1977. In the recent wildlife survey, chipmunks were found to occupy a number of habitats including residential backyards. It is interesting to note that in the 1880s, Bailey described chipmunks as scarce "probably owing to the cats, dogs and boys" (Bailey,

1896). As agricultural fields and meadows slowly transformed into mature mast-bearing forests, the population of *T. striatus* most likely increased in population. Today, chipmunks are commonplace and well known to most residents with properties bordering on parkland. **Current Status:** Locally common within preferable habitat.

Woodchuck *Marmata monax monax.* The woodchuck or groundhog is presently uncommon in Arlington. In the late 1800s they were often observed near Chain Bridge and along the Virginia side of the Potomac River. This species was most likely abundant throughout the early 20th century, when Arlington farmland would have provided the open grass and edge habitat that woodchucks prefer. Modern development and loss of habitat has drastically reduced their former numbers. Road kill data from 2005-2007 show only 10 woodchucks killed on local roadways in a three-year period. Recent observations were made in Tuckahoe Park, Washington Golf and County Club, Army-Navy Country Club, and along the edge of the George Washington Memorial Parkway in North Arlington. **Current Status:** Uncommon, restricted to high quality edge communities.

Northern Gray Squirrel *Sciurus carolinensis pennsylanicus.* This species, described in most early historic accounts, was probably subject to over-harvesting by hunting during the early period of active colonization. By the late 1800s, Bailey described that gray squirrels occurred in native forest on the Virginia side of the river, but were shy and rarely seen (Bailey, 1896). Gray squirrels have thrived as a result of local urbanization; the remaining extant forest tracts (parkland) and many residential backyards are rich in mature, mast-producing oaks and hickories; most primary predators have disappeared; and supplemental food is generously provided at bird feeders across the County. No population studies were attempted. However, even with approximately 300 road kills reported each year and a large number of squirrel nuisance calls received by nature centers and the Animal Welfare League of Arlington, it is fair to say that local populations are artificially high and likely to remain so short of epidemic disease or dramatic mast-failure.

The high proportion of black (melanistic) squirrels within the local population is notable and the subject of some controversy. Some believe that since melanism is a relatively high natural occurrence within a large population, increased survival and reduced predation allow melanistic squirrels to breed and produce more offspring. Others trace the origin of local black squirrels to the release and subsequent escape of 18 melanistic squirrels imported by the National Zoo in 1902 and 1906 (Linzey, 1998. Fahrenthold, 2005). Of note, in 2004, two gray squirrels with a color combination of red, black and white were observed and photographed in South Arlington (Zell, personal observation). **Current Status:** Over-abundant throughout the County.

Eastern Fox Squirrel *Sciurus niger vulpinus.* Fox squirrels can be distinguished from the

abundant Gray Squirrel by its much larger size, generally brown coloration and habit of occupying more open woodlands. They were most likely abundant in colonial times but would have suffered from over-harvesting at an early date. By the late 19th century, Bailey reported Fox Squirrels to be uncommon in the vicinity of Washington, and relayed that numbers were being shipped to local markets from 30-40 miles distant (Bailey, 1896). In 1952, Mansueti described remaining nearby Maryland populations to be strictly local and relict colonies (Paradiso, 1969). The most interesting historical account from Arlington County reports that in 1933, a large resident migration of fox squirrels left the grounds of the Arlington National Cemetery in frenzy, some plunging into the Potomac River and swimming to Analostan (Roosevelt) Island. Despite this mass exodus, the report states that some *S. niger* remained in 1953 (Linzey, 1998). Apart from this one historical account, no other local documented records were found. Upon inquiry, current National Park Service staff had no knowledge of the past event or whether the population at that time was a result of importation/release or a natural relict population. The existing environment of mowed grass and open woodlots at the cemetery would certainly have provided optimum habitat.

Interestingly, after many years of being considered extirpated, fox squirrels have recently been sighted at several locations in Fairfax County. Ernst last reported a single observation in 1973. Current records include both direct observations and road kill documentation over the past four months. Fairfax County Park Authority staff is unsure whether the sightings are a result of unauthorized releases or increased activity within a formerly unknown relict population (Bulmer, personal communication). **Current Status:** Extirpated.

Talkative Red Squirrel *Tamiasciurus hudsonicus loquax.* Red Squirrels or Chickarees are smaller than the gray squirrel and exhibit a strong preference for coniferous forests. A number of records exist for collections made in the late 1800s at Ballston, Ft. Myer, and along Four Mile Run (unspecified). They were also reported to be common in the wooded bluffs along the Virginia shore of the Potomac River (Bailey, 1896). As the natural forests of Arlington transformed from mixed oak-pine into mature hardwoods in the 20th century and development increased, natural habitat for the red squirrel declined and finally disappeared. **Current Status:** Extirpated.

Southern Flying Squirrel *Glaucomys volans volans.* Flying Squirrels were unfamiliar to early explorers, so were often described in historical accounts. Strictly nocturnal and too small for market, these tiny squirrels were still common at the end of the 19th century (Bailey, 1896). Multiple collection records were found for the period of 1897-1940. Flying squirrels remain common in Arlington today within areas of suitable habitat--mature, mixed-age hardwood forest near water,—but are rarely observed. Specimens have been reported and collected from a number of residential neighborhoods in

the past several years. **Current Status:** Locally common – abundant within high quality forest habitat.

American Beaver *Castor canadensis.* Beavers would have been abundant along the length of Four Mile Run, other larger streams and in tidal marsh communities lining the Potomac River prior to the contact period. However, highly valued as trade items from the earliest days of European exploration, the local beaver population probably disappeared prior to or just after colonial settlement of the area. Over-harvesting continued throughout the state into the late 19th century. A single collection was made in Four Mile Run in 1894. Between that year and 1911, beavers were considered to be extirpated from Virginia. A statewide program of reintroduction from imported stock took place from 1932 -1938 (Linzey, 1998). Successful reintroduction, coupled with careful management by the Virginia Commission of Game and Inland Fisheries allowed the population to increase rapidly and expand across the state. Within Arlington today, beavers are uncommon but persistent residents. Historical loss of wetlands and extensive urban development has eliminated all high value habitats within the County. Remaining habitat is rated as marginal and appears to support the short-term needs of transient beavers (two-year old beavers searching for new territory). Beavers most often enter Arlington from the Potomac River into Four Mile Run and other tributaries. Most transients stay for a short period of time and move on. A total of seven beavers were documented in road kill data in the three-year period of 2005-2007. Bank dens are more common than lodges in Arlington, and reproduction has been noted in two colonies over the past several years. Loss of pelt value and resulting decrease in legal trapping has contributed to an increased beaver population across the state. In highly urbanized communities, beavers can become a nuisance species, threatening human infrastructure with dams and damaging or killing valuable trees. The relocation of live-trapped beaver is illegal in Virginia. During the period of 2006-2008, the presence of beavers was confirmed from the following locations – Glen Carlyn Park, Ballston Beaver Pond, Roaches Run, Pimmit Run and the G. W. Parkway. **Current Status:** Uncommon and transient.

Marsh Rice Rat *Oryzomys palustris palustris.* Arlington County lies on the extreme edge of the northern-most range of this wild native rat. Although no historical records of local occurrence were found, the extensive tidal marshes that once lined the Potomac River prior to colonization may have supported a population in South Arlington at one time. The presence of *O. palustris* was recently reported from southern Fairfax County near the Occoquan River (Smith, 2010). A small section of tidal marsh community within the Roaches Run Waterfowl Sanctuary provides the only remaining habitat for this species. However, considering the reduced size of available habitat and the extensive historical development around the site, presence is extremely unlikely. **Current Status:** Unknown, but most likely extirpated.

Eastern Harvest Mouse *Reithrodontomys humulis virginianus.* Optimal habitat for *R. humulis* includes old field stage meadow and tall grasslands – habitats that are rare in Arlington today. In the past, harvest mice may have been common to abundant within favorable habitats, such as agricultural lands, abandoned farms, and the old Experimental Farm (Dept. of Agriculture) near Arlington National Cemetery. Few historical records were found for regional collections. A single trapping record for Arlington was from a specimen collected by Palmer at Ft. Myer in 1896. Only a few historical records were located from nearby Takoma Park, Maryland (1934-1940). In the District of Columbia, in the early 1900s, a number of harvest mice skulls were found in Barn Owl pellets, but the exact location of the "meals" is not known (Paradiso, 1969). **Current Status:** Unknown, may be present in small numbers.

Woodland Deer Mouse *Peromyscus maniculatus maniculatus.* This medium-sized native mouse has large eyes, long whiskers and exhibits a keen sense of touch, smell and hearing. They can be found in a variety of habitats, but prefer mature woodlands (Linzey, 1998). On occasion, these nocturnal mice will enter homes or outbuildings. *P. maniculatus maniculatus* was easily live-trapped from two forested sites in 2007 and 2008, and is probably common throughout Arlington within appropriate habitat. **Current Status:** locally common within suitable habitat.

Prairie Deer Mouse *Peromyscus maniculatus bairdii.* Similar to the woodland deer mouse, the prairie deer mouse has not been recorded locally but may be in the near future. This sub-species is native to the mid-west, but migrated eastward as the great expanse of forest was cleared in the eastern United States. *P. m. bairdii* is similar in appearance to *P. m. maniculatus*, but prefers to inhabit grasslands and meadows. *P. m. bairdii* was first recorded from Northern Virginia in 1962, when it was found in Chantilly near Dulles Airport (Linzey, 1998). **Current Status:** Watch List.

Northern White-footed Mouse *Peromyscus leucopus noveboracensis.* The white-footed mouse can easily be confused with the deer mouse, with subtle differences in coloration, length of tail and skull characteristics. The white-footed is more common in Arlington than the former and occupies a greater variety of habitats including woodlands, forest edges and meadows. This species may frequently inhabit residential back yards and sometimes enters homes or buildings. *P. leucopus* is more apt to nest on or under the ground, while *P. m. maniculatus* is more arboreal and prefers to nest in trees (Linzey, 1998). A number of specimens were live-trapped as part of the inventory in grassy meadow-like areas adjacent to mature forest. Historical collections are recorded from 1895 - 2003. Both the white-footed and deer mouse were more abundant prior to major development in the 20th century, but are still common within remaining habitat. **Current Status:** Common - abundant throughout forested parks and neighborhoods.

Pungo White-footed Mouse *Peromyscus leucopus eastii.* A single record from the Virginia Department of Game and Inland Fisheries in 2002 records the presence of *P. l. eastii.* Since this sub-species has only been recorded from the extreme southeast of Virginia, this record is highly questionable and most likely based on an erroneous identification. **Current Status:** Not present.

Allegheny Wood Rat *Neotoma magister.* Also known as a pack rat, this native species appears similar to a giant deer mouse, with long whiskers, large eyes, and white throat, belly and feet. Preferred habitats are rocky outcrops, cliffs and river bluffs. Arlington County is shown on most range maps as the eastern-most point of distribution in Virginia. There are no current or definitive historical records for the occurrence within Arlington County. However, it is possible that wood rats did range into Arlington prior to colonization. Bailey reported that wood rats were still common among the rocks on the west side of the Potomac River about a mile above Chain Bridge (Fairfax County) in 1896 (Bailey, 1896). By that time in history, the rocky bluffs south of Chain Bridge known as the Palisades, had been continuously quarried for over 100 years. It is reasonable to assume that prior to human disturbance of the Palisades, wood rats may well have occupied the rocky cliffs as far south as Spout Run. **Current Status:** Extirpated.

Common Gapper's Red-backed Vole *Clethrionomys gapperi gapperi.* While range maps indicate the possible presence of *Clethrionomys* in Arlington, there is no data to establish the current or past presence. Arlington stands on the eastern edge of this species range in Virginia. In the Old Dominion, the red-backed vole primarily inhabits cool and moist forests at higher elevations in the western portion of the state (Linzey, 1998). In nearby Maryland, these voles were found to be restricted to the mountainous regions, well to the north of Arlington (Paradiso, 1969). The only local habitat (marginal) available in the past would have included the lower portions of several northern stream valleys, such as Pimmit Run, Gulf Branch, Donaldson Run and Windy Run. Plant surveys within these four valleys indicate that in the past, species such as Eastern Hemlock and Sugar Maple may have been more dominant – indicative of a cool, moist plant community prior to settlement and subsequent logging. **Current Status:** Unknown, presence is unlikely.

Meadow Vole *Microtus pennsylvanicus pennsylvanicus.* Meadow voles, also called field mice, are stocky with short tails, small ears and a flattened face. *M. pennsylvanicus* is a creature of grassy meadows, old-field successional stages and marsh edges. During Arlington's heyday as an agricultural and farming community, this species would have been numerous, and remains Virginia's most abundant mammal. Within optimal habitat, populations can be as high as 80 per acre. They serve as a staple food item for many predators and birds of prey. Multiple collection records exist for the period from 1889 to 1994, and recent live trapping has documented continued presence. While not

as abundant as in the past, meadow voles are considered common within available remaining habitat, including local community garden plots. **Current Status:** Locally common within high value habitat.

Pine Vole *Microtus pinetorum scalopsoides.* Similar in appearance to the meadow vole, *M. pinetorum* is generally less abundant and more confined to uplands and forests. It is fossorial, spending much of its time beneath the leaf litter or loose soil. Multiple historical collections were made of this species between the years 1896 - 1977 from Ft. Myer, the Experimental Farm and Rosslyn. A single dead specimen was collected in the late 1980s in North Arlington (Zell, personal recollection). No examples were captured as part of the recent field survey, but additional trapping in heavily forested sections of parkland with streams might be productive. Contemporary records do exist for nearby Turkey Run Park in Fairfax County (Steury, Email Communication). **Current Status:** Unknown, but most likely present.

Southern Bog Lemming *Synaptomys cooperi.* Little is known of this small mammal in the Northern Virginia region. In Virginia, it is mostly found to the west of the Blue Ridge Mountains (Linzey, 1998).In nearby Maryland, historical collections were largely found within localized sphagnum bogs (Linzey, 1998 Paradiso, 1969). No historical records were found for Arlington County nor were any specimens captured within the study. However, an historical account from 1888 states that a Dr. Fisher examined long-eared owl pellets collected from Munson Hill (near the Arlington boundary) and found three skulls of *Snaptomys* (Bailey, 1896). **Current Status:** Unknown, presence unlikely.

Large-toothed Muskrat *Ondatra zibethicus macrodon.* The common muskrat requires high value wetland habitats such as ponds, streams or marshes. Insufficient habitat remains in Arlington to sustain a stable population. Like the beaver, local muskrat populations are transient and move in and out of the County, and appear to be less numerous than the larger beaver. Only one historical record was found from 1899 from a specimen collected near the current Roosevelt Island (Washington, D.C.). From 2005 - 2007, only three road kill muskrat were documented locally. In the period from 1999 - 2003, muskrats were observed in Sparrow Pond (Glencarlyn Park) and Ballston Beaver Pond (Zell, personal recollection). In 2007, a muskrat lodge and droppings were observed in Roaches Run Waterfowl Sanctuary. They are probably more common along the Potomac River to the south of Arlington. **Current Status:** Rare, limited to reduced available habitat.

Norway Rat *Rattus norvegicus norvegicus* (non-native/naturalized). In spite of the common name, the Norway rat is originally native to Asia, having arrived in Europe during the Middle Ages. Transported to America as stowaways aboard ships prior to the 1770s, escapees quickly became established in the new colonies, including Virginia. The Norway rat has an extremely high reproductive potential, is highly adaptive and has

thrived in urban communities across the United States. In Arlington, *R. norvegicus* primarily occur in commercial and residential areas, but have also been found in woodlands. This species inhabits storm drains and freely moves through parkland along connecting streams. The Norway rat is considered a vector for contagious human diseases and all local governmental agencies have developed abatement programs in order to control populations. **Current Status:** Abundant throughout the County.

Black Rat *Rattus rattus rattus* (non-native). The black or roof rat is also of Asian origin, but actually arrived earlier with European explorers in the late 1500s (Linzey, 1998). The black rat is smaller, less aggressive and less abundant than its larger relative. According to various literature, in areas where populations overlap, the more aggressive *R. norvegicus* forces *R. rattus* to occupy the upper levels of buildings, reducing their opportunity to find food successfully. The overall status of the black rat in the eastern United States is tenuous, with most known populations restricted to port cities where periodic replacement of migrants continue to occur from shipping. There are some historical accounts of black rats from Norfolk, Baltimore and from the D. C. waterfront (wharf). The single confirmed report from Arlington is from 2002, where Arlington County staff from the Public Health Division responded to a residential complaint and discovered a black rat building a nest in a tree on the homeowner's property (Colon 2009). Unable to compete with the Norway rat, the black rat will remain a scattered and temporary visitor to urban areas such as Arlington. **Current Status:** Unknown, but most likely present in small numbers in some years.

House Mouse *Mus musculus musculus* (non-native/naturalized). The common house mouse is unfortunately well known to most urban dwellers. Native to Eurasia, they were accidentally introduced to America by shipping sometime from 1770 - 1780 and are now found across Virginia and the United States (Linzey, 1998). A number of historical records report the presence of house mice from 1843 - 1895. Even more adaptable than the Norway rat, house mice will occupy dwellings, fields and forests. As a result, the house mouse is the most abundant mammal in Arlington. While their wild brethren are known for potential disease transmission, the white strain or laboratory mouse (and rat) is widely used for medical research related to the cure of human diseases. **Current Status:** Abundant throughout the County.

Meadow Jumping Mouse *Zapus hudsonius americanus.* The Meadow Jumping Mouse is medium-sized, with a long tail and extra long rear legs. They are often solitary, not as abundant as other small mammals, and one of only two Virginia mammals that truly hibernate. Little is known about the historical presence of the jumping mouse in Arlington. The species ranges statewide, but is found in scattered local populations within desirable habitat. Known habitats include grassy fields, moist meadows, wet thickets and streamside woodlands. Two historical records from Arlington document their present in 1882 (no location) and 1896 when

several were removed from a nest between the west end of Long Bridge and the Aqueduct Bridge in habitat described as brush heaps and weed beds (Bailey, 1896). Nearby historical records from Fairfax County, Maryland (Prince Georges and Montgomery Counties) and Washington D. C. have been documented. In 1890, six *Zapus* skulls were reportedly identified from barn owl pellets collected at the Smithsonian tower (Forbes, 1913). Since Arlington is located only a short flying distance away, it is possible that those "collections" may have originated from fields on the west side of the Potomac River. Nearby contemporary records include several specimens collected from Cub Run Stream Valley Park in Centerville in 2006 (Smith, personal communication). **Current Status:** Unknown, relict population may remain present.

Carnivores (Order Carnivora)

The carnivores represent a diverse group of local mammals that includes the native dogs, cats, bears, weasels and raccoon. While the name carnivore implies a strict meat-eating diet, some species will consume seasonal plant foods, such as mast and fruits.

Red Fox *Vulpes vulpes fulva.* Red foxes are abundant in Arlington and were observed in virtually every wooded park inventoried. Red Fox can be most easily identified by the white tip on the end of the tail and black behind the ears and legs. Between the years 2005 - 2007, an estimated 75 road kills were reported. As a highly adapted urban predator, foxes not only capture and feed upon rabbits, squirrels and small mammals, but will also feed on kitchen scraps placed in trashcans or bags. Red foxes can be active both day and night and are often reported to establish dens in close proximity to human residences – under decks or backyard sheds. The red fox found commonly in Northern Virginia has an interesting history and may or may not be truly native. There is universal agreement that prior to the arrival of European explorers, the smaller gray fox was the only species present in Virginia and Maryland. The native North American red fox at that time was restricted to well north of the Mason Dixon Line. During the period of 1650-1802, European red foxes were imported and released into southern Maryland for the sport of foxhunting. By the year 1816, the red fox had spread to the Washington area and were reported as part of the local fauna (Bailey, 1896. Paradiso, 1969). Is the red fox in Arlington today the historical offspring from the released European race, the progeny of the native North American race that moved south as land was cleared, or a genetic mix of the two? No clear answer to the question has been provided. **Current Status:** Over-abundant throughout the County.

Common Gray Fox *Urocyon cinereoargenteus cinereoargenteus.* The gray fox was the only native fox present in Arlington prior to the mid-1600s. It differs in appearance and habit from the more abundant red fox. The smaller gray fox prefers wetland habitat, is capable of climbing low trees and can be distinguished from the red fox by the black tip on the end of the tail. While most early ex-

plorers described the native species, verified collection records are scarce. Even in the late 1800s, it was described as uncommon in the area (Bailey, 1896). Based on contemporary records and observations made during the recent wildlife survey, the gray fox is considered to be locally rare. One record exists for a collection in 1976 near Arlington National Cemetery and two reliable reports cite observations made in 1982 near Key Bridge and in 1992 in Zachary Taylor Park (Smith, personal communication). The most recent voucher was established in 2008. The small resident population is most likely the result of a combination of unsuccessful competition with the over-abundant and larger red fox and loss of historic wetlands. **Current Status:** Rare in wetland habitats.

Coyote *Canis latrans.* The coyote is not part of the historical native fauna of Virginia. A western species, the coyote has steadily expanded its range for many decades, moving east and north (Paradiso, 1969). As a master of adaptability, coyotes have moved into urban communities in recent years and have easily been trapped in the city limits of Chicago. The earliest documented reports of coyotes in Virginia were in the early 1950s, but may have originated from released specimens. Prior to 1983, a total of eight coyotes had been killed and identified in five counties of Virginia. Between the years 1983 - 1987, 53 coyotes were shot and the range had expanded to 10 counties (Linzey, 1998). The first coyotes positively identified within the immediate Northern Virginia area were from Dulles Airport (Hodnett, personal communication). The presence of coyotes in Arlington has not been officially verified to date. However, as part of the wildlife inventory, several dozen reported observations from residents were investigated from 2006 - 2007. After reviewing provided digital photos or debriefing the observer, over half of the sightings were identified to instead be red foxes. Of the remaining reports, approximately one dozen appeared to be accurate descriptions of a coyote. Some sightings were from multiple observers at slightly different locations and times. In several cases, game cameras were placed where observations occurred, but proved unsuccessful. It is considered likely that coyotes have found their way into Arlington, but they are extremely cautious, range very widely and move primarily at night. It is expected that documentation in the form of photographic evidence or road kill will be forthcoming in the next few years.

Coyotes are considerably larger than foxes and more resemble dogs. A grayish coat is most common, but in Virginia approximately 25% of specimens are mostly black (Linzey, 1998). A white throat is often visible. Coyotes have not yet presented a danger to residents of the community, but attacks upon people and pets have been reported in other states. Adult coyotes are capable of easily jumping over a standard 48" fence and have been known to kill and eat domestic cats and small dogs. **Current Status:** Undocumented, but may be present in small numbers.

Gray Wolf *Canis lupus.* The gray wolf is officially listed as extirpated in Virginia and is

included for informational purposes. Wolves formerly ranged across the state and were most likely abundant at the time of first contact based on descriptions of deer herd sizes at the time. This species began to disappear during early colonial times, with Virginia first enacting a bounty on wolves in 1632. McAttee states that wolves were still present in the vicinity of the District of Columbia as late as 1728. (McAtee, 1918). The last recorded wolves in Virginia were reportedly killed in Tazewell County in the winter of 1909-1910 (Linzey, 1998). **Current Status:** Extirpated.

Black Bear *Ursus americanus americanus.* The black bear, most at home in heavy forest and swamp, was formerly distributed across the state, but probably disappeared from the region not long after European settlement. An easy target for European guns, they were hunted for meat, fur and out of fear. Although native black bears were never totally eliminated, the population in Maryland came close to extirpation. An estimate from the U.S. Fish and Wildlife Service in 1956 had placed the number of bears remaining in Maryland at only 12 individuals. (Paradiso, 1969). Wild bears in Virginia fared better during that time period with an estimated 650-750 animals finding refuge in the western mountains or within the Dismal Swamp (Linzey, 1998). In 2003, the Center for Ursid Research at Virginia Tech estimated the current population of 3,500-4,000 black bears as stable or increasing (Trent, 2003). In recent years, the Virginia bear population appears to be spreading eastward. Over the past four to five years, there has been an average of two reliable bear sightings in nearby Fairfax County each year (Hodnett, personal communication). Between approximately 1977 and 1985, two separate sightings of bears were reported in Arlington County. Both events caused some excitement among local police who were unsure how to handle the situation. In both cases, the bears quickly disappeared and were never seen again. The Arlington bears were probably recently independent yearlings with little experience and poor sense of direction. While not considered to be part of extant local fauna, it should be recognized that a wandering bear could at any time migrate down the Potomac River to make news in Arlington. **Current Status:** Rare transient in North Arlington in some years.

Raccoon *Procyon lotor lotor.* Early explorers found the raccoon interesting based on various descriptions of the animal. In 1612, one explorer named William Strachey wrote – "The Rackoone I take to be a species of Monkey" (Linzey, 1998). This description was undoubtedly given after observing the raccoon's ability to climb trees. The raccoon is a common to locally abundant animal in most parts of the state. Like a handful of other species, *P. lotor* has adapted well to an urban existence and has thrived. If the mean population density of raccoons state-wide is estimated to be 1 per 14.5 acres (Linzey, 1998), then Arlington's local population must exceed the state average many times over. Between the years 2005 - 2007, approximately 600 raccoons were reported killed on local roads. Local overpopulation has also led to an increase in human-wildlife conflict.

Competition for a reduced number of high-value natural den sites (hollow trees) has resulted in an increased number of complaints about raccoons nesting in chimneys, attics, and other residential structures. This highly intelligent and social species can easily become a nuisance if fed, and as a rabies vector species, all contact with human pets should be avoided. **Current Status:** Over-abundant throughout the County.

Long-tailed Weasel *Mustela frenata noveboracensis.* The long-tailed weasel is distributed widely across both Virginia and North America. *M. frenata* is known as an aggressive predator with well-developed senses of smell, sight and hearing. They feed primarily on mice, rats, shrews and moles. While running, its body appears to undulate, with its back held in an arching position. Historical records for weasels are scarce. Three Arlington collections were found for 1890 (Ballston), 1892 (no location), and 1941 (no location). A number of historical records were noted from nearby Maryland and the District. A single contemporary observation was made at Potomac Overlook Park in 1977, when the resident park manager witnessed a female with three young crossing the entrance road to the park (Hodnett, 2009. personal communication). With a habitat preference of grassy meadows, thick brush, old field meadow, and cultivated fields, this species was undoubtedly more abundant in the 19th and early 20th centuries prior to the elimination of agriculture in Arlington. If still present in Arlington, it would most likely occur in small numbers in North Arlington along the G. W. Memorial Parkway. **Current Status:** Unknown, may persist in small numbers along the Potomac River.

Common Mink *Mustela vison mink*. The mink has not adapted well to changes in the local urban environment. A wetland species, the mink's preferred habitat includes stream banks, river edges, lakes and marshes. Considered an opportunistic predator, this medium-sized weasel feeds on any small mammal, reptile, amphibian or bird within its territory. Historical records include collections made in 1892 (no location) and 1889 (Ballston). Bailey described the mink as still common in the Washington area along stream valleys in the 1920s (Paradiso, 1969). No contemporary records for Arlington exist. However, areas of Fairfax and Prince William Counties, such as Riverbend Park and Mason Neck appear to retain small populations. Most likely a combination of over-trapping, wetland loss and water quality degradation within Arlington County streams over the past 80 years has forced this water dependent species to seek higher quality habitat away from the city. A few transient minks may travel along the west bank of the Potomac River in Arlington from time to time, but most likely continue traveling north or south where more suitable habitat is available. **Current Status:** Unknown, occasional transients possible.

Northern River Otter *Lontra canadensis lataxina.* River otters are the largest of the native Virginia weasels and are never found far from water. They are well adapted to an aquatic existence, with a sleek body, webbed feet and an oily coat of insulating fur. Diet is

composed largely of fish, aquatic amphibians, crustaceans, bivalves and insects. Occasionally, mammals or birds are taken. No local historic records for this species in Arlington were found, but a general account by Bailey in 1896, classifies *Lontra* within the Washington area as scarce (Bailey, 1896). By 1978, the future of the river otter population in Virginia seemed bleak and was temporarily classified as a state endangered species. In response, the Virginia Game Commission closed all legal trapping west of the Blue Ridge Mountains and released 18 otters imported from Louisiana into Bath County (Linzey, 1998). While the statewide population has stabilized from its low point in the 1970s, the species remains uncommon - rare in Northern Virginia. There has been some recent evidence of river otter returning to nearby areas such as Mason Neck (Prince William Co.) and Huntley Meadows (Fairfax Co.) in recent years, and transients may occasionally inhabit Dyke Marsh in Alexandria or travel up and down the Potomac River along the Arlington boundary. While the regional population may be increasing, Arlington's streams and remaining wetlands are judged insufficient to supply and sustain the dietary needs of a family of otters. A single contemporary observation records the presence of river otter in Arlington—an adult otter was killed on Rt. 66 near the East Falls Church Metro Station in 2006. **Current Status:** Rare, occasional transients possible.

Striped Skunk *Mephitis mephitis nigra.* The striped skunk is well known, but rarely encountered in Arlington. Historical records include a single early record from 1878 (Four Mile Run) and a later record in 1946 from N. Nelson St. The absence of skunks from the local environment is not unexpected. Based on dietary need, skunks primarily inhabit open fields, old field meadows, thick brush land, pastures and farmland. Past environmental changes in Arlington have eliminated natural meadows and farmland and replaced them largely with an urban landscape or mature forest. Over the course of the wildlife inventory, a number of citizen reports were received claiming to have smelled an odor of skunk. A number of these reports were later dismissed as unverifiable or mistaken as male red fox scent. However, two reported observations within the period of 2003-2006 were followed up by interviews. In both cases, the reports were deemed credible. No contemporary documentation exists in the form of photos, bones, fur or scat. In addition, no road kills have been reported within the last ten years by two different reporting agencies. Arlington National Cemetery may provide the best remaining habitat for skunks in Arlington. Striped skunks remain more common in the less developed portions of Fairfax and Prince William Counties (Smith, personal communication). **Current Status:** Rare, does not occur every year.

Bobcat *Lynx rufus rufus.* Often called "wildcat" by early explorers, the bobcat was probably extirpated from Arlington at an early date as a result of over-hunting. As forests were cleared and deer populations fell, bobcat populations declined throughout the early 20th century. The bobcat was not listed as part of the local fauna by Bailey (1896).

However, in the 1930s, as farmland was abandoned and replaced with successional forest, bobcat numbers began to stabilize in the state. Since the 1980s, the bobcat population has increased and expanded its range eastward (Linzey 1998). Between the years 1996 - 2006, several reliable reports of sightings or sign have been reported in Fairfax (Smith, personal communication). Despite the fact that *Lynx rufus* generally avoids heavily developed urban environments, a bobcat was hit and killed by a vehicle on Chain Bridge Road in McLean in December 2007 (Activity Report, 2007). The unusual arrival of a bobcat within one mile of Arlington's northern border is not likely to be repeated anytime soon, but it is possible. **Current Status:** Extirpated.

Deer (Order Artiodactyla)

White-tailed Deer *Odocoileus virginianus.*
Early explorers found an abundant deer population, often forming herds of many dozens. Relentlessly hunted by early settlers, deer were reported by Warden to be absent from the Washington area in 1816. As settlement continued to the west and land was cleared for farming, the white-tailed deer was hunted virtually to extinction throughout Virginia by 1925. From 1930 - 1950, deer were imported from North Carolina, Pennsylvania, Florida and parts of the midwest (Linzey, 1998). The release of these deer in conjunction with careful management eventually restored the population. In recent years, with the loss of natural predators and decreased hunting near urban centers, the number of deer in most counties of Virginia has greatly increased. In the absence of effective population controls, the white-tailed deer has the potential to cause increased human injuries (car accidents), health concerns (Lyme disease) and substantial damage to natural forests and plant communities. In some forested parks of Fairfax County, deer have completely consumed the forest under story and are impacting natural forest succession. In Arlington County, the impact of deer browsing on vegetation is apparent. If local deer populations continue to increase, the impact upon limited natural resources will equally increase. From 2005 - 2007, deer were observed to inhabit almost every forested park in Arlington. Population studies were not included within the wildlife inventory; however, a number of people have reported observing herds of up to a dozen deer in North Arlington. A review of aerial photos shows the most likely immigration route into Arlington from Fairfax to be the Pimmit Run watershed, including Chain Bridge and the G. W. Memorial Parkway. Deer killed on roadways in Arlington rose from 11 in 2005 to 39 in 2007. The increase of deer killed on the G. W. Parkway alone was four-fold within a three-year period. **Current Status:** Common in North Arlington – uncommon in South Arlington with population increases expected.

Reptiles (Class Reptilia)

Northern Copperhead (A. contortrix) is Arlington's only venomous reptile (see pages 43, 53 for more info).
Photo by Greg Zell

Turtles (Order Testudines)

A dozen species were placed on the inventory search list for Arlington based on published range maps and historic records, including nine aquatic, two semi-aquatic and one terrestrial species. Three species are considered non-native and potentially invasive and one is listed as threatened in Virginia.

Eastern Snapping Turtle *Chelydra serpentina serpentine.* The record size snapping turtle in Virginia weighed 74 lbs. (Mitchell, 1994). Adults routinely reach a weight of 25-35 lbs. This large wetland species is ubiquitous, and can be found in any local deep water environment regardless of quality. As a top predator within their habitat, they have no enemies except man. Historical records for the snapping turtle include collections from Ft. Myer in 1895 and near National Airport in 1954. The presence of *Chelydra* in County parks is reported several times annually to the Animal Welfare League of Arlington as well as local nature centers. Citizen observations are most often reported in late spring and represent large females searching for nest sites. Although snapping turtles spend a majority of the time submerged in water, a number of specimens were observed or captured in areas of appropriate habitat within the wildlife inventory. Current records include observations in Glencarlyn Park, Bluemont Park, Ballston Beaver Pond and Roaches Run Waterfowl Sanctuary. **Current Status:** Common in remaining deep water wetlands.

Eastern Painted Turtle *Chrysemys picta picta.* As a small basking turtle, this species naturally occupies wet ditches, slow moving streams and ponds. *C. picta* has adapted well to an urban existence and can be observed on sunny days lying on top of submerged logs or sticks at the water surface within man-made storm water management ponds. The speed of flowing water and lack of aquatic plants within Arlington's modern streams rate these waterways as unsuitable habitat. A number of historical records include collections made in 1877 (no location), 1901 (Custis Springs at Arlington National Cemetery), and 1921 (Experimental Farm). Known as the "skilpot" in earlier years

(Dunn, 1918), contemporary observations were routinely made at Roaches Run Waterfowl Sanctuary and most constructed wetlands (ponds) in the County. **Current Status:** Common in remaining deep water wetlands.

Spotted Turtle *Clemmys guttata.* *Clemmys guttata* is a declining species in Virginia as a result of habitat loss and fragmentation. The spotted turtle is considered a semi-aquatic species with specialized habitat requirements. Historical habitat preferences included bottomland forests with vernal pools, open wet ditches, flooded fields and shallow wet marshes. No historical collections for Arlington were found even though Dunn placed the species on a local checklist early in the 20th century (Dunn, 1918). On the basis of recent wetland and plant community inventories within the County, it has been determined that all historic habitats for this species have been lost and no populations exist. No observations were made at any wetlands recently surveyed. **Current Status:** Extirpated, no remaining habitat.

Wood Turtle *Glyptemys insculpta.* The wood turtle is listed as a threatened species in Virginia. This large, seasonally-aquatic terrestrial turtle requires specific habitat needs and responds poorly to water quality degradation, loss of wetlands, fragmentation of habitats and urbanization (BOVA, 2009). A single historical collection was reported from Four Mile Run at US Rt.1 in 1953. While the collection itself is not questioned, the nativity of the specimen is suspect. In the 1950s, the lower section of Four Mile Run in Arlington County was severely impaired physically, chemically and biologically and would not have provided even marginal habitat for this species. It is more likely that a specimen had been unknowingly released at the site and subsequently captured. While relict populations exist in several Fairfax County sites, no suitable habitat remains in Arlington to support a native population of *G. insculpta.* **Current Status:** Extirpated, no remaining habitat.

Eastern River Cooter *Pseudemys concinna concinna.* Some distributional range maps indicate the likely presence of *P. concinna* in Arlington (BOVA, 2009). However, no direct historical or contemporary data provides confirmation of local presence. As an occupant of large, slow moving streams and rivers with abundant aquatic plants, the single habitat within the County would be the west bank of the Potomac River. If present in the general area, this species would be more likely to occur to the south of Arlington, where the presence of aquatic plants along the river is more pronounced. **Current Status:** Unknown, no records to date, limited habitat available locally.

Florida Cooter *Pseudemys floridana floridana* (non-native). *P. floridana* has been included in the accounts as a species to "keep on the radar." While normal distribution in Virginia is limited to the southeastern corner of the state, it is possible that specimens are being released in Northern Virginia as a result of the pet trade and subsequent releases. The Florida cooter shares similar habits and habitat preferences with a close relative,

the eastern river cooter. **Current Status:** Watch List.

Northern Red-bellied Cooter *Pseudemys rubriventris.* *P. rebriventris* is the only large native basking turtle that was once abundant in the Potomac River and adjacent tidal marshes along Arlington County. This turtle was collected heavily in the 1800s and sold at market in Washington, D.C. as food (Mitchell, 1994). Like other *Pseudemys*, this local species requires both deep water and the presence of aquatic vegetation for food. Local observations have been verified at Roaches Run and Sparrow Pond in Glencarlyn Park. **Current Status:** Locally uncommon within preferred habitats.

Yellow-bellied Slider *Trachemys scripta scripta* (non-native). The natural range of *T. scripta* is confined to the coastal plain in southeast Virginia (BOVA, 2009). Localized populations presently found in Arlington (Zell, personal observation) and Fairfax Counties (Mitchell, 1994) are the result of formerly released specimens. The locally introduced species appears to survive in ponds with deep water and sufficient aquatic vegetation to support dietary needs. Sparrow Pond is the only known location at present. Over the past decade, several specimens which may have been *T. scripta* were collected from the Potomac River and brought to local nature centers for identification, but these were never verified. **Current Status:** Rare, present in a single location.

Red-eared Slider *Trachemys scripta elegans* (non-native). *T. s. elegans*, a close relative of the yellow-bellied slider, is easily recognized by the red stripe behind each eye. This introduced species is native to the Mississippi valley (Ernst, 1989) and has greatly expanded its natural range through pet sales and subsequent release. Unfortunately, the red-eared slider will occupy the same habitats as the native Northern red-bellied cooter and has the potential to out-compete the native turtle. Local observations have been confirmed from Roaches Run, the Potomac River, Sparrow Pond, Donaldson Run and Four Mile Run. **Current Status:** Locally common in ponds, population increasing.

Eastern Mud Turtle *Kinosternon subrubrum subrubrum.* Spending long periods of time submerged in water, this small wetland turtle is difficult to inventory through observation. A number of historical records indicate the presence of *Kinosternon* over the years. Records of collections were found for 1877 (no location), 1892 (the end of Long Bridge) and 1896 (Potomac River marsh). Dunn indicated the species as still present in 1918 (Dunn, 1918). A resident of ponds, wet ditches, marshes and slow-moving streams, the local population has undoubtedly suffered with the loss of local wetlands, but most likely persists within the tidal marshes of Roaches Run and near the mouth Four Mile Run. No observations were made for the years 2005-2007. **Current Status:** Unknown, most likely persist in small numbers.

Stinkpot (Common Musk Turtle) *Sternotherus odoratus.* Known as "stinking Jim" by early settlers, this small aquatic turtle was common up to the late 19th century (Dunn,

1918). Even more reclusive than its close relative, the mud turtle, a number of both historical and contemporary records confirm the continued presence of *Sternotherus* in Arlington. Early collections include those made at the Custis Springs (Arlington National Cemetery) in 1901 and at the mouth of Four Mile Run in 1935. Recent collections include those made at Sparrow Pond in Glencarlyn Park and Poplar Pond in Long Branch Park. Musk turtles most likely continue to inhabit Roaches Run and the mouth of Four Mile Run as well. Habits and habitat preferences are similar to those of *Kinosternon.* **Current Status:** Locally uncommon in suitable habitat.

Eastern Box Turtle *Terrapene carolina carolina.* Perhaps the best-known turtle species in Arlington, the box turtle appears to persist in spite of the stresses associated with loss of habitat, fragmentation and suspected high predation from red fox and raccoon. Historical accounts and collection records abound for this popular land turtle. Sometimes called the "dry-land terrapin" (Dunn, 1918), this turtle was used both for food and for the fabrication of rattles by indigenous Native Americans in earlier centuries (Rountree, 1990). A number of individuals, struck by cars in the fall and spring are brought to the Long Branch Nature Center for rehabilitation. Specimens were routinely observed in Arlington's wooded parks from 2005 - 2007 and were often reported to be present in urban backyards. **Current Status:** Remains common in woodland parks and residential backyards adjacent to parkland.

Lizards (Order Squamata / suborder Lacertilia)

As a group, lizards generally retain a southern affinity. The southern and western portions of the U. S. contain a greater diversity and number of species. A total of five species are considered native to the Northern Virginia region. Occupying woodlands and wood edges, these small native lizards often go unnoticed by the public. The historical loss of railroad lines in the County has undoubtedly eliminated a primary ecotone habitat for these species.

Eastern Fence Lizard *Sceloporus undulates*. A number of historical collections of S. undulates between the years 1889 - 1917 came from Ft. Myer, Ballston and Minor Hill (near Arlington). In Virginia, eastern fence lizards inhabit variable environments, but seem to prefer xeric or dry locations. Rock piles with crevices, dry woods with stumps, and even urban backyards may hold populations. These small lizards feed on insects and other invertebrates. Like other native lizards, they are difficult to observe unless moving or sunning in open areas. No current observations were made from 2006 - 2007 in Arlington, and no records exist for this species at Great Falls or Turkey Run Park in Fairfax County (Steury, email communication). Remnant populations, if present, would be rare in North Arlington. **Current Status:** Unknown. Most likely extirpated or extremely rare if present.

Common Five-lined Skink *Plestiodon fasciatus.* While no historical records were located

for occurrence in Arlington, a number of past collections were found for nearby Fairfax County and continue to remain common outside of heavily urbanized sections (Smith, personal communication). Contemporary observations and collections from Arlington came from the northern portion of the County, within the Piedmont section. The ideal habitat for *P. fasciatus* is riparian zones within hardwood forests. The presence of dead trees and decaying logs increases habitat value. Observations made over the past two years came from the G. W. Parkway, Donaldson Run Park, Potomac Overlook Park, Zachary Taylor Park and Gulf Branch Park. **Current Status:** Uncommon within high quality habitat.

Southeastern Five-lined Skink *Plestiodon inexpectatus.* The southeastern five-line skink can be difficult to distinguish from the common five-lined skink unless "in the hand." Statewide distribution of *P. inexpectatus* is considered to be widespread, but patchy. Arlington County lies at the northern edge of its range in the eastern U.S., occupies a more xeric habitat than *P. fasciatus,* and exhibits higher populations in southeastern mixed pine forests. As of 1994, there were no local records from Arlington County and only a single record from Fairfax County (Mitchell, 1994). This species is either not present locally, or may be underreported due to similarity in appearance. **Current Status:** Unknown, no credible documentation to date.

Broad-headed Skink *Plestiodon laticeps.* The broad-headed skink is easily distinguished from other Arlington skinks by its much larger size and "chunky" stature. *P. laticeps* is found in semi-open xeric woodlands. An abundance of decaying logs and stumps enhances the habitat quality for this arboreal lizard. No official collection records were found for Arlington, but one observation was made in the 1970s at Gulf Branch Park (Zell – personal observation). There are a number of historical records from Fairfax County (Mitchell, 1994). The single contemporary record (observation report) is from Potomac Overlook Park in 2006. Difficult for the casual observer to notice, this native lizard is most likely under-reported in the County. **Current Status:** uncommon in woodlands of North Arlington.

Little Brown Skink *Scincella lateralis.* The little brown skink is aptly named with a maximum length in Virginia of less than two inches from snout to vent, and about four inches overall including the tail. Terrestrial in nature, this small lizard inhabits the leaf and duff layer of the forest floor. Camouflaged with a tan to golden brown background, *S. lateralis* is difficult to see and capture. One historical record was found for Powhatan Springs, with a collection made in 1955. No contemporary records or recent observations in Arlington were made. However, within recent years specimens have been collected at multiple Fairfax County sites (Smith, personal communication). **Current Status:** Unknown.

Snakes (Order Squamata / suborder Serpentes)

Of all groups of reptiles, snakes surely provoke the most fear and interest among the general public. While various range maps and publications list 17-18 native extant species for Arlington County, the impact of long-term urban development has greatly reduced that number. Only four species are still considered to be commonplace. All others have experienced population declines, are ranked as locally rare, or are no longer present (extirpated). The only venomous snake in Arlington is the Northern copperhead, with a reduced but stable population.

Worm Snake *Carphophis amoenus amoenus.* A number of historical records were located for worm snakes in Arlington from 1885 - 1989. Due to its fossorial habits, this small, secretive snake requires soft soil for burrowing, so it may be more abundant than recognized. With that said, it should also be noted that approximately 50% of the historical habitat in Arlington has been eliminated through urban development. The most recent collection was made in 2007 in Pimmit Run Park. **Current Status:** Uncommon within forested habitat.

Northern Scarletsnake *Cemophora coccinea copei.* There are no historical or contemporary records of *C. coccinea* from Arlington, and only a single collection from southern Fairfax County (Mitchell, 1994). Collection records from Virginia are clustered heavily in the southeastern portion of the state. This colorful snake does not appear to be part of the local fauna. **Current Status:** Assumed not present based on range and state distribution.

Northern Black Racer *Coluber constrictor constrictor.* Historical records indicate past collections (1897-1955) from Powhatan Springs, Bluemont Junction, Ballston, Ft. Myer and along the W&OD railroad. The most recent contemporary record was from 2004, where a specimen was captured and released at Long Branch Nature Center (Zell, personal recollection). No observations or collections have been made since that date. The black racer, a medium-sized constrictor is most abundant in agricultural areas of meadow with brush edge and oak-pine successional forest. Unfortunately, the maturing of Arlington's forest (elimination of Virginia Pine) and elimination of active rail road lines have decreased habitat for this species in Arlington. **Current Status:** Rare, relict population may persist along edges of W&OD railroad trail.

Northern Ring-neck Snake *Diadophis punctatus edwardsii.* This small, secretive snake occupies the upper soil horizon and leaf litter of the forest and can be found inside rotting logs. It is most often observed on the surface after heavy rains. *D. punctatus* has a state-wide distribution and may remain common in some urban communities. The northern subspecies found locally, can easily be identified by the presence of a single crème or yellow ring or band around the neck. No historical collections for Arlington were noted, but several contemporary collections and observations were made within

several Arlington parks over the past three years. **Current Status:** Uncommon within high quality habitat.

Red Cornsnake *Pantherophis guttatus.* The red cornsnake presents a problem from a distributional analysis standpoint. Arlington County lies near the northern extent of natural range for this species. Therefore the red cornsnake may or may not have been present historically. Dunn does not include the red cornsnake on his list of native snakes for either Alexandria County or Fairfax County in 1918 (Dunn, 1918). The single historical record for Arlington County, reported to the VDGIF by Deibler from Gulf Branch in 1994, was most likely based on the collection of a released captive-born specimen. In the mid-1980s, a clutch of captive bred juveniles were released by the nature center staff in the Gulf Branch Park (Zell, personal recollection). With the exception of that single record, no earlier or later observations or collections have been recorded. The nearest record from Mitchell is from the western border of Fairfax County (Mitchell, 1994). **Current Status:** Not present, historical range undetermined.

Eastern Ratsnake *Pantherophis alleghaniensis* (formerly Elaphe obsolete). Better known locally as the common blacksnake, *P. alleghaniensis* is the largest snake native to Arlington. A number of historical and contemporary records document the continued and common presence of this urbanized snake. This species is ubiquitous, occupying not only forested parkland, but also open recreational spaces and urban backyards. Only heavily commercial zones are avoided. The species is terrestrial and arboreal – sometimes feeding on nesting birds or bird eggs. Each year a number of residents report live ratsnakes or shed skins inside homes, garages and outdoor structures. **Current Status:** Common in forest and residential neighborhoods.

Eastern Hog-nosed Snake *Heterodon platirhinos.* The hog-nosed snake is unique in several respects. It is known for its propensity to hiss loudly, inflate its head with air and ultimately play dead if bluffing does not deter a predator or human intruder. It is easily identified by the presence of an upturned snout. *H. platirhinos* is distributed across the state, but has specific habitat requirements including sandy soils, nearby woodlands and a reliable food supply. With a specialized diet, hog-nosed snakes feed almost exclusively on American toads. Historical records are scant and occur in the mid-late 1800s. No contemporary records or observations reveal its presence today. With the disappearance in South Arlington of natural coastal plain wetlands, bottomland forests and American toads, no suitable habitat remains for the hog-nosed snake. **Current Status:** Extirpated, loss of habitat.

Mole Kingsnake *Lampropeltis calligaster rhombomaculata.* Collections of the mole kingsnake are well documented in historical records between the years 1888 - 1954 within all sections of the County. Unfortunately, no evidence of collections or observations made after the 1950s was found. As a fossorial and largely nocturnal species, *L. calli-*

gaster is difficult to inventory through routine observational techniques. This species is most often found on the surface at night, often after heavy rains or in freshly plowed fields or turned soil. Occasionally they can be found basking on warm pavement after dark. With a preferred habitat of agricultural lands, cultivated fields, pastures, old field meadows or successional oak-pine forests, the absence of modern data is not surprising. Starting from the late 1930s, Arlington began to rapidly transform from an agricultural village to an urban community. Over the past 60 years, all former agricultural lands have disappeared, natural meadows are no longer present, and remaining successional forests have transformed into mature hardwood communities. In 2009, little to no preferential habitat remains. **Current Status:** Unknown, most likely extirpated.

Eastern Kingsnake *Lampropeltis getula getula.* The eastern kingsnake is primarily distributed in the Piedmont and coastal plain sections of Virginia. This medium to large-sized constrictor differs from *L. calligaster* in several respects. The eastern kingsnake is terrestrial and diurnal in habit, most often found beneath logs, boards or around abandoned buildings. Known habitats include not only agricultural lands and successional growth, but also hardwood forests, wetlands, and stream edges (Mitchell, 1994). Scattered historical collections are recorded from 1918 to 1953. The single contemporary record for this species occurred in 2007, when a specimen had become trapped in a subterranean water meter box in North Arlington and was subsequently rescued. Coloration of the specimen indicated *L. getula getula,* but it remains speculation whether the collection represented a remnant natural population or a pet store release. The collection is suspect as the eastern kingsnake remains a popular species within the pet trade. **Current Status:** Unknown, rare if remnant natural population persists.

Eastern Milksnake *Lampropeltis triangulum triangulum.* The eastern milksnake may occupy a variety of habitats including deciduous forest, mixed oak-pine woods, agricultural lands and meadows. They are terrestrial and most active at dusk, but may be found during the day under logs, boards, or slabs of stone (Mitchell, 1994). Three historical records from Arlington include collections made from Rosslyn (no date), North Arlington (1912) and Cherrydale (1928). All collections are from the largely agricultural period of Arlington. Dunn included the milksnake on his checklist of reptiles for Alexandria County in 1918 (Dunn, 1918). No contemporary records, collections or observations have been located. **Current Status:** Extirpated.

Northern Watersnake *Nerodia sipedon sipedon.* In Arlington County, the northern watersnake is often misidentified as the venomous cottonmouth by park users and residents. Often uniformly dark as adults, they can grow to large sizes (girth) and demonstrate aggressive defensive behaviors when attacked or harassed. Aggressive behavior, an affinity for water and the habit of displaying an open mouth when confronted all serve to reinforce the erroneous identifica-

tion. Multiple collection records for this species range from 1878 - 1955 in all parts of the County. While abundance has most likely decreased historically, *N. sipedon* remains one of the most common snakes that occupy the urban community. Feeding on small fish and amphibians, they can be found along most of Arlington's streams and ponds from spring through fall. **Current Status:** locally common along waterways and in constructed wetlands.

Northern Rough Greensnake *Opheodrys* aestivus aestivus. This small docile snake can be easily recognized by its bright green coloration. This species holds the unique distinction of turning blue upon death. High value habitat includes ecotones (edge), shrub thickets, hedgerows and wetlands surrounded by shrub vegetation. Unfortunately, this insect-eating snake may be susceptible to the affects of herbicide and pesticide application within occupied habitats (Mitchell, 1994). *O. aestivus* is primarily an arboreal species, feeding and resting in the protection of low shrubs. Historical records for local occurrence date from 1876 - 1998. Contemporary records include two observations or collections from Barcroft Park and the G. W. Memorial Parkway at the mouth of Gulf Branch between 2006 and 2007. Based on vegetative analysis, the highest value habitat remaining in Arlington for this species is the long, narrow ecotone adjacent to the W&OD Trail. **Current Status:** Uncommon within remaining high value habitat.

Queen Snake *Regina septemvittata.* *R. septemvittata,* a small watersnake with crème-colored stripes, feeds almost exclusively on molting (soft shelled) crayfish. The existence of woodland, rock-filled streams with a healthy population of crayfish is a limiting factor for abundance and distribution of this species. Historical records were noted from 1879 - 1954 from the following locations: Ft. Myer, Bluemont Junction, Williamsburg Jr. High School (vicinity), and Chain Bridge. With a deterioration of water quality, degradation of streams, and loss of high value crayfish habitat across the County, the native queen snake population has undoubtedly suffered. The only contemporary records are from 2008, which include a capture from Roaches Run Waterfowl Sanctuary and an observation from the foot bridge that crosses from Arlington to Roosevelt Island (D.C.). The most promising remaining habitat (unsurveyed) in the County would be found in lower Pimmit Run and on National Park Service property along the Potomac River shoreline in North Arlington. **Current Status:** Rare – uncommon along wooded streams and remaining tidal marsh.

Northern Brownsnake *Storeria dekayi dekayi.* The diminutive northern brownsnake often prefers disturbed soils and is the most frequently reported snake by homeowners in Arlington. They are often found in residential backyards under such items as flagstones, flat rocks, bags of mulch or while raking leaves. In woodlands, they favor moist leaf litter or decaying logs. *S. dekayi* is harmless and feeds on worms, insects and other small arthropods. A number of historical records document the local presence (1897-2005). A number of contemporary

records for this snake were documented in the period of 2005-2007. **Current Status:** Common outside of commercially developed areas.

Northern Red-bellied Snake *Storeria occiptomaculata occiptomaculata.* Distribution of the northern red-bellied snake appears to be statewide, but regional records are lacking with substantial gaps between known observations. Mitchell appears to have an historical record for Alexandria (Mitchell, 1994), but it could not be verified. The red-bellied snake was listed as occurring in Alexandria County by Dunn in 1918. While no specific historical or contemporary records were found for Arlington County, this species may be generally under-reported in the Northern Virginia area. This could be a result of the similarity in appearance with the locally common northern brown snake (*Storeria dekayi).* While both species may occupy the same habitat type, *S. occiptomacualata* can easily be differentiated by the bright red belly or underside. **Current Status:** Unknown, no records from Arlington. May or may not be present.

Common Ribbonsnake *Thamnophis sauritus sauritus.* This thin medium-sized snake most resembles the eastern gartersnake in coloration and pattern. Distribution is statewide with a semi-aquatic habitat preference for wet meadows, wet ditches and freshwater marsh edges. Historical records from Arlington include collections from Jackson City (1893), Ft. Myer (1895-6), 1901 (no location), and Four Mile Run at Westover (1952-4). A single contemporary observation (capture and release) was made while performing plant studies along the edge of Gulf Branch stream in 2006 (Zell, personal observation). Based on a general absence of contemporary observations coupled with the historical loss of local wetlands, it appears that *T. sauritus* has not adapted well to urbanization. **Current Status:** Locally rare.

Eastern Gartersnake *Thamnophis sirtalis sirtalis.* The nickname "garden snake" is a reference to the cosmopolitan nature of *T. sirtalis.* Highly adaptable, the eastern gartersnake can be found in habitats ranging from wetlands to grass meadows and mixed oak-pine forest (Mitchell, 1994). In Arlington, most observations have been within 100 meters of a water source (stream or pond). During the period of 2005-2008, the eastern gartersnake was the most commonly observed local snake. **Current Status:** Locally common in or near wetland habitats.

Eastern Smooth Earth Snake *Virginia valeriae valeriae.* Distributional range maps disagree on the historical presence of *V. valeriae* in Arlington. While Dunn listed the smooth earth snake as present in Alexandria County (1918), no confirming local records were found. However, within the past decade, several specimens of *V. valeriae* were brought to the Long Branch Nature Center by local residents for identification. Unfortunately, the collection dates and locations were never recorded. These specimens may have been collected from adjacent counties or even brought home from family vacations (Zell, personal recollection). Consequently, there are no contemporary records for this

species, although under-reporting is possible due to the secretive nature and fossorial habits of the worm snake. When present, they are most often found beneath loose forest soils or inside moist rotting logs or stumps. Two live captures were documented by Bulmer and Smith between 2000 and 2004 at E. C. Lawrence Park in Centerville. **Current Status:** Unknown, most likely present in small numbers.

Northern Copperhead *Agkistrodon contortrix mokasen.* The northern copperhead is the only venomous snake species currently found in Arlington County. Historical accounts and local historical collections (1920-1942) indicate that the copperhead was once widespread across Northern Virginia, including what is now Arlington. However, urban development over the past 70 years has reduced the range of *A. contortrix* to a single isolated population in North Arlington. All known local records over the past 20 years have occurred within a defined area bounded by Chain Bridge to the north, Military Road to the west, the Potomac River on the east, and by the Spout Run Parkway on the south. The existing habitat is fragmented by a combination of forested parkland, residential neighborhoods and roadways. As a result of seasonal movements and reduced space, copperheads are occasionally reported by homeowners to be on private property. While rare, venomous snake bites to both humans and pets have been reported in the past. Although venomous, copperheads residing on county parkland are a protected species. Natural populations can be found along the G. W. Memorial Parkway, and in the following county parks – Gulf Branch (east of Military Road), Donaldson Run, Windy Run and Fort C. F. Smith Historic Site. Potomac Overlook Park (NVRPA) appears to support the most concentrated population locally. **Current Status:** Uncommon within locally defined range.

Cottonmouth *Agkistrodon piscivorus.* Also called the "water moccasin," this venomous water snake does not naturally occur in Arlington. With a southern affinity, the northern-most range of this species in Virginia occurs near the City of Hopewell, to the south of Richmond. A single written account from the Smithsonian Institution, recording the collection of a cottonmouth in Arlington in 1879 is clearly erroneous, with the nearest known population found 100 miles to the south (Linzey, 1981). Each year, a number of residents and park patrons report cottonmouths when observing the common northern watersnake along streams and in ponds. **Current Status:** Not present, north of natural range in Virginia.

Timber Rattlesnake *Crotalus horridus.* The timber rattlesnake was frequently mentioned in the historical accounts of travelers to the upper Potomac region and appears to have been widespread locally in the early colonial period. Habitat loss through land clearing and outright killing by farmers and landowners by the end of the 17th century had reduced the native population to a small number, with the last remnants probably confined to the rocky cliffs of the palisades in North Arlington. Rattlesnakes were last recorded along the banks of Great Falls in

1816 by Warden (McAtee, 1918). Today, most populations occur well to the west of Arlington within the upper Piedmont and mountains of western Virginia. Bull Run Mountain, in western Prince William County has been cited as the eastern-most population, but is in serious decline (Smith, personal communication).**Current Status:** Extirpated.

Amphibians (Class Amphibia)

Spotted Salamander (A. maculatum) Photo by Greg Zell

Salamanders (Order Caudata)

In Arlington, salamanders inhabit woodlands, streams and wetlands. Almost all local species are dependent upon water for reproduction. As a group they are secretive, generally fossorial, and some are more active at night. They feed on small insects, crustaceans and other arthropods. Salamanders can be distinguished from lizards by their smooth skin, slow movement, and the absence of toenails or eyelids. A total of eleven species were placed on the inventory search list for Arlington. The eastern red-backed salamander, a terrestrial species, was determined to be the only remaining common salamander. All water-dependent species, through loss of wetlands and water quality degradation, have experienced population declines or are no longer present (extirpated). Importantly, the success or failure of local salamander populations may serve as an environmental health indicator for local forests and waterways. With smooth porous skin, salamanders are susceptible to the affects of herbicides, pesticides and water pollutants, and with high moisture requirements, are more at risk from long-term droughts and general loss of groundwater.

Jefferson Salamander *Ambystoma jeffersonianum.* While not expected to be found in Arlington, this large mole salamander was added to the target list of species based on state rarity and informal / unverified reports in the past. Virginia represents the southern limit for this northern ranging salamander. The closest confirmed collection for *A. jeffersonianum* in the region is well to the

north of Arlington in Loudoun County. All other reports and collections are from western Virginia at higher elevations (Mitchell, 1999). Possible habitats within North Arlington stream valleys were searched with negative results. Based on the search results, it is concluded Arlington lies too far south from the historic and current range of the species. **Current Status:** Not present based on historical range of species.

Spotted Salamander *Ambystoma maculatum.* Also a member of the mole salamander group, *A. maculatum* lives a secretive life, buried beneath moist soils or under logs near water. For successful breeding, the spotted salamander requires at least semi-permanent pools (vernal pools) or spring-flooded wetlands with no fish present. Loss of local wetlands has greatly reduced the number of natural breeding sites within the County. Published range maps for Virginia do not currently show local records for Arlington. However, two remaining colonies for this species have been documented in Arlington and are restricted to a single breeding pond each within the Gulf Branch and Long Branch Nature Areas. **Current Status:** Rare, two small breeding populations remain.

Marbled Salamander *Ambystoma opacum.* As a fall breeding species, the presence of vernal pools or swamp depressions are required to be present through the cool season. While a number of records exist for nearby Fairfax County, no contemporary records or inventory results could confirm the presence of *A. opacum* in Arlington. Marbled salamanders may have occurred within the County prior to urban development; however, the species was not included on Dunn's list of local amphibians in 1918 (Dunn, 1918). **Current Status:** Extirpated.

Northern Dusky Salamander *Desmognathus fuscus.* The northern dusky salamander inhabits woodland springs, streams and forested seeps. A number of historical records and collections were made of this species between the years 1895 - 1954. Notable past collection sites included Ft. Myer, Ballston, former wetlands near Washington-Lee High School, Bluemont Junction and Powhatan Springs. While most of the original collecting sites no longer sustain viable wetlands, recent field surveys have found *D. fuscus* to be present at a number of locations in modest numbers. Existing populations were found near the headwaters of first order streams and woodland spring faces where the impact from storm water is minimal and water quality the highest. **Current Status:** Locally common in higher quality headwaters and seeps.

Northern Two-lined Salamander *Eurycea bislineata.* According to historical records, this highly aquatic salamander was widely collected throughout Arlington until the early 1950s. Once commonly found within the main channel of Four Mile Run and other larger streams, water quality degradation has reduced this formerly abundant species. In 2010, several larvae were found dead in Four Mile Run (Madison Manor Park) as the result of a chemical fish-kill event. However, current inventory data suggests that *E. bisli-*

neata is primarily restricted to no more than a half-dozen first order streams and woodland seeps within county parks and national park service properties. **Current Status:** Rare. Restricted to remaining high value aquatic habitat.

Three-lined Salamander *Eurycea guttolineata.* The *Atlas of Amphibians and Reptiles in Virginia* indicates a number of historical records for this species in Arlington, but does not list dates or collection locations (Mitchell, 1999). Historical records most likely date to the pre-1950s. Small creeks in bottomland hardwood forest provide optimum habitat (BOVA, 2009), but unfortunately only disturbed remnants of that forest association type remain in the County. Only a single contemporary collection for *E. guttolineata* was recorded in 2008. The specimen was found in Salamander Creek within the Long Branch Nature Area. **Current Status:** Rare. Documented from a single stream in South Arlington.

Four-toed Salamander *Hemidactylium scutatum.* No historic or contemporary records were found for this secretive salamander. However, a number of records exist in nearby Fairfax County (Mitchell, 1999). This semi-aquatic species inhabits forested areas surrounding swamps, bogs and vernal pools. Fish must be absent from any water utilized for breeding (BOVA, 2009). Field searches within remaining marginal habitat yielded no results. **Current Status:** Unknown, most likely extirpated.

Red-spotted Newt *Notophthalmus viridescens viridescens.* Red-spotted newts are widely distributed across Virginia and have been reported from most counties. One historical record (no date or location) for Arlington was provided by Mitchell (1999), and this species was most likely commonplace when the County was heavily forested prior to the Civil War. In the late 1970s, several individuals were released into a pond at the Gulf Branch Nature Area, but apparently did not survive (Zell, personal recollection). *N. viridescens* has not been collected or reported within Arlington since that time. This species exhibits a unique life-cycle among salamanders, with adults found in fish-free permanent ponds, while the juvenile stage (red eft) is terrestrial and inhabits the surrounding woodlands. **Current Status:** Extirpated.

Eastern Red-backed Salamander *Plethodon cinereus.* This small terrestrial salamander is well distributed across the state and is probably the most commonly found species in Virginia. Historical collections of *P. cinereus* in Arlington are numerous between the years 1895 - 2003. Normally found hiding beneath logs or other surface debris in forested parkland or heavily treed urban backyards, the red-backed salamander occurs in two distinct color morphs – with a reddish stripe along the top of the back or uniformly dark (lacking the stripe). Often, both color forms are found together under one log. This species is not water dependent and may occur some distance from streams. While found throughout forested parkland in Arlington, Lacy Woods Park appears to have

the highest population density of any areas surveyed. **Current Status:** Locally common – abundant in forested parks and back yards.

White-spotted Slimy Salamander *Plethodon cylindraceus.* The white-spotted slimy salamander is appropriately named for the sticky slime exuded by skin glands when handled (Martof, 1980). A medium to large-sized terrestrial species, *P. cylindraceus* inhabits forested uplands, but is generally absent from bottomlands subject to periodic flooding (Mitchel, 1999). Historical records for Arlington from 1910 - 1953 are spotty, with past collections verified from hillsides near Chain Bridge, the mouth of Spout Run, Arlington Forest, Dominion Hills and Madison Manor. The most recent records date from the 1970s and are few in number. John White collected a single specimen in Madison Manor Park, near Brandymore Castle in 1978 or 1979 (John White, 2009, personal communication). Greg Zell collected a single specimen each from Zachary Taylor Park and Donaldson Run Park around 1977 (Zell, personal recollection). No collections were made nor were observations verified during the survey period of 2006-2007. While clearly diminished in numbers County-wide, it is likely that a small remnant population may still reside on the steep slopes above the Potomac River from Chain Bridge to Spout Run on National Park Service properties. **Current Status:** Unknown, most likely present in small numbers in the Northeast Arlington.

Eastern Mud Salamander *Pseudotriton montanus montanus.* Arlington lies at the extreme northern extent of the range in Virginia for this coastal plain species. No historical records for collections in Arlington were found, but several past collections (unknown dates) appear to have been made in south Alexandria and in the Fort Belvoir – Mason Neck section of Fairfax County (Mitchell, 1999). Dunn (1918) did not list the species on his checklist for Alexandria County. Unfortunately, the section of Arlington County that would have historically provided the preferred habitat of muddy seeps and swampland has largely disappeared due to urban development. If historically present, *P. montanus* would have inhabited the bottomlands and swamps formerly occurring in areas now occupied by the Pentagon and Crystal City. **Current Status:** Extirpated.

Northern Red Salamander *Pseudotriton ruber rubber. P. ruber* is a large colorful salamander with an orange body, black spots and yellow eyes. Habitat includes cold woodland springs, and small clear brooks or creeks. A number of historic records track collections made in Arlington from 1921 - 1956. Many of the locations identified as former collection sites have either undergone development, experienced a loss of wetlands, or were displaced by the construction of Rt. 66. An extensive field search of remaining natural springs, seeps and small headwater streams in the County found only a single remaining remnant population. This small colony is restricted to the immediate vicinity of an historic spring on private property. **Current Status:** Rare, a single small documented population.

Frogs and Toads (Order Anura)

Thirteen species of native frogs and toads were included in the inventory search list based on historical collections, data and published range maps. While all local native frogs and toads are dependent upon water for reproduction, some remain highly aquatic throughout their life cycle and others take on a terrestrial existence, returning to water briefly each year to breed. There is great diversity among species in respect to habitat preferences, breeding seasons and calls. Quantity and quality of wetlands and other water resources have heavily impacted the ability of anurans to survive within the urban environment.

Eastern Cricket Frog *Acris crepitans crepitans.* Named for its insect-like breeding call, this small frog inhabits grassy pond edges, open wooded wetlands, wet ditches, swamps and freshwater marshes. In suburban areas, populations are sometimes found in wet depressions along power lines. With the exception of Dunn's inclusion of *A. crepitans* in his 1918 checklist for Alexandria County, no specific historic records were found for Arlington. A number of collections have been cited for Fairfax County (Mitchell, 1999). Distribution maps covering the Northern Virginia area strongly suggest an historic presence of this species. Recent observational and audible surveys failed to document any extant populations. **Current Status:** Extirpated.

Eastern American Toad *Anaxyrus americanus americanus* (formerly *Bufo*). The familiar American toad, known for its loud trilling call in early spring, is widely distributed across the state. *Anaxyrus* requires only a temporary shallow pool of water for breeding. The tadpoles develop quickly to complete metamorphosis before the pools dry. Historic records for Arlington County between the years of 1916 - 1953 include collections made in Clarendon, Vinson Station, Westover and Madison Manor. Unfortunately, due to the loss of depressional wetlands and disappearance of vernal pools within the County, current records for a once common species are scant. During the period of 2005-2008, a single natural breeding colony of *A. americanus* was found within the floodplain of Pimmit Run on the Arlington border with Fairfax County. In addition to the Pimmit Run population, the introduction of American toads into three small artificial or decorative ponds was documented with unknown success or potential for expansion. Introduced locations include Gulf Branch Park, Potomac Overlook Park and Barrett School. An unknown number of backyard "fish ponds" may support an additional small population of formerly released larvae or eggs. **Current Status:** Rare. A single natural population documented with scattered releases County-wide.

Fowler's Toad *Anaxyrus fowleri* (formerly *Bufo*). A single historical record was from a collection by Mearns at Ft. Myer in 1895. Apparently still present in the early 1900s, Dunn included the Fowler's toad on a local checklist in 1918. Closely associated with sandy soils and shallow pools for breeding, this species would have historically been re-

stricted to the coastal plain in South Arlington – most likely in the current vicinity of Arlington National Cemetery, the Pentagon, Roaches Run Waterfowl Sanctuary and the mouth of Four Mile Run. A review of aerial photos and ground searches failed to produce any promising habitat within this highly urbanized portion of the County. **Current Status:** Extirpated.

Cope's Gray Treefrog *Hyla chrysoscelis*. *H. chrysoscelis* is indistinguishable from *H. versicolor* by sight (Mitchell, 1999), but it can be distinguished by its breeding call. While both may occupy the same range, they do not interbreed (Martof, 1980). Audible night surveys have confirmed only the presence of *chrysoscelis* in Arlington. The Cope's gray treefrog is generally common within the coastal plain section of Virginia, but no historical accounts or past collection records were found for Arlington or Alexandria. This small summer-calling treefrog is found in forests near streams, rivers and temporary pools. Probably more common in the past, *H. chrysoscelis* was documented from only three locations in the County in between the years 2004 - 2009. In 2008, the call of a single specimen was taped in Bluemont Park, near a degraded remnant of bottomland hardwood forest, and several individuals were found breeding in a private backyard on North Kensington Street. The Kensington Street population was found to be breeding in an unused above-ground swimming pool, at least several hundred yards from the nearest stream. At Gulf Branch Nature Center, staff reported observing a single specimen in woodlands near a small stream in 2004 and photographed another single specimen near a small pond in May 2009. In 2010, an additional collection was made from a residential swimming pool in North Arlington. With so few verified reports scattered over a broad area of the County, it is debatable whether these collections and observations indicate a small remnant natural population that has managed to survive by breeding in residential backyard ponds and pools or reflect periodic releases by the public. **Current Status:** Rare, currently documented from four locations.

Green Treefrog *Hyla cinerea.* The green treefrog is confined to the coastal plain in Virginia (Martof, 1980) and prefers habitats with sandy soils and an open wetland canopy (BOVA, 2009). McAtee (1918) described the "cowbell frog or tink-tonk" as present in the tidal marshes near the mouth of Four Mile Run. A single collection record was found for 1912 (no location). All other Northern Virginia records (Fairfax/Prince William Counties) are clustered along the Potomac River (Mitchell, 1999). The tidal marshes within the Roaches Run Waterfowl Sanctuary are the only possibility for remaining habitat in Arlington. However, attempts to conduct evening audible surveys at the site were unsuccessful due to persistent ambient noises from the G. W. Parkway and Reagan National Airport. **Current Status:** Unknown, most likely extirpated.

Northern Spring Peeper *Pseudacris crucifer crucifer.* The northern spring peeper was once common in Arlington, with historical records from 1895 - 1953. The small treefrog

with a loud voice remains commonplace in many parts of Fairfax County. Shallow ponds, depression swamps or vernal pools are required for successful breeding. A general loss of wetlands has reduced the occurrence of *P. crucifer* within Arlington to four known wetland sites. Three of the four sites host previously introduced populations to artificial ponds/wetlands (Gulf Branch, Long Branch, and Glencarlyn Parks). Barcroft Park contains what is considered to be the only natural remnant population found to date and is much reduced in size. Natural populations adjacent to Four Mile Run at Madison Manor and Westover were eliminated with the construction of Rt. 66 in the 1970s, and a small population in East Falls Church Park was destroyed in the early 1990s by development. Several calling individuals were discovered in 2009 in a residential backyard—most likely the result of a release. **Current Status:** Locally uncommon, restricted to a small number of breeding ponds.

Upland Chorus Frog *Pseudacris feriarum feriarum* (formerly *triseriata*). The chorus frog is widely distributed throughout the state, but is concentrated in the coastal plain. Historical records from Arlington span the years 1895-1918. The only documented location for historical collections is from Ft. Myer. Preferred habitat includes grassy swales, moist wetlands, swamps, and marsh edges. Shallow ponds or standing water in early spring are required for breeding. No contemporary or recent records for Arlington were found, and recent wildlife surveys produced no results. **Current Status:** Extirpated.

American Bullfrog *Lithobates catesbeianus* (formerly *Rana*). *L. catesbeianus* is the largest native frog in North America. As a late spring or early summer breeder, this species normally inhabits lakes, ponds and larger streams (Martof, 1980). Highly aquatic, the bullfrog never strays far from water. In Northern Virginia, bullfrog tadpoles require two years to metamorphose into adult frogs. Historical records from Arlington show collections made between the years 1876 - 1910, while more contemporary records document a single collection in 2002. Current survey records have documented local presence at the following pond locations—Ballston Beaver Pond, I-66 ponds (Cherry Valley Park), Sparrow Pond (Glencarlyn Park), Poplar Pond (Long Branch Nature Area) and Roaches Run Waterfowl Sanctuary. Collections have also been verified from streams in Zachary Taylor Park and Bluemont Park. **Current Status:** Locally common in artificial ponds, storm water facilities, and remaining tidal marshes.

Northern Green Frog *Lithobates clamitans melanota*. *L. clamitans* is widely distributed across Virginia and is found in close association locally with its larger cousin, the bull frog. Also highly aquatic, *L. clamitans* can be differentiated from *L. catesbeianus* by a prominent dorsolateral fold on its back. Historical collections are recorded from 1875 - 1953. Green frogs presently occur at multiple locations within the County, including both ponds and streams. **Current Status:**

Common in local ponds and larger streams across the County.

Pickerel Frog *Lithobates palustris* (formerly *Rana*). There are no historical records showing collections of this species in Arlington (Mitchell, 1999). However, since Dunn included pickerel frogs on his local amphibian checklist for Alexandria County in 1918, pickerel frogs may have been present early in the 20th century. Pickerel frogs are semi-aquatic, preferring riparian habitats such as open-canopied meadow streams, bogs and wooded streams. The only contemporary record for *L. palustris* is a report in 2008 from staff of the Potomac Overlook Regional Park of a single specimen inhabiting a small plastic-lined artificial pool at the site (Rich Bailey, personal communication). This record undoubtedly represents a pet store release or relocation from outside Arlington. A number of parks within Fairfax County appear to maintain native populations, including Bull Run Regional Park. **Current Status:** Natural population extirpated.

Southern Leopard Frog *Lithobates sphenocephalus utricularius* (formerly *Rana*). The southern leopard frog is confined mostly to the coastal plain, and Arlington represents the northern-most extent of the range of this species in Virginia. Mitchell (1999) does not provide any past records for *L. sphenocephalus*, but data from the Smithsonian Institution record two historical collections. Game Commission data shows their presence to be likely, but undocumented (BOVA, 2009). No contemporary or current observations of this species were made from 2005 - 2008. The only known local population occurs in Huntley Meadows Park within Fairfax County (Smith, personal communication). As an aquatic species, they are often found in ponds, wet ditches, swamps and marshes, but may forage into surrounding dry areas for food. Shallow permanent or semi-permanent pools are necessary for breeding. **Current Status:** Extirpated.

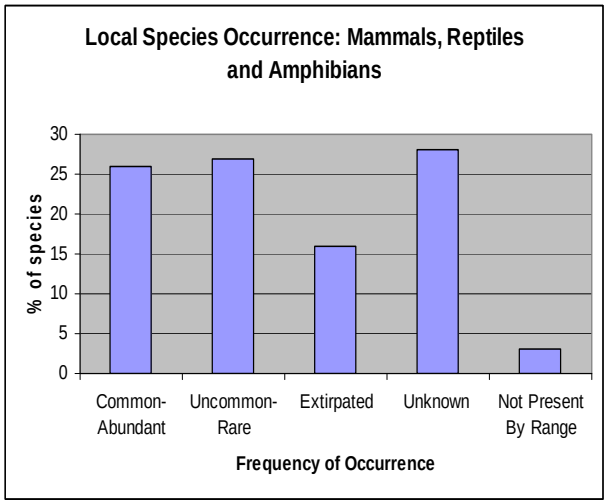
Wood Frog *Lithobates sylvaticus.* In Virginia, *L. sylvaticus* is largely restricted to the Piedmont and mountain provinces. Historical collections were documented from 1899 - 1953. The later collections were made from wetlands adjacent to Four Mile Run, destroyed by the construction of Rt. 66 in the 1970s (Westover and Madison Manor). Currently, two small extant populations were found to remain in the County within artificial ponds at Long Branch and Gulf Branch Nature Centers. Largely terrestrial, these early spring breeders require vernal pools, wet ditches or shallow ponds. **Current Status:** Rare, restricted to two documented breeding ponds.

Eastern Spadefoot Toad *Scaphiopus holbrookii.* This unusual toad is armed with a special horny projection on each rear foot which enables it to dig into soft dirt or sand and disappear (Martof, 1980). In Virginia, *S. holbrookii* is mostly confined to areas of sandy soils in the coastal plain. Range maps disagree on whether this species was ever present in Arlington. Toby (1985) considered the eastern spadefoot to be local, while Martof (1980) does not. The Virginia Game Commission (BOVA, 2009) indicates presence as

likely, but not documented. No historical or contemporary records were found of this species, and none were recorded in the recent wildlife survey of Arlington. Mitchell (1999) reports the historical collection of S. holbrookii from the extreme southeast corner of Fairfax County. A contemporary collection of this species was made in Great Falls Park along an old canal (Steury, email communication). **Current Status:** Extirpated.

Summary of Survey Results

The wildlife survey of local mammals, reptiles and amphibians included an initial target list of 114 expected or possible species. Each listed species has been described individually within the Species Accounts section of this report. The two largest search groups were mammals (51 species) and snakes (21 species). Of the 114 targeted species, five (5) were judged not to be present in Arlington based on analysis of range maps, historical data and published habitat requirements. The remaining species were categorized by current status or presence/non-presence



within the County. Twenty-seven (27) species were determined to be common – abundant, with three of those categorized as over-abundant (gray squirrels, raccoons and red foxes). Thirty-two (32) species were classified as rare – uncommon, while eighteen (18) were determined to be extirpated (no longer present). The largest categorical group, with thirty-two (32) species, was classified as "unknown." Unknown species are wildlife that have a recorded historical presence or likelihood, but that were not found as part of the recent wildlife survey, nor documented in contemporary records. Those identified as unknown may remain in small numbers within defined habitats, but will require additional specialized surveys to make a final determination as to their presence. It is estimated that at least 10 of the currently undocumented species listed as unknown are most likely extirpated, and most of the remainder would be considered rare if present. In that case, the percentage of extirpated species would increase from 16% to 24% or higher. Examples of species not currently documented, but likely to be present include a number of bats and shrews. A more complete survey of both groups will be required to determine their final status. Specific recommendations for further studies and wildlife management issues are discussed in the final section of the report.

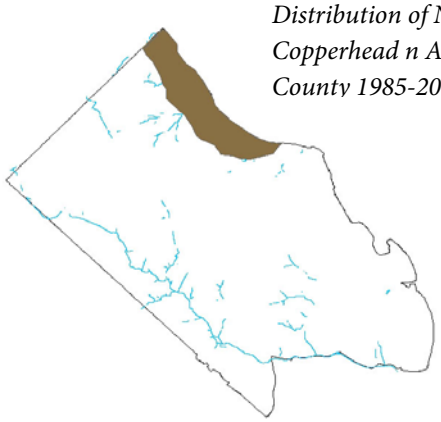
Analysis of the survey data provides some interesting information in regards to the current status (presence) and distribution (relative abundance) of Arlington's wildlife in the post-urbanization period. A quick ref-

erence chart of mammal, reptile and amphibian presence in Arlington County is shown in Appendix I.

Mammals: While 33% of all native and naturalized mammals documented in Arlington are considered to be common – abundant, an alarming 49% are classified as extirpated or unknown (undocumented). The decline of wildlife diversity in Arlington County can most likely be attributed to losses in habitat quality, habitat fragmentation, water quality degradation, and the inability of some species to exist in an urban environment.

Turtles Only 33% (including one non-native species) of chelonian species were found to be common, with 50% determined to be extirpated or remain unknown. Surprisingly, the hardy Eastern box turtle was found to remain common and was observed in almost every large forested county park. The distribution and status of turtle species in Arlington is directly attributable to changes in wetland and aquatic habitats because most species are closely tied to aquatic environments.

Lizards: With only five native species on the target list, two were found to be uncommon, and the remaining three species unknown or undocumented. Additional specialized surveys may resolve the status of currently undocumented species.



Distribution of Northern Copperhead n Arlington County 1985-2010

Snakes: One of the largest groups of wildlife included in the survey, snakes appear to have been heavily impacted by the effects of development and urbanization. Only four (4) species are currently considered to be common in Arlington, as 47% of all local native snake species have been judged to be extirpated, rare or unknown. Habitat loss, fragmentation, isolation and wetland degradation have all contributed to the large decrease in diversity. For example, the queen snake (rare – uncommon), an aquatic species, is highly dependent upon an abundance of crayfish for food. The decrease in crayfish populations within local streams has [most likely] resulted in a corresponding decrease in the population of queen snakes.

Salamanders: As a group, salamanders often serve as a bell-weather for overall environmental conditions. With porous skin, salamanders are generally more sensitive to environmental conditions such as water quality, pesticide and herbicide use, acid rain, and drought. They are also less mobile than some other wildlife groups (mammals and birds) and may be at increased risk of population declines through isolation or local environmental impact. Of the 12 species placed on the target search list, only two species, the eastern red-backed salamander and the northern dusky salamander were found to be common - abundant in Arlington today. Seventy-five percent of all salamander species were determined to be rare, extirpated or unknown. One locally rare species, the northern red salamander, was found to exist

at a single remaining site within the small confines of an historic spring on private property. Additional field studies within the more isolated sections of the George Washington Memorial Parkway in North Arlington may provide documentation on the two currently undocumented species.

Frogs and Toads: Closely tied to the aquatic environment, frogs and toads have been greatly impacted by urbanization. Historic loss of wetlands, elimination of vernal pools, and heavy development within the coastal plain in South Arlington have collectively affected the status of this group of wildlife. Two species (15%) are considered common, four species (31%) rare to uncommon, and six species (46%) are judged to be extirpated or unknown.

Part III. DRAGONFLIES AND DAMSELFLIES (Class Insecta)

Cyrano Darner (Nasiaeschna pentacantha) at Cherry Valley Park
Photo by Kevin Munroe

Introduction

Dragonflies and Damselflies, collectively known as odonates, represent two closely related insect groups that have received increased public and scientific interest in recent years. Affectionately known as "odes" to enthusiasts, dragonfly- and damselfly-watching is on the rise with a number of field guides now available for both the professional and amateur naturalist. The study of odonate populations may also provide a tool for ecologists to track qualitative changes in the local environment. According to Corbet, "…sensitivity to structural habitat quality (e.g. forest cover, water limpidity) and amphibious habits make Odonata well suited for evaluating environmental change in the long term and in the short term, both above and below the water surface (Corbet, 1999)." Odonate larvae or nymphs are strictly aquatic and represent an important component of the macro-invertebrate population of a healthy stream, pond or river (Natural Heritage Resources Fact Sheet).

All odonates share a number of characteristics. They have strong jaws, are strong flyers, possess long narrow abdomens, two pairs of veined wings, display large compound eyes and come in many different colors. Dragonflies are generally the larger of the two

groups and hold their wings open when perching, while damselflies are more petite and in most cases rest with their wings held upright and touching. As terrestrial and aquatic predators, Odonates provide an environmental benefit by feeding voraciously on mosquitoes and other small insect pests. Although they require an aquatic environment for successful reproduction, dragonflies and damselflies can often be found some distance from water hunting on the wing. Males of some species display territorial behavior and will patrol a given space to drive away interlopers. Local Virginia species (adults) can generally be observed in Arlington from April through November.

Odonate Survey Overview

In 2007, two biological specialists, Kevin Munroe and Andy Rabin were hired under a Special Services Contract to perform a field survey of odonates in Arlington County for the purpose of establishing a contemporary database of extant species. An historical records search by both the Project Coordinator and contractors produced sparse data, implying that little survey work had been completed in the past. Odonate records found in the database at the OdonataCentral website (http://www.odonatacentral.org) indicate that up to the time of the start of this survey, a total of 18 species (13 dragonflies and five damselflies) had been recorded in the County (collectors unknown). The same database lists Fairfax County, which surrounds Arlington County on three sides, as having 83 species of odonates (Munroe, Rabin 2007). It is unclear why such a discrepancy in historical data exists between the two adjacent counties, but it most likely reflects the larger size and wider variety of habitats found in Fairfax County, and higher levels of field studies. A further data search of the online version of *Dragonflies and Damselflies of the United States*, provided by the USGS, showed no Virginia collection records for Arlington County (Kondratieff 2000). In addition, a small collection of preserved odonate specimens, collected in Arlington by Scott Deibler between 1993 and 1994 and housed at the Gulf Branch Nature Center, contained eight specimens representing four separate species. None were found to be new to the County. A final report, titled *2007 Survey of Dragonflies and Damselflies in Arlington County, Va.* (cited in Appendix V. as Munroe, Rabin 2007) provides the basis for the following information, data and results.

Methodology

Surveyors Munroe and Rabin spent a total of 100 person hours conducting time-constrained surveys. The 2007 survey season was conducted between April 29 and October 8. Survey dates and times of day were selected to optimize the opportunity to observe the greatest number of species (diversity) and to accommodate the particular habits of various target species. For example, some species are known to be more active during certain seasons or times of day.

Individual species were identified by direct observation (sight) and by collection (netting). Photos were taken of some specimens "in hand" or perching, and were included as a deliverable in the final report. To facilitate

the collection of samples, both contractors were listed on the Research Collection Permit obtained from the Virginia Department of Game and Inland Fisheries.

At the beginning of the project, six survey sites or large plots were initially selected by the project coordinator based on a review of ortho-photos and GIS data showing the locations of surface streams and delineated wetlands. All plots were located on parkland and other public properties. Researchers were given the latitude to expand the number of survey sites if the pre-selected plots proved unproductive. As the project progressed, the number of survey sites expanded to sixteen (16), including two sites on the Arlington County and District of Columbia border. Survey site locations with habitat descriptions are shown in Appendix II.

Field Collections and Observational Records, April 29 – October 8, 2007 Field Season

* Data Note: Early – Late dates indicate the earliest and latest seasonal observation of each species during the 2007 survey period. A single date listed indicates only one observation was made.

Dragonflies and Damselflies *(Order Odonata)*

Damselflies (Sub-order *Zygoptera)*

Broad-winged Damsels (Family *Calopterygidae*).

Ebony Jewelwing *Calopteryx maculata.*

Early – Late: June 2 – August 26
Locations: Pimmit Run, Barcroft Park, Chain Bridge Observational Notes: Perched

in foliage in shaded areas along sides of stream, usually in small numbers.

American Rubyspot *Hetaerina americana.*

Early – Late: July 8
Locations: Pimmit Run
Observational Notes: A single sighting along the Potomac River.

Great Spreadwing *Archilestes grandis.*

Early – Late: August 26 – October 8
Locations: Fort C. F. Smith Park, Long Branch Park, Cherry Valley Park, Sparrow Pond
Observational Notes: Several sightings (both males and females) in pond-side vegetation and in managed meadow.

Pond Damsels (Family *Coenagrionidae*)

Blue-fronted Dancer *Argia apicalis.*

Early – Late: June 2 – August 12
Locations: Pimmit Run, Four Mile Run, Chain Bridge

Observational Notes: Fairly common along the Potomac River, perching on rocks in water.

Variable Dancer *Argia fumipennis.*

Early – Late: June 2 – September 16
Locations: Sparrow Pond, Pimmit Run, Barcroft Park, Cherry Valley Park
Observational Notes: Fairly widespread throughout the County.

Powdered Dancer *Argia moesta.*

Early – Late: June 2 – July 8
Locations: Pimmit Run
Observational Notes: Near the Potomac River on rocks in water – three sightings.

Blue-tipped Dancer *Argia tibialis.*

Early – Late: June 2 – July 22
Locations: Pimmit Run
Observational Notes: On rocks in water – several sightings.

Dusky Dancer *Argia translate.*

Early – Late: June 17 – October 7
Locations: Barcroft Park, Pimmit Run, Sparrow Pond, Chain Bridge
Observational Notes: On rocks or vegetation in or near water – several sightings.

Familiar Bluet *Enallagma civile.*

Early – Late: June 2 – September 16
Locations: Four Mile Run, Roaches Run, Fort C. F. Smith Park, Sparrow Pond
Observational Notes: In or near water and around meadows.

Big Bluet *Enallagma durum.*

Early – Late: June 2 – August 12
Locations: Four Mile Run, Roaches Run, Pimmit Run, Gravelly Point
Observational Notes: Common near Potomac River edge next to Reagan National Airport.

Stream Bluet *Enallagma exsulans*.

Early – Late: June 2 – August 12
Locations: Four Mile Run, Chain Bridge, Barcroft Park, Sparrow Pond
Observational Notes: Observed flying over streams and the Potomac River, often in tandem.

Orange Bluet *Enallagma signatum.*

Early – Late: June 2 – August 26
Locations: Four Mile Run, Chain Bridge, Roaches Run, Sparrow Pond
Observational Notes: Observed most often over still or slow-moving water, common at Roaches Run.

Fragile Forktail *Ischnura posita.*

Early – Late: April 29 – September 16
Locations: Sparrow Pond, Cherry Valley Park, Pimmit Run, Barcroft Park
Observational Notes: Common around ponds.

Eastern Forktail *Ischnura verticalis.*

Early – Late: May 26 – July 15
Locations: Cherry Valley Park, Sparrow Pond
Observational Notes: Common around ponds.

Dragonflies (Sub-*Order Anisoptera)*

Darners (Family *Aeshnidae*)

Shadow Darner *Aeshna umbrosa.*

Early – Late: August 26 – October 8
Locations: Sparrow Pond, Long Branch Nature Center
Observational Notes: Patrolling small pond and flying low over wood-edge and foot path.

Common Green Darner *Anax junius.*

Early – Late: April 29 – September 16
Locations: Barcroft Park, Sparrow Pond, Four Mile Run, Cherry Valley Park, Fort C. F. Smith Park
Observational Notes: Observed both sexes over land and water.

Swamp Darner *Epiaeschna heros.*

Early – Late: May 26 – June 17
Locations: Gulf Branch Nature Center, Pimmit Run, Barcroft Park, Cherry Valley Park
Observational Notes: Sighted hunting over open areas – parking lots and meadows.

Cyrano Darner *Nasiaeschna pentacantha.*

Early – Late: May 26
Locations: Cherry Valley Park
Observational Notes: Observed patrolling woodlands around pond – a single sighting.

Clubtails (Family *Gomphidae*)

Unicorn Clubtail *Arigomphus villosipes.*

Early – Late: May 26
Locations: Cherry Valley Park
Observational Notes: Single sighting around shallow pond.

Black-shouldered Spinyleg *Dromogomphus spinosus.*

Early – Late: June 17 – June 30
Locations: Chain Bridge, Pimmit Run
Observational Notes: Several sightings perched on rocks along the river shore and patrolling above streams.

Lancet Clubtail *Gomphus exilis.*

Early – Late: May 19 – May 26
Locations: Pimmit Run
Observational Notes: Two sightings in a wet meadow along Pimmit Run stream

Dragonhunter *Hagenius brevistylus.*

Early – Late: July 8
Locations: Pimmit Run
Observational Notes: Observed patrolling Pimmit Run stream.

Russet-tipped Clubtail *Stylurus plagiatus.*

Early – Late: July 8 – August 26
Locations: Chain Bridge, Roosevelt Island
Observational Notes: Three sightings patrolling the Potomac River and perched in river-edge trees.

Cruisers (Family *Macromiidae*)

Swift River Cruiser *Macromia illinoiensis*.

Early – Late: June 17 – July 22
Locations: Pimmit Run, Barcroft Park, Long Branch Nature Center, Fort C. F. Smith Park
Observational Notes: Sightings made along Four Mile Run, hunting over meadows and perched in tree-tops.

Emeralds (Family *Corduliidae)*

Common Baskettail *Tetragoneuria cynosure.*

Early – Late: May 19 – June 17

Locations: Pimmit Run, Sparrow Pond, Long Branch Nature Center, Barcroft Park
Observational Notes: Sighted both high and low, patrolling over water and in streamside openings.

Prince Baskettail *Epitheca princes.*

Early – Late: June 17 – August 26
Locations: Roosevelt Island, Pimmit Run, Chain Bridge, Barcroft Park, Roaches Run
Observational Notes: Observed patrolling along the Potomac River, over ponds and hunting over meadows.

Striped Emerald *Somatochlora sp.*

Early – Late: June 17 – August 26
Locations: Barcroft Park
Observational Notes: Unable to identify without specimens in hand, but were most likely Clamp-tipped Emeralds (*S. tenebrosa)* based on observable physical characteristics and flying behaviors. Observed patrolling high over meadow and athletic fields adjacent to Four Mile Run.

Skimmers (Family *Libellulidae)*

Halloween Pennant *Celithemis eponina.*

Early – Late: July 22 – August 12
Locations: Fort C. F. Smith Park, Gravelly Point
Observational Notes: Two sightings – seen flying and perched in meadow and over the Potomac River.

Common Pondhawk *Erythemis simplicicollis.*

Early – Late: June 2 – August 26
Locations: Sparrow Pond, Pimmit Run, Cherry Valley Park, Chain Bridge, Barcroft Park
Observational Notes: Sighted patrolling over water and perched in nearby vegetation.

Spangled Skimmer *Libellula cyanea.*

Early – Late: June 2
Locations: Sparrow Pond
Observational Notes: Sighted flying over ponds.

Slaty Skimmer *Libellula incesta.*

Early – Late: June 2 – July 22
Locations: Sparrow Pond, Cherry Valley Park
Observational Notes: Perched in vegetation and patrolling over water.

Widow Skimmer *Libellula luctuosa.*

Early – Late: June 17
Locations: Pimmit Run, Chain Bridge
Observational Notes: Seen flying over water and woodland clearings.

Common Whitetail *Plathemis Lydia.*

Early – Late: April 29 – October 8
Locations: Barcroft Park, Pimmit Run, Cherry Valley Park, Long Branch Nature Center, Sparrow Pond, Chain Bridge, Fort C. F. Smith Park
Observational Notes: Sighted perching on ground and flying over water.

Needham's Skimmer *Libellula needhami.*

Early – Late: June 17
Locations: Barcroft Park
Observational Notes: Observed in vicinity of Barcroft Bog wetlands.

Twelve-spotted Skimmer *Libellula pulchella.*

Early – Late: June 2 – August 12
Locations: Sparrow Pond, Barcroft Park
Observational Notes: Perched in vegetation and patrolling over water and meadows.

Painted Skimmer *Libellula semifasciata.*

Early – Late: June 17
Locations: Barcroft Park
Observational Notes: Perched in vegetation in meadow adjacent to wetlands.

Great Blue Skimmer *Libellula vibrans.*

Early – Late: June 2 – June 17
Locations: Long Branch Nature Center, Barcroft Park, Cherry Valley Park
Observational Notes: Observed patrolling small ponds, wet ditches and puddles.

Blue Dasher *Pachydiplax longipennis.*

Early – Late: May 19 – October 8
Locations: Barcroft Park, Sparrow Pond, Cherry Valley Park, Potomac Overlook, Long Branch Nature Center, Ballston Beaver Pond, Chain Bridge
Observational Notes: Found patrolling over ponds streams, and the Potomac River.

Wandering Glider *Pantala flavenscens.*

Early – Late: July 22 – September 16
Locations: Barcroft Park, Fort C. F. Smith Park
Observational Notes: Seen flying at various heights over meadows and athletic fields adjacent to wetlands.

Spot-winged Glider *Pantala hymenaea.*

Early – Late: June 2 – September 16
Locations: Four Mile Run, Cherry Valley Park, Fort C. F. Smith Park, Roaches Run
Observational Notes: Observed flying low over meadows, fields and parking lots near water.

Eastern Amberwing *Perithemis tenera.*

Early – Late: June 2 – August 26
Locations: Four Mile Run, Roaches Run, Cherry Valley Park, Roosevelt Island, Sparrow Pond, Ballston Beaver Pond
Observational Notes: Common sightings at many locations.

Black Saddlebags *Tramea lacerate.*

Early – Late: June 2 – September 16
Locations: Four Mile Run, Roaches Run, Long Branch Nature Center, Barcroft Park, Roosevelt Island
Observational Notes: Well distributed, observed flying high over water, meadows and athletic fields.

Survey Results

It is estimated that approximately 200 species of odonates can be found in Virginia, but that nearly a third of the state's dragonflies and damselflies are considered to be rare (LandscapeAmerica).

During the 2007 Survey of Dragonflies and Damselflies, researchers Munroe and Rabin were able to document and establish a contemporary database of 42 species (28 species of Dragonfly and 14 species of Damselflies). Of that total, 32 species were previously undocumented for Arlington County. The initial 2007 field survey should be considered a starting point for the future development of

a full database of odonate presence in Arlington. Unfortunately, periods of cool and windy weather in the spring and dry periods during the summer of 2007 did not provide optimum conditions for field survey work. Researchers agreed that additional surveys, particularly focused on spring and fall fieldwork would generate the documentation of additional species. However, it is unlikely that Arlington would ever match the 83+ species currently recorded from Fairfax County. The full list of species recorded from Fairfax County that remain undocumented in Arlington are listed in Appendix III. This data could serve as a future target search list for continuing field studies in Arlington.

Species of Note

According to researchers Munroe and Rabin, six of the forty-two recently documented Odonata records represent species of note within the Anisoptera (Dragonflies) and are described below.

Russet-tipped Clubtail *(Stylurus plagiatus).*
Three observations of this state-rare (S3) dragonfly were made along the shores of the Potomac River.

Cyrano Darner *(Nasiaeschna pentacantha).*
A single observation of this species came from a pond in Cherry Valley Park. Listed as a state-rare species in both Maryland and Delaware, the current status in Virginia is "undetermined."

Unicorn Clubtail (Arigomphus villosipes).
A sighting of this odonate within a highly urbanized community was unusual and not expected. A single observation was made near a pond in Cherry Valley Park.

Lancet Clubtail *(Gomphus exilis)* and Dragonhunter *(Hagenius brevistylus)*. Both require relatively clean water for successful larval development. The presence of these two stream species along Pimmit Run may signal a higher than average local water quality within that water body.

Needham's Skimmer (*Libellula needhami*).
This freshwater marsh species was not expected to be observed in Arlington due to heavy urbanization and historic loss of wetlands. A single sighting was made near Barcroft Bog, in the adjacent successional meadow buffer, and may represent a remnant extant population.

Arlington's Best Observation Sites

Based on survey results, four general areas within Arlington were identified as "diversity hotspots" by Munroe and Rabin and this knowledge should be taken into consideration in regards to conservation planning and management of parkland.

- *Long Branch Nature Center – W&OD Trail – Sparrow Pond:* For survey purposes, all three of these sites are included as one continuous study area paralleling Long Branch stream and Four Mile Run into central Glencarlyn Park. Two surface streams, three fabricated wetlands, and a combination of mature riparian forest, mixed-age vegetation and sun-lit ecotones provide generous habitat for hunting, breeding and shelter. A higher number of species were documented

from this study area by surveyors than any other location in the County.

- *Pimmit Run Stream – G. W. Parkway – Chain Bridge:* The study area begins at the valley head in Pimmit Run Nature Area and follows the course of Pimmet Run stream through mature woodlands to its confluence with the Potomac River at Chain Bridge. The course of the stream briefly meanders into Fairfax County prior to reentering Arlington. In addition to stream-side riparian habitat and Potomac River shoreline, the Pimmit Run Nature Area contains a forested wetland, a number of freshwater springs and a small sunny wet meadow. The Pimmit Run stream valley is considered an important reservoir for odonate habitat in the County.
- *Barcroft Park:* While less species were documented than anticipated, the site nevertheless ranked as a high diversity study area. Due to the presence of rare woodland seeps within the park, a number of seep-dependent odonates were sought, but not observed. Weather during the 2007 survey season (cool spring, dry summer) was not considered optimum for an odonate census. One species of note, the Needham's Skimmer *(Libellula needhami)* was found only in Barcroft Park.
- *Cherry Valley Park:* Adjacent to Interstate 66, this small park lies within a highly urbanized section of Arlington. Although lacking any high value natural lands or extant native plant communities, two fabricated ponds at the site appear to provide the only quality water resource in the immediate area. While not high in odonate diversity overall, two species of note were observed and collected in close proximity to the wetlands – the Cyrano Darner *(Nasiaeschna pentacantha)* and Unicorn Clubtail *(Arigomphus villosipes)*.

Part IV. BUTTERFLIES (Class Insecta)

Red-banded Hairstreak (C. cecrops) on Goldenrod

Photo by Alonso Abugattas

Introduction

Butterflies and moths (Order Lepidoptera) have long held the interest of the scientific community and the personal collector. The heyday of lepidopteran study occurred during the Victorian Era

(1837-1901), when naturalists traveled the world in search of new specimens for their collections. Many of these original collections are still on display or held in major natural history museums around the world today. With the advent of the internet and increased educational outreach, a wealth of information is now readily available to the layperson interested in lepidopteran study.

Aside from their beauty, butterflies and moths play a vital role in the delicate and often stressed urban environment. Both groups act as a vital link in a long-developed ecological relationship between native flora and fauna. Native species serve as host plants for larval development and adult butterflies and moths assist in the pollination of flowers while feeding on nectar. The larval stage (caterpillar) of butterflies and moths provide one of the largest readily accessible sources of seasonal food for local wildlife. Many species of birds are reliant on this abundant food source to successfully raise broods of young, while bats are known to feed heavily on the night-flying adult moths.

The relative health and abundance of lepidopteran species may also serve as a bell-whether or early warning system for local environmental change. According to Thomas Emmel, Director of the McGuire Center for Lepidoptera and Biodiversity: "Like canaries warning miners of dangerous gases in coal mines, the Lepidoptera are particularly sensitive to poisons in the environment, such as pesticides or heavy metals. They are also good indicators of the impact of climate change and global warming on the survival and distribution of animals and plants" (Emmel, 2010).
The Lepidoptera are abundant and are the second largest order within the Class Insecta. The actual number of species worldwide is unknown, but has been estimated to be around 165,000. Many species remain undiscovered or have been collected but await classification. Moths are more abundant than butterflies, accounting for about 85% of the total. Estimates of Virginia's lepidopteran population vary by source and a full accounting is most likely not yet complete. County staff naturalist Alonso Abugattas cites the number of known butterfly species in Virginia at 168 (Abugattas 2008), and Ludwig (DCR) estimates the number of known macro-moth species at approximately 1,200 (Steury, et al. 2007). The Virginia Department of Game and Inland Fisheries (VDGIF) provides a list of 439 recorded lepidopteran species statewide on its list of native and naturalized fauna (VDGIF July 2007), and the Virginia Department of Conservation and Recreation (DCR) cites 34 butterflies and 87 moths as state-rare species (Roble, 2010)

Lepidoptera Survey Overview
A local survey of Lepidoptera was performed in Arlington from September 2006 to October 2008 by Abugattas. This initial effort focused on establishing a contemporary database of the diurnal Lepidoptera (butterflies). The daytime field surveys were conducted during non-winter months over a two-year period at established survey sites. Data contained within a final report, titled *Survey of Butterflies of Arlington County, Virginia* (cited as Abugattas, 2008 in Appendix V.), serves as the basis for the following summary information. In his full technical report, Abugattas also provides a wealth of information on butterfly species and host plant relationships.

While moths were not specifically surveyed within the wildlife inventory, a number of moth species observed in recent years at the Long Branch Nature Center during evening interpretive programs by Abugattas are shown in Appendix IV. Future study would surely provide a more complete inventory of moths, but will largely require that surveys be conducted at night while utilizing different methodologies and special collecting equipment (bait stations, light traps, lures, etc.). Although the potential number of nocturnal moth species is high, many are small-sized and difficult to identify. By way of example, in a recent multi-year study (1999-2007) completed within two National Park Service (NPS) properties in Fairfax County, a total of 480 different macro-moths (larger species) were documented (Steury, et al. 2007).

Methodology

Prior to conducting the active survey, a target list of potential butterfly species was developed. With local collection data largely unavailable, regional source material was utilized to construct a reasonable search list. The list of 87 expected and possible species was compiled from a review of past regional butterfly count records, records listed on the *Butterflies and Moths of North America* (BAMONA) website, and a review of records contained on the Washington Area Butterfly Club (WABC) website. Several publications, including *Butterflies Occurring in the D.C. Area* (Richard H. Smith) and *Inventory of the Butterflies of Plummers Island* (Kimberly Vann) provided some documentation of past records. A number of individual members of the Washington Area Butterfly Club reviewed and provided comment on the master search list. Species considered accidental or historically extirpated were not included.

Species occurrence was documented through time-constrained surveys at predetermined survey locations. Field surveys were conducted during warm, sunny days to take advantage of optimum butterfly and caterpillar activity periods. Species were identified in both adult (butterfly) and larval (caterpillar) form. The six survey sites received repeated visits and were selected based on the presence of diverse native flora and the presence of both host and nectar plants. Site selection criteria included diverse vegetative characteristics, such as meadow, native and non-native gardens, pond edges, forest edges and successional fields. Field survey sites were located at Long Branch Nature Center, Gulf Branch Nature Center, Glencarlyn and Columbia Pike Libraries, Potomac Overlook Park, Fort C. F. Smith Historic Site, and a private garden located on North Powhatan Street.

A majority of the specimens observed were identified by sight or captured by net, hand identified and released. *Butterflies Through Binoculars in the Washington/Baltimore Region* (Jeffery Glassberg) was used as a primary resource for identification. All voucher specimens collected as part of this project are housed at the Long Branch Nature Center. In cases of questionable identification, photo vouchers were taken for later confirmation or larvae were collected and raised to adulthood at the nature center.

Adapted from *Survey of the Butterflies of Arlington County, Virginia* (Abugattas, 2008) and listed in taxonomic order following Butterflies and Moths of North America (BAMONA).

Family Hesperidia (Spread-wing Skippers)

Horary Edge	*Achalarus lyciades*	X
Silver-spotted Skipper	*Epargyreus clarus*	P
Wild Indigo Duskywing	*Erynnis baptisiae*	R
Horace's Duskywing	*Erynnis horatius*	P

Occurrence Key: (P)resent – Observed during current survey; (R)ecent – Not observed during the current survey, but previously recorded 2001-2006; (X) – No contemporary observations or records

Dreamy Duskywing	*Erynnis icelus*	X
Juvenal's Duskywing	*Erynnis juvenalis*	P
Zarucco Duskywing	*Erynnis zarucco*	X
Common Sootywing	*Pholisora catullus*	P
Common Checkered-Skipper	*Pyrgus communis*	P
Hayhurst's Scallopwing	*Staphylus hayhurstii*	P
Southern Cloudywing	*Thorybes bathyllus*	X
Northern Cloudywing	*Thorybes pylades*	X
Long-tailed Skipper	*Urbanus proteus*	R

Family Hesperiidae (Grass Skippers)

Pepper and Salt Skipper	*Amblyscirtes hegon*	X
Common Roadside-Skipper	*Amblyscirtes vialis*	X
Least Skipper	*Ancyloxypha numitor*	P
Sachem	*Atalopedes campestris*	P
Dusted Skipper	*Atrytonopsis hianna*	X
Brazilian Skipper	*Calpodes ethlius*	X
Dun Skipper	*Euphyes vestris*	P
Leonard's Skipper	*Hesperia leonardus*	X
Cobweb Skipper	*Hesperia metea*	X
Indian Skipper	*Hesperia sassacus*	X
Fiery Skipper	*Hylephila phyleus*	P
Clouded Skipper	*Lerema accius*	P
Swarthy Skipper	*Nastra lherminier*	X
Ocola Skipper	*Panoquina ocola*	X
Hobomok Skipper	*Poanes hobomok*	R
Zabulon Skipper	*Poanes zabulon*	P
Crossline Skipper	*Polites origenes*	X
Peck's Skipper	*Polites peckius*	P
Tawny-edged Skipper	*Polites themistocles*	X
Little Glassywing	*Pompeius verna*	P
European Skipper	*Thymelicus phyleus*	X
Northern Broken-Dash	*Wallengrenia egeremet*	X

Occurrence Key: (P)resent – Observed during current survey; (R)ecent – Not observed during the current survey, but previously recorded 2001-2006; (X) – No contemporary observations or records

Family Papilionidae (Swallowtails)

Pipevine Swallowtail	*Battus philenor*	P
Zebra Swallowtail	*Eurytides marcellus*	P
Giant Swallowtail	*Papilio cresphontes*	X
Eastern Tiger Swallowtail	*Papilio glaucus*	P
Black Swallowtail	*Papilio polyxenes*	P
Spicebush Swallowtail	*Papilio troilus*	P

Family Pieridae (Whites and Sulphurs)

Falcate Orangetip	*Anthocaris midea*	X
Orange (Alfalfa) Sulphur	*Colias eurytheme*	P
Clouded Sulphur	*Colias philodice*	P
Little Yellow	*Eurema lisa*	P
Sleepy Orange	*Eurema nicippe*	R
Cloudless Sulphur	*Phoebis sennae*	P
Cabbage White	*Pieris rapae*	P
Checkered White	*Pontia protodice*	X

Family Lycaenidae (Gossamer-wings)

Brown Elfin	*Callophrys augustinus*	X
Juniper (Olive) Hairstreak	*Callophrys gryneus*	X
Henry's Elfin	*Callophrys henrici*	X
Eastern Pine Elfin	*Callophrys niphon*	X
Red-banded Hairstreak	*Calycopis cecrops*	P
Spring Azure	*Celastrina ladon*	R
Summer Azure	*Celastrina neglecta*	P
Eastern Tailed Blue	*Everes comyntas*	P
Harvester	*Feniseca tarquinius*	R
American Copper	*Lycaena phlaeas*	X
White M Hairstreak	*Parrhasius m-album*	P
Banded Hairstreak	*Satyrium calanus*	X
Southern Hairstreak	*Satyrium favonius*	X
Striped Hairstreak	*Satyrium liparops*	X
Coral Hairstreak	*Satyrium titus*	X
Gray Hairstreak	*Strymon melinus*	X

Family Nymphalidae (Brushfoots)

Hackberry Emperor	*Asterocampa celtis*	X
Tawny Emperor	*Asterocampa clyton*	X
Meadow Fritillary	*Boloria bellona*	X
Common Wood Nymph	*Cercyonis pegala*	X
Silvery Checkerspot	*Chlosyne nycteis*	X
Monarch	*Danaus plexippus*	P
Northern Pearly Eye	*Enodia anthedon*	X

Occurrence Key: (P)resent – Observed during current survey; (R)ecent – Not observed during the current survey, but previously recorded 2001-2006; (X) – No contemporary observations or records

Variegated Fritillary	*Euptoieta claudia*	P
Common Buckeye	*Junonia coenia*	P
American Snout	*Libytheana carinenta*	P
Viceroy	*Limenitis archippus*	R
Red-spotted Purple	*Limenitis arthemis*	P
Little Wood Satyr	*Megisto cymela*	X
Mourning Cloak	*Nymphalis antiopa*	P
Pearl Crescent	*Phyciodes tharos*	P
Eastern Comma	*Polygonia comma*	P
Question Mark	*Polygonia interrogationis*	P
Appalachian Brown	*Satyrodes appalachia*	X
Great Spangled Fritillary	*Speyeria cybele*	R
Red Admiral	*Vanessa atalanta*	P
Painted Lady	*Vanessa cardui*	P
American Lady	*Vanessa virginiensis*	R

Occurrence Key: (P)resent – Observed during current survey; (R)ecent – Not observed during the current survey, but previously recorded 2001-2006; (X) – No contemporary observations or records

Survey Results and Species of Note

Despite the documentation of 849 individual records, only 39 of the 87 target species were found to be present during the current field survey period, with an additional nine species observed contemporarily between the years 2001 - 2006. Together, slightly over half (48) of the expected number of local butterfly species were documented. By way of comparison with other regional studies in the past, Dr. Paul Opler documented 79 butterfly species in a five-year (1982-1986) inventory of the area including and surrounding Huntley Meadows Park in Alexandria (Abugattas, 2008). In 2001, Elwood Martin completed and published a checklist of extant butterfly species of the Patuxent Wildlife Research Center (USFWS) in Laurel, Maryland listing 77 documented species (Martin, 2001). The comparatively large number of species documented from these earlier studies is not surprising, considering the largely undeveloped state and size of the study areas. Huntley Meadows Park (1,425 acres) is larger than all of Arlington's parkland combined, and the Patuxent Wildlife Research Center (12,841 acres) approaches the size of all of Arlington County.

While Abugattas believes that the number of unrecorded butterflies would increase with additional field studies, it is unlikely that all target species remain. Unfortunately, the decline of butterfly populations regionally has been noted in other studies. "A survey conducted by John Fales in Rock Creek Park, Washington, D.C. from 1977 to 1980 recorded 58 species. A similar survey in the same park in 2003 recorded only 24 species. In 1923, Austin Clark recorded 93 butterfly species in the D.C. area" (Abugattas, 2008). To search for currently undocumented spe-

cies, Abugattas suggests utilizing flora data recently collected through the Natural Heritage Resource Inventory to develop future inventory sites based on specific habitat types with the presence of preferential nectar sources and host plants.

No listed endangered species were documented as part of this study, but several butterfly species represent regionally rare or unusual observations. White M Hairstreak (*Parrhasius m-album*) was not listed in the BOMONA checklist for Arlington County, and Little Yellows (*Eurema lisa*) and Hayhurst's Scallopwings (*Staphylus hayhurstii*) are considered uncommon to locally rare. The earlier observation of a Harvester (*Feniseca tarquinius*) was a County record and rare sighting locally. For unknown reasons, a number of normally wide-ranging species or those common to neighboring counties were not documented during the active survey period. Spring Azures (*Celastrina ladon*) were conspicuously absent and Appalachian Browns (*Satyrodes Appalachia*), Little Wood Satyrs (*Megisto cymela*), and Common Wood Nymphs (*Cercyonis pagala*) were expected, but not found.

With little local historical data available, the loss of species diversity is anecdotal, but not unexpected. Similar or greater decreases in diversity were found among other native wildlife groups surveyed as part of the Natural Heritage Resource Inventory. Over the past 70 years, Arlington County has undergone intense development and urbanization, reducing natural lands to fragmented, isolated, small patches. The resulting loss of wetlands, natural meadows, lack of high quality ecotones or forest edge and replacement of native grasses with non-native turf grasses has eliminated preferential and, in some cases, required habitat for lepidopteran species. For example, one extirpated species, the Baltimore Checkerspot (*Euphydryas phaeton*), requires large colonies of native White Turtlehead (*Chelone glabra*) as a host plant. This marsh-loving native flower can now only be found in six locations across the County in small patches. The negative impact of widespread non-native plants throughout the urban environment has undoubtedly diminished habitat and species diversity of lepidopterans. While some lepidopteran species may be attracted to showy non-native plants as a food source (nectar), studies have shown that native plants support up to 35 times more insect diversity, including Lepidoptera, than non-native exotics (Abugattas, 2008). Even within remaining natural plant communities, native plants are being threatened by competition and replacement from non-native invasive species. For example, the most abundant species documented in the survey was the Cabbage White (*Pieres rapae*) that utilizes Garlic Mustard (*Alliaria petiolata*) as a host plant, and both are invasive species of European origin.

Part V. BIRDS OF ARLINGTON (Class Aves)

Northern Cardinal (Cardinalis cardinalis)

Photo by John White

Editor Note: The following information has been excerpted in its entirety from the report "*Birdlife of Arlington,"* submitted by David Farner, cited in Appendix V. as Farner, 2008.

Introduction

The following list of bird species found in Arlington represents a combination of year-round resident birds, birds that migrate into Arlington for nesting, birds that migrate into Arlington for the winter and birds that migrate through Arlington during the spring and/or fall migration periods. The order of the list follows the American Ornithologists' Union's "Official Check-list of North American Birds." This list represents bird species which have been found within the County since 2002. An attempt has been made to note the frequency of occurrence within the County. In addition, an attempt has been made to note whether or not these species nest within the County. However, since no breeding bird surveys of the County have been completed since the late 1980s, the nesting status for many species is speculative.

This list was compiled through knowledge of local bird species, discussions with Arlington birders, a search of records of the Virginia Avian Records Committee and an online search of the Virginia Statewide Birding Listserve (Va-bird). Arlington does have a strong and active bird-watching community that records sightings at local parks and neighborhoods. Contemporary records from Long Branch Nature Center, Glencarlyn Park and Fort C.F. Smith Park have been particularly helpful in compiling this list. The updated birdlist of Arlington could be used as a basis to develop a new local checklist for use by the birding community.

Habitats

Arlington's small size and suburban-urban nature limit the amount of quality space for birds within the County. The absence or limitation of particular habitat types in the County unfortunately decreases the diversity and abundance of species that may have once been present. For example:

Open Water Bodies. The Potomac River, the largest local water body, is not within Arlington County boundaries. The only remaining mudflat habitat occurs at low tide within the tidal marshes of Roaches Run Waterfowl Sanctuary. Arlington has no lakes, large ponds or natural freshwater marshes. Most shorebird or wading species in the County have been observed either in Roaches Run or as flyovers heading to or from the Potomac.

Grasslands and Natural Meadows. The historical patterns of development across Arlington have left the County with no remaining natural grasslands or old field meadow habitat. Small parcels of artificial grassland have been planted and maintained at both Potomac Overlook Park and C. F. Smith Park, providing a structural facsimile of natural meadows in order to attract species with these specific habitat needs. Most meadow species have been documented from Potomac Overlook, Fort C. F. Smith, and Gravelly Point. It is possible that some species not included on the Arlington Bird List could be found at Reagan National Airport, if more access to the grounds were possible.

Large Forested Tracts. Arlington's remaining forests suffer from severe fragmentation and isolation, limiting a basic need for a number of nesting and migrating species. Many neotropical migrants rely on large forested habitats for successful breeding and feeding activities. Since Arlington's natural forests are largely mature, the less-dense understory often does not provide substantial protection from mammal predation to ground nesters such as thrushes and Ovenbirds.

Early to Mid-successional Stage Forest. Little to no successional-stage forest growth remains in Arlington. Documented natural forests were determined to range in age from 85 to over 200 years. In nearby Fairfax County, where the abandonment of farmland and meadows occurred more recently, larger expanses of mixed oak-pine forest still persist. Species requiring or preferring the denser understory and difference in food and physical structure provided by an oak-pine forest are less abundant in Arlington.

Historical Changes in Species and Frequency

Since the 1940s the status of many bird species within Arlington and indeed in the mid-Atlantic has changed. Some species such as American Robin, Fish Crow, and Black Vulture have experienced increased populations due to their ability to coexist with humans. In 2008 a pair of Bald Eagles nested in Arlington along the George Washington Memorial Parkway. The number of Bald Eagles has rebounded remarkably throughout the United States and Canada following the banning of DDT. This pair of eagles

represents a much broader success relating to environmental quality improvements.

However, most species of birds, particularly those that migrate to the tropics for the winter, have experienced declines in population. Although the decline in quality and quantity of Arlington's natural areas has resulted in decreased space for many species, the decline in frequency of many is affected primarily by environmental conditions on breeding grounds in North America and wintering ground in Central and South America. Many bird species which previously could be found with relative ease in Arlington during migration now rarely appear. According to the American Bird Conservancy: "More than one third of the 650 species that breed in the United States are in long-term decline. At least 29 species of migratory birds have experienced population declines of 45% or greater since the 1960s. Some species, such as the Cerulean Warbler and Olive-sided Flycatcher, have declined more than 70%" (Farner, 2008).

Backyard Habitats

Many households in Arlington attempt to attract birds to their yards by providing food, water, habitat and shelter. Among the most common and easily attracted bird species are American Robin, American Goldfinch, Northern Cardinal, Carolina Chickadee, Tufted Titmouse, Carolina Wren, Downy Woodpecker and Red-bellied Woodpecker. Also attracted to back yard habitats are several non-native invasive species such as the House Sparrow, European Starling and House Finch.

Birdfeeders provide an easy way to draw a variety of species close enough for easy observation, study and personal enjoyment. Bird feeding, especially in winter and early spring, can provide supplemental food to birds at a time when insects and other food are not present or are scarce. Bird feeding stations should be kept clean and bird food replaced frequently to prevent seed from rotting. Frequent clean up of the ground beneath feeders will discourage the attraction of rats and unwanted wildlife. Stations should also be sited so that predation from domestic house cats and hawks is minimized. Water provided through artificial streams or bird baths can be beneficial to birds in mid-winter and summer. However the water in bird baths should be emptied at least twice per week to keep it clean and prevent its use by mosquitoes. While the provision of birdfeeding stations will not necessarily increase the number of native birds within any given neighborhood, it will serve to make those present more observable at a single location and increase the survivability of those individuals during the winter-early spring seasons.

Using native plants in landscaping can provide much needed food and cover to birds in the County. As cited elsewhere in this report, non-native invasive plants often outcompete and replace native plants that provide a natural food source for local birds. The removal of invasive plants from urban backyards would benefit a number of native wildlife species, including birds.

Birdwatching in Arlington County

Despite its small size Arlington does have several highly productive locations for seasonal bird watching. Five sites within the County are listed on Virginia's Birding and Wildlife Trail. They are:

- *Long Branch Nature Center.* Glencarlyn Park. Features include two small artificial ponds, streams, high quality mature hardwood forest, and Sparrow Pond wetland. Walking trails are provided throughout the parks and the W&OD Regional Trail bisects the parkland. The stream valley at Long Branch serves as a natural migration conduit during the spring and fall for migrating warblers. Woodpeckers, birds of prey, and sparrows are often observed.

- *Lubber Run Park.* Features a forested stream valley with riparian woodlands and easy access for walking. The valley provides excellent opportunities to observe a number of songbirds during the spring and fall migration period.

- *Fort C. F. Smith Historic Site and Park.* Features several areas of maintained grasslands with an artificial bird stream designed for bird attraction. The proximity to the Potomac River also increases the opportunity to view some unusual species on occasion. Species of note that have been observed at this park include the Olive-sided Flycatcher, Sora, Golden Eagle and Rusty Blackbird.

- *Potomac Overlook Regional Park.* Features a number of varying habitats including mature woodlands, maintained grasslands, riparian forest and access to the Potomac River shoreline by hiking trail. By virtue of size and geographic location, this park provides one of the best nesting locations for birds in the County.

- *Roaches Run Waterfowl Sanctuary.* Features a 25 acre aquatic basin with tidal marsh, tidal swamp and remnant bottomland hardwood forest plant communities. A number of waterfowl, wading birds and shorebirds are attracted to the exposed mud flats at low tide. The Sanctuary is located off the George Washington Memorial Parkway, adjacent to the Reagan National Airport.

Arlington County Bird Checklist

Key

Frequency	Seasons
Abundant = a species likely to be found in the proper season and habitat Common = a species that may be found most of the time in the proper season and habitat Uncommon = present, but not certain to be seen Occasional = seen only a few times during a season Rare = may be present, but not every year	Spring = March to May Summer = June to August Fall = September to November Winter = December to February

Common Name	**Scientific Name**	**Notes**	**Nesting? (Y/N)**
Snow Goose	*Chen caerulescens*	Rare in migration	N
Canada Goose	*Branta canadensis*	Abundant year round	Y
Tundra Swan	*Cygnus columbianus*	Occasional flyover migrant	N
Wood Duck	*Aix sponsa*	Uncommon	Y
American Wigeon	*Anas americana*	Occasional late fall through early spring at Roaches Run	N
American Black Duck	*Anas rubripes*	Occasional late fall through early spring at Roaches Run	N
Mallard	*Anas platyrhynchos*	Common	Y
Northern Pintail	*Anas acuta*	Occasional late fall through early spring at Roaches Run	N
Green-winged Teal	*Anas crecca*	Occasional late fall through early spring at Roaches Run	N
Redhead	*Aythya Americana*	Rare late fall through early spring at Roaches Run	N
Ring-necked Duck	*Aythya collaris*	Uncommon late fall through early spring at Roaches Run	N

Arlington County Bird Checklist

Common Name	**Scientific Name**	**Notes**	**Nesting? (Y/N)**
Lesser Scaup	*Aythya affinis*	Occasional late fall through early spring at Roaches Run	N
Bufflehead	*Bucephala albeola*	Uncommon late fall through early spring at Roaches Run	N
Common Goldeneye	*Bucephala clangula*	Occasional late fall through early spring at Roaches Run	N
Hooded Merganser	*Lophodytes cucullatus*	Uncommon late fall through early spring at Roaches Run	N
Common Merganser	*Mergus merganser*	Occasional late fall through early spring at Roaches Run	N
Red-breasted Merganser	*Mergus serrator*	Rare late fall through early spring at Roaches Run	N
Ruddy Duck	*Oxyura jamaicensis*	Uncommon late fall through early spring at Roaches Run	N
Wild Turkey	*Meleagris gallopavo*	Rare, two known sightings	N?
Common Loon	*Gavia immer*	Rare flyover in migration	N
Pied-billed Grebe	*Podilymbus podiceps*	Uncommon late fall through early spring at Roaches Run	N
Horned Grebe	*Podiceps auritus*	Occasional late fall through early spring at Roaches Run	N
Red-necked Grebe	*Podiceps grisegena*	Rare late fall through early spring at Roaches Run	N
Double-crested Cormorant	*Phalacrocorax auritus*	Uncommon fall - spring at Roaches Run	N
Great Cormorant	*Phalacrocorax carbo*	Rare - one known sighting at Roaches Run	N
Great Blue Heron	*Ardea herodias*	Common along water edges and as flyover	N
Great Egret	*Ardea alba*	Rare at Roaches Run	N
Green Heron	*Butorides virescens*	Occasional spring - fall	N
Black-crowned Night Heron	*Nycticorax nycticorax*	Occasional at Roaches Run and flyover along Potomac shore	N
Black Vulture	*Coragyps atratus*	Common	N?
Turkey Vulture	*Cathartes aura*	Common	??

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Osprey	*Pandion haliaetus*	Common late-March - October near water	Y
Bald Eagle	*Haliaeetus leucocephalus*	Uncommon	Y
Northern Harrier	*Circus cyaneus*	Rare at CF Smith, Gravelly Point and Reagan National Airport	N
Sharp-shinned Hawk	*Accipiter striatus*	Common fall through spring, especially at bird feeders	N
Cooper's Hawk	*Accipiter cooperii*	Common fall through spring, uncommon summer	Y
Red-shouldered Hawk	*Buteo lineatus*	Uncommon	Y
Broad-winged Hawk	*Buteo platypterus*	Occasional in spring and fall migration	N
Red-tailed Hawk	*Buteo jamaicensis*	Uncommon year round	Y
Golden Eagle	*Aquila chrysaetos*	One known sighting from CF Smith	N
American Kestrel	*Falco sparverius*	Occasional at CF Smith, Gravelly Point, W&OD Trail and as flyover	N
Merlin	*Falco columbarius*	Rare migrant	N
Peregrine Falcon	*Falco peregrinus*	Occasional migrant, nests nearby on Potomac and Anacostia bridges	N
Sora	*Porzana carolina*	Rare, seen once at CF Smith	N
American Coot	*Fulica americana*	Occasional at Roaches Run	N
Killdeer	*Charadrius vociferus*	Occasional	?
Spotted Sandpiper	*Actitus macularius*	Occasional in migration along water edges	N
Solitary Sandpiper	*Tringa solitaria*	Occasional in migration along water edges	N
Least Sandpiper	*Calidris pusilla*	Occasional on mudflats	N
American Woodcock	*Scolopax minor*	Rare in meadows, CF Smith	N
Bonaparte's Gull	*Larus philadelphia*	Rare at Roaches Run	N
Laughing Gull	*Larus atricilla*	Uncommon at Roaches Run and along Potomac shore	N

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Ring-billed Gull	*Larus delawarensis*	Common fall through spring, parking lot gull	N
Herring Gull	*Larus argentatus*	Uncommon along Potomac shore	N
Great Black-backed Gull	*Larus marinus*	Uncommon along Potomac shore	N
Caspian Tern	*Hydroprogne caspia*	Occasional at Roaches Run or flyover along Potomac shore	N
Rock Pigeon	*Columba livia*	Abundant, introduced	Y
Mourning Dove	*Zenaida macroura*	Abundant	Y
Yellow-billed Cuckoo	*Coccyzus americanus*	Uncommon, mainly migrates through County, with some nesting in County	Y
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Occasional migrant	N
Eastern Screech-owl	*Megascops asio*	Uncommon, nests in County	Y
Great Horned Owl	*Bubo virginianus*	Uncommon, nests in County	Y
Barred Owl	*Strix varia*	Uncommon, nests in County	Y
Common Nighthawk	*Chordeiles minor*	Uncommon in migration, more likely in fall	N?
Chimney Swift	*Chaetura pelagica*	Common spring to fall, nests in County	Y?
Ruby-throated Hummingbird	*Archilochus colubris*	Uncommon except at hummingbird feeders, nests in County	Y
Rufous Hummingtbird	*Selasphorus rufus*	Rare, visited hummingbird feeder at Potomac Overlook winter 2007-08	N
Belted Kingfisher	*Ceryle alcyon*	Occasional, Potomac shore, Roaches Run	?
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Rare, mainly at CF Smith, Potomac Overlook Park	N
Red-bellied Woodpecker	*Melanerpes carolinas*	Abundant	Y
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Common fall through spring	N

Common Name	Scientific Name	Notes	Nesting? (Y/N)
Downy Woodpecker	*Picoides pubescens*	Abundant	Y
Hairy Woodpecker	*Picoides villosus*	Common	Y
Northern Flicker	*Colaptes auratus*	Abundant	Y
Pileated Woodpecker	*Dryocopus pileatus*	Common	Y
Olive-sided Flycatcher	*Contopus cooperi*	Rare, CF Smith 2008	N
Eastern Wood-pewee	*Contopus virens*	Abundant spring through fall	Y
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Rare migrant	N
Acadian Flycatcher	*Empidonax virescens*	Common spring - fall	Y
Willow Flycatcher	*Empidonax traillii*	Rare in migration, seen at CF Smith	N
Least Flycatcher	*Empidonax minimus*	Rare in migration, seen at CF Smith	N
Eastern Phoebe	*Sayornis phoebe*	Abundant March - October, rare in winter	Y
Great Creasted Flycatcher	*Myiarchus crinitus*	Common spring - fall	Y
Eastern Kingbird	*Tyrannus tyrannus*	Nests at Gravelly Point, occasional at CF Smith	Y
White-eyed Vireo	*Vireo griseus*	Uncommon	Y
Yellow-throated Vireo	*Vireo flavifrons*	Occasional migrant	N?
Blue-headed Vireo	*Vireo solitarius*	Uncommon migrant	N
Warbling Vireo	*Vireo gilivus*	Occasional, nesting in Sycamores along GW Parkway	Y
Philadelphia Vireo	*Vireo philadelphicus*	Occasional migrant	N
Red-eyed Vireo	*Vireo olivaceus*	Abundant spring through fall	Y
Blue Jay	*Cyanocitta cristata*	Abundant	Y
American Crow	*Corvus brachyrhynchos*	Abundant	Y
Fish Crow	*Corvus ossifragus*	Abundant	Y

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Common Raven	*Corvus corax*	One known sighting from CF Smith	N
Purple Martin	*Progne subis*	Uncommon migrant, has nested at CF Smith	N?
Tree Swallow	*Tachycineta bicolor*	Uncommon spring - fall	Y?
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Common along water edges and as flyover	Y
Bank Swallow	*Riparia riparia*	Occasional in migration	N
Barn Swallow	*Hirundo rustica*	Uncommon, nests just outside County limits on bridges to TRI and Ladybird JG	?
Carolina Chickadee	*Poecile carolinensis*	Abundant	Y
Tufted Titmouse	*Baeolophus bicolor*	Abundant	Y
Red-breasted Nuthatch	*Sitta canadensis*	Occasional migrant - not found every year	N
White-breasted Nuthatch	*Sitta carolinensis*	Abundant	Y
Brown Creeper	*Certhia americana*	Common October - April	N
Carolina Wren	*Thryothorus ludovicianus*	Abundant	Y
House Wren	*Troglodytes aedon*	Abundant spring - fall	Y
Winter Wren	*Troglodytes troglodytes*	Common in woods and along stream valleys October - April	N
Golden-crowned Kinglet	*Regulus satrapa*	Common late September - April	N
Ruby-crowned Kinglet	*Regulus calendula*	Common in fall and spring migration, uncommon in winter	N
Blue-gray Gnatcatcher	*Polioptila caerulea*	Common spring - fall	Y

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Eastern Bluebird	*Sialia sialis*	Nest @Taylor Elementary in 2008, occasional elsewhere in County	Y
Veery	*Catharus fuscescens*	Declining nester in County due to lack of habitat	Y
Gray-cheeked Thrush	*Catharus minumus*	Uncommon, primarily in fall migration	N
Swainson's Thrush	*Catharus ustulatus*	Uncommon in spring and fall migration	N
Hermit Thrush	*Catharus guttatus*	Uncommon October-April	N
Wood Thrush	*Hylocichla mustelina*	Declining nester in County due to lack of habitat	Y
American Robin	*Turdus migratorius*	Abundant	Y
Gray Catbird	*Dumetella carolinensis*	Abundant April - October	Y
Northern Mockingbird	*Mimus polypglottos*	Abundant	Y
Brown Thrasher	*Toxostoma rufum*	Uncommon April - October	Y
European Starling	*Sturnus vulgaris*	Abundant - introduced	Y
American Pipit	*Anthus rubescens*	Rare at Gravelly Point in winter	N
Cedar Waxwing	*Bombycilla cedrorum*	Common in winter, occasional nester in summer	Y
Blue-winged Warbler	*Vermivora pinus*	Occasional in migration	N
Golden-winged Warbler	*Vermivora chrysoptera*	Rare in migration	N
Tennessee Warbler	*Vermivora peregrina*	Uncommon in migration	N

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Orange-crowned Warbler	*Vermivora celata*	Rare in fall migration	N
Nashville Warbler	*Vermivora ruficapilla*	Uncommon in migration	N
Northern Parula	*Parula americana*	Common spring - fall	Y
Yellow Warbler	*Dendroica petechia*	Uncommon spring - fall	Y
Chestnut-sided Warbler	*Dendroica pensylvanica*	Uncommon in migration	N
Magnolia Warbler	*Dendroica magnolia*	Uncommon in migration	N
Cape May Warbler	*Dendroica tigrina*	Occasional in migration	N
Black-throated Blue Warbler	*Dendroica caerulescens*	Uncommon in migration	N
Yellow-rumped Warbler	*Dendroica coronata*	Common late fall and early spring, uncommon in winter	N
Black-throated Green Warbler	*Dendroica virens*	Uncommon in migration	N
Blackburnian Warbler	*Dendroica fusca*	Occasional in migration	N
Yellow-throated Warbler	*Dendroica dominica*	Occasional in spring migration, one known winter record (LBNC)	N
Pine Warbler	*Dendroica pinus*	Occasional in migration	N
Prairie Warbler	*Dendroica discolor*	Uncommon in fall	N

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Palm Warbler	*Dendroica palmarum*	Uncommon in migration	N
Bay-breasted Warbler	*Dendroica castanea*	Occasional in migration	N
Blackpoll Warbler	*Dendroica striata*	Uncommon in spring, rare in fall	N
Cerulean Warbler	*Dendroica cerulea*	Rare, all recent records from Potomac Overlook Park	N
Black-and-white Warbler	*Mniotilta varia*	Common spring - fall	Y?
American Redstart	*Setophaga ruticilla*	Common spring - fall	Y?
Prothonotary Warbler	*Protonotaria citrea*	Rare spring - fall	N?
Worm-eating Warbler	*Helmitheros vermivorum*	Occasional in migration	N?
Ovenbird	*Seiurus aurocapilla*	Uncommon spring - fall, declining nester	Y
Northern Waterthrush	*Seiurus noveboracensis*	Occasional migrant early spring - late summer	N
Louisiana Waterthrush	*Seiurus motacilla*	Uncommon spring - fall, declining nester (perhaps former)	Y?
Kentucky Warbler	*Oporornis formosus*	Rare in migration	N
Connecticut Warbler	*Oporornis agilis*	Rare in migration	N
Mourning Warbler	*Oporornis philadelphia*	Rare in migration	N
Common Yellowthroat	*Geothlypis trichas*	Common spring - fall	Y
Hooded Warbler	*Wilsonia citrina*	Occasional in migration	N
Wilson's Warbler	*Wilsonia pusilla*	Occasional in migration	N

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Canada Warbler	*Wilsonia canadensis*	Occasional in migration	N
Yellow-breasted Chat	*Icteria virens*	Rare in migration	N
Summer Tanager	*Piranga rubra*	Rare in migration	N
Scarlet Tanager	*Piranga olivacea*	Uncommon spring - fall	Y
Eastern Towhee	*Pipilo erythrophthalmus*	Common spring - fall	Y
American Tree Sparrow	*Spizella arborea*	Occasional in winter	N
Chipping Sparrow	*Spizella passerina*	Common spring - fall	Y
Field Sparrow	*Spizella pusilla*	Uncommon due to lack of proper habitat	Y?
Vesper Sparrow	*Pooecetes gramineus*	Rare in winter	N
Savannah Sparrow	*Passerculus sandwichensis*	Occasional in fall - spring at CF Smith, Gravelly Point	N
Fox Sparrow	*Passerella iliaca*	Occasional in winter	N
Song Sparrow	*Melospiza melodia*	Abundant	Y
Lincoln's Sparrow	*Melospiza lincolnii*	Rare in migration	N
Swamp Sparrow	*Melospiza georgiana*	Uncommon in migration	N?
White-throated Sparrow	*Zonotrichia albicollis*	Abundant fall - spring	N
White-crowned Sparrow	*Zonotrichia leucophrys*	Occasional in winter	N
Dark-eyed Junco	*Junco hyemalis*	Common fall - spring	N

Common Name	***Scientific Name***	**Notes**	**Nesting? (Y/N)**
Northern Cardinal	*Cardinalis cardinalis*	Abundant	Y
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Occasional in migration	N
Blue Grosbeak	*Passerina caerulea*	Rare spring - fall	N
Indigo Bunting	*Passerina cyanea*	Uncommon spring - fall	Y?
Bobolink	*Dolichonyx oryzivorus*	Occasional in migration at CF Smith, Gravelly Point	N
Red-winged Blackbird	*Agelaius phoeniceus*	Abundant	Y?
Eastern Meadowlark	*Sturnella magna*	Rare at Gravelly Point	N
Rusty Blackbird	*Euphagus carolinus*	Occasional in migration, primarily wet woods	N
Common Grackle	*Quiscalus quiscula*	Abundant	Y
Brown-headed Cowbird	*Molothrus ater*	Abundant	Y
Orchard Oriole	*Icterus spurius*	Uncommon spring - fall	Y
Baltimore Oriole	*Icterus galbula*	Uncommon spring - fall	Y
Purple Finch	*Carpodacus purpurens*	Occasional in winter	N
House Finch	*Carpodacus mexicans*	Abundant - introduced	Y
Pine Siskin	*Carduelis pinus*	Occasional in winter	N
American Goldfinch	*Carduelis tristis*	Abundant	Y
House Sparrow	*Passer domesticus*	Abundant - introduced	Y

Part VI: THE FUTURE OF WILDLIFE IN ARLINGTON

A single colony of Red Salamander (P. ruber) remain

Photo by Greg Zell

Biologists and wildlife managers have recognized for some time that large-scale landscape alterations destroy valuable habitat and have led directly to the loss or reduction of some wildlife species and unwanted increases in others (Mitchell, 1994). Without question, the loss of habitat and related wildlife within the most highly urbanized corridors of the state has been great and, to date, largely undocumented. Analysis of the data collected through the recent Natural Heritage Resource Inventory clearly shows that Arlington's remaining natural environment is under stress. It is not coincidental that 70% of all historically documented mammals, reptiles and amphibians are locally absent (extirpated), undocumented or persisting in reduced numbers. It is not by chance that select insect orders (Ondonata, Lepidoptera) were found to be much less diverse compared to populations in nearby Fairfax County. The authors hope that the information contained within this report will assist state agencies in quantifying the extent and impact of urbanization throughout the Old Dominion and help Arlington County to better define opportunities for habitat improvements and targeted wildlife restoration.

The development of a plan to protect, enhance or increase native wildlife in an urban environment is a significant challenge. A number of existing urban stresses have and will continue to impact the size and health of local wildlife populations. These stresses include habitat fragmentation, loss of habitat diversity, loss of wetlands, spread of invasive plants and, to a lesser degree, the unknown impacts of human activity and the affects of ambient light and noise present in the urban environment.

Habitat Fragmentation

One of the most damaging impacts of urban development on wildlife has been the fragmentation of habitat and the resulting isolation of populations. For less mobile species, such as reptiles and amphibians, the habitat islands created by urbanization often mimic the ecology of true oceanic islands (Mitchell, 1994). Vulnerable wildlife populations isolated by human infrastructure are at increased risk of eventual reproductive failure. The concept of "minimum viable population" holds that a minimum number of individuals within isolated populations must be present in order to survive, reproduce and continue to succeed (Shaffer, 1981). When individual numbers fall below the minimum required, genetic viability is reduced, replacement is insufficient for sustainability, and the entire population is at increased risk of catastrophic failure (storm event, pesticide spill, sustained drought, etc.). In the absence of catastrophe, these weakened populations slowly die out and become lost fauna. Habitat fragmentation impacts all groups of wildlife, but particularly those with limited mobility such as amphibians and reptiles.

Loss of Habitat Diversity

In addition to habitat fragmentation, many urban communities have experienced a large net loss of habitat in terms of both quantity and quality. While Arlington County can claim approximately 3,000 acres of open space, less than 800 acres, divided into several dozen individual parcels, have been classified as "natural lands" (Zell, March 2009). Vegetative data collected as part of the Natural Heritage Resource Inventory shows that a large majority of the remaining natural lands exist as mature mixed hardwood forest, with a number of different forest types present. However, a number of plant community types that would have been present historically have disappeared. Most notably, high quality forest edge, successional stage oak-pine forest, and old field meadow are no longer present. The loss of habitat diversity affects all wildlife groups, but particularly those species with specialized nesting and cover requirements.

Loss of Wetlands

Arlington County was once historically rich in wetlands. Types of wetlands that have been lost or heavily impacted by develop-

ment include flood plains, back swamps, woodland seeps, vernal pools, wet ditches, freshwater marsh, and tidal marsh. Miles of surface streams have disappeared or suffer from storm water flooding and degraded water quality. While all groups of wildlife have been impacted by the loss of wetlands, the elimination of breeding habitat for amphibians and a general loss of high quality habitat for the Odonata (dragonflies and damselflies) have been most evident.

Invasive Plants

Over the past 50-70 years, non-native invasive plants have spread from private property into parkland forests. All parks and parcels inventoried in the recent vegetative survey were found to have sections of moderate to high invasiveness. The adverse affects of invasive plants to natural forest succession and the resulting loss of native plants may have a long-term impact on migrating birds through the elimination of native food sources and alteration of forest structure. The native Lepidoptera (butterflies and moths) are also at increased risk through the loss of native host and food plants.

Part VII. A STRATEGY FOR THE CONSERVATION, PRESERVATION AND RESTORATION OF WILDLIFE

Management Limitations

While Arlington's natural environment can be described as ecologically imbalanced from an historical perspective, the current status may simply indicate movement toward a new "urbanized equilibrium." In the post-urbanization period, it is not realistic to expect to be able to sustain all remaining species or to restore all that have disappeared. Any efforts to manage wildlife should be thoughtful, objective-based and within the authority granted by state law. With few exceptions, the Virginia Department of Game and Inland Fisheries (VDGIF), under the authority of Commonwealth of Virginia, provides oversight for the management of wildlife within the Old Dominion. By statute, the Animal Welfare League of Arlington (AWLA) is granted broad authority to control, regulate and license domestic animals and pets, but has limited authority in regards to wildlife. Although animal control officers will respond to reports of injured or abandoned wildlife, there currently exists no agency, resources or funding for the direct management or control of general wildlife within the County. In most cases, a permit would be required to allow county staff to trap and remove, collect or reintroduce wildlife into Arlington as part of any wildlife management program. While the VDGIF does provide consultation and technical assistance in areas of wildlife control and management, performance of those permitted activities (staff and resources) would be the responsibility of the County. Depending on the requested project or activity, there

may be data collection and reporting requirements as part of the permit.

A constraint or challenge for successful management of wildlife habitat will be the ability to develop cooperative strategies and goals across jurisdictional lines. A number of Arlington County parks that contain natural lands and wildlife resources abut properties owned by the National Park Service (G. W. Memorial Parkway) and the Northern Virginia Regional Park Authority (NVRPA). In a single case, the only colony of a locally-rare salamander occurs on private property. Cooperation with the owner and voluntary protection of the site has been sought.

Management Opportunities

Considering the available resources and limited independent legal authority of county staff, the following discussion highlights opportunities that represent a reasonable approach to the management of urban wildlife as a component of Arlington's natural resources.

Protection of Existing Wildlife Habitat: The most effective tool available to indirectly manage local wildlife populations on a county-wide basis is to ensure the protection of existing natural lands and high value habitat on publicly-owned properties. While historically lost habitats cannot be replaced, nor additional natural lands easily created, it is important to prevent or limit the loss of extant natural lands. Preservation of existing habitat and plant communities is the only management option for many local wildlife species.

Habitat Restoration and Creation: The vegetative and plant community surveys conducted as part of the Natural Heritage Resource Inventory identified a number of restorable remnant plant communities, including wetlands, which currently support or could support documented at-risk water-dependent species (amphibians, odonates). A priority list of recommended restoration opportunities on county-owned parkland should be developed by staff. Small scale habitat restoration opportunities exist in the following parks – Barcroft, Bluemont, Benjamin Banneker, Lucky Run, Fort C. F. Smith and others. Habitat restoration within the identified parcels could be accomplished using a combination of in-house county resources and volunteers. With high demand and competition for use of existing public open space within Arlington, the opportunities for new habitat creation are limited. The establishment of early-stage riparian forest along portions of Four Mile Run stream and the creation of scattered, small-scale native meadows are options.

Continuation of Wildlife Studies and Data Collection: This report is the first comprehensive effort to catalog and document Arlington's historic and extant wildlife. In order to protect or manage those species identified as uncommon – rare, periodic monitoring of known populations should be conducted. In addition, a large percentage of target species within the current study were listed as "unknown" or currently undocumented. Additional inventories should be conducted to verify the presence or non-presence of these species. Several families

within the Order Mammalia require further specialized studies, including the small rodents, insectivores and bats, in order to verify or discount their presence. Volunteer professional scientists or local universities should be solicited to conduct these studies under the oversight and coordination of county staff. The initial inventory of odonates (dragonflies/damselflies) and lepidopterans (butterflies/moths) is incomplete and should continue for a number of additional seasons in order to establish a full record of occurrence. A combination of county staff and trained volunteers could accomplish this objective. Thereafter, as environmental "bell weather" species, the odonates and Lepidoptera should be re-inventoried every three to five years in order to monitor change.

Reintroduction of Wildlife: Analysis of plant community and wildlife data collected in the natural resource inventory concludes that the reintroduction of several locally-rare amphibian species may be successful. Seasonal breeding pools are a critical missing element for a number of local species with reduced or extirpated populations. The construction of vernal pools within a number of county parks would provide breeding sites for reintroduced populations of Cope's gray treefrog, American toad, spring peeper and spotted salamander. The construction of vernal pools could easily be accomplished by volunteers with hand tools and labor under the direction of county staff. Without additional analysis, the reintroduction of non-amphibians is not currently suggested.

Wildlife Habitat Enhancement Opportunities: A number of opportunities have been identified where existing habitat or habitat components could be improved for several groups of local wildlife.

(1) Establish Dragonfly Sanctuary. Dragonfly survey data assumes a general decline of species in Arlington County compared to nearby Fairfax County. Two small County-owned ponds, located in Cherry Valley Park, were found to contain several rare or unusual dragonfly species. Both ponds could be managed expressly for odonate species and be dedicated as a Dragonfly Sanctuary. Only minor modifications or physical changes would be required, including the removal of all goldfish from the ponds. Education at the site could be provided through the placement of interpretive signs or panels.

(2) Enhance Butterfly Habitat. As a highly mobile group, butterflies do not necessarily need large spaces, but the presence of required host and food plants are critical. Woodland species have probably been impacted locally to a larger degree due to the affects of invasive plants replacing natives and fragmented woodlands. The grass and forb meadows at C. F. Smith Park were noted as being the most productive site for attracting butterflies in the County. There are two specific suggestions to enhance butterfly habitat County-wide with little to no fiscal impact.

- *Create two model butterfly garden designs to fit in small spaces.* One model would be for shade and the other for sunny locations. Local native plants would be recommended to attract targeted butterfly species. The completed garden designs would be made available to both the general public and county staff. A reasonable future goal would be to construct up to 100 micro-habitat butterfly gardens across the County on both private property and public parkland. In addition to enhancing available habitat, the new gardens could be used as survey stations for the continuation of butterfly surveys. Volunteer groups such as the Master Naturalists and Master Gardeners could assist in the installation of gardens on public property. Arlingtonians for a Cleaner Environment (ACE) could promote the establishment of butterfly gardens as part of the Community Backyard Habitat Program that they manage.

- *Manage the Four Mile Run stream valley as a migration route for Monarch Butterflies.* The Monarch Butterfly migrates annually through Arlington toward its southern wintering grounds and is in decline throughout the Eastern United States. The W&OD Trail and parallel Four Mile Run trail could be managed as a dedicated migration route by planting and maintaining native milkweed (Asclepias spp.) species along the length of the two trails. This would present a partnership opportunity for the Northern Virginia Regional Park Authority (NVRPA) and Arlington County in the conservation of an at-risk wildlife species. The establishment of this joint program would not only allow the cost of plantings to be shared, but would provide both agencies with the opportunity to demonstrate an active role in protecting and preserving local native wildlife.

(3) Create Nesting Habitat for Native Bees. In light of the rapid decline of European Honeybees (*Apis mellifera*) and native Bumble Bees (*Bombus spp.*) nationwide, the important role of native bees in the pollination of native plants cannot be understated (Evans, et al.). This is particularly true in urban areas where natural nesting sites have disappeared or when nests are destroyed out of unfounded fear. A number of local species, known variously as sand bees and mining bees (Family Andrenidae) or digger bees (Family Apidae), are solitary species, non-aggressive and prolific early spring pollinators. Large numbers of individuals nesting within a small area are known as "aggregations." As ground nesters, they prefer sandy soil with sparse or no vegetation on the surface. In Arlington County, they are often attracted to recreational areas where sand has been placed for playgrounds or volleyball courts. The construction of nesting habitat in multiple County parks, away from recreational amenities, would be inexpensive and could be accomplished with hand tools by removing soil from linear or rectangular pits to a depth of 2 feet and refilling them with a mixture of sand and loam. Nesting pits

should be constructed in well-drained areas in both flat and sloped landscape (Mader, et al. 2010). Post-construction maintenance would be limited to the periodic mowing or removal of accumulated vegetation on the surface of the pit.

Wild Bird Management: With many species of birds in decline due to a variety of factors throughout North and South America, there is little that Arlington County can do independently to reverse larger global changes. However, there are some positive steps that the County can undertake to minimize continued declines locally. The single largest step that Arlington as a community can take to protect native bird populations is to ensure that additional woodlands and natural spaces are not lost. Even though much of the remaining natural forest County-wide is fragmented, these remnant woodlands and stream valleys continue to provide migration corridors and nesting habitat for a number of species. A continuation of the County's efforts to increase forest canopy will provide long-term benefit to birdlife. On a park-level scale, a coordinated program of invasive plant removal would help to restore degraded remnants into more natural environments, providing higher quality food and cover resources for birds. The restoration of suitable wetlands and the establishment of carefully designed and maintained grassland tracts would provide additional habitat that is greatly lacking within the County at the present time. While the mature woodlands of Arlington most likely provide sufficient nesting sites for tree-hollow nesters, such as woodpeckers, chickadees and nuthatches, the placement of additional nesting structures in private backyards could provide additional territorial space and serve to increase the numbers of a limited number of species. Lastly, to reduce the predation of local birds by house cats, a public education campaign could be directed to convince owners to keep pets inside and report stray cats to the Arlington Animal Welfare League.

Establish Wildlife Control Plan. One of the inevitable results of urbanization is the imbalance of wildlife populations. Some species, known as "generalists" are very adaptive and in the absence of sufficient natural predation may increase populations to pest level status. Local species within that category include gray squirrels, red foxes, raccoons, and white-tailed deer. When populations reach abnormally high levels, some species have the potential to threaten the environment (white-tailed deer) or pose a human health risk from transmittable disease (raccoon, red fox and white-tailed deer). Three other species that are not currently problematic, but could potentially require control in the future are non-migratory geese, beavers and coyotes. In large numbers, geese can cause traffic problems, create unsanitary conditions (droppings) in public spaces, and may exhibit aggression when nesting. Beavers can damage urban infrastructure through the construction of dams and kill trees or shrubbery on private property. To date, coyotes have remained largely secretive in Arlington, but increases in the local population could result

in predation on small pets (dogs and cats) and aggression towards humans.

Of particular local concern is the apparent increase in number of white-tailed deer. This has been most noticeable in North Arlington within stream valley parks along the Potomac River. Reports of individual deer herds in excess of a dozen animals have been reported with increased frequency, and signs of over browsing within some parks are obvious. The Virginia Department of Game and Inland Fisheries (VDGIF) have found deer populations rising across the state and account for an average of 3 deaths and 450 injuries per year from vehicle collisions. The highest population increases are reported from Northern Virginia (Northern Virginia Deer Management Summit, September 2010). As selective feeders, each adult whitetail deer can consume up to three to five percent of its body weight in plant material each day. With only small patches of forest remaining in Arlington, over browsing by deer can rapidly reduce or eliminate native flora, including rare plants, and can retard the natural regeneration of forest trees. In some sections of wooded parkland in nearby Fairfax County, deer have completely eliminated all ground cover within the forest. While Arlington's population of deer may continue to rise exponentially before reaching the biological carrying capacity of available parkland, it has most likely already reached the ecological carrying capacity in some areas – the point at which damage to normally renewable native plant resources occurs and vulnerable species, such as Trilliums (*Trillium spp.*) may completely disappear.

In addition to monitoring the populations of nuisance wildlife and performing a population survey or browse survey for deer, it would be prudent for the County to develop a Wildlife Control Plan in the event that control or reduction of target species is required in the future. Currently, the County has no dedicated staff, resources, or contingency plan to deal with this possibility. A Wildlife Control Plan would include a written document outlining the steps that would be taken, legal authorities cited, resources needed and responsible County agencies identified.

Artificial Pond Management. Within the urban environment, artificial ponds can serve as a high value wildlife habitat for a number of avian species and water-dependent amphibians, reptiles and mammals. A number of dry and wet ponds on public property are presently managed by Arlington County as storm water BMP's. The addition of a wildlife management component to current operational criteria could greatly benefit a number of native wildlife species. The development process for future BMP's should consider wildlife habitat options as a design element.

Local Animal Regulations and Public Education. Both the general public and county staff are aware of the environmental threats posed by non-native invasive plants. There is less general awareness of the problems relating to the release of both native and non-

native (exotic) wildlife into public parkland in Arlington. It is not uncommon to discover wildlife, collected by individuals while on vacation in other states or other parts of Virginia, and subsequently released into Arlington. In other cases, non-native exotic wildlife purchased as pets have been found after being released into parks or neighborhoods. The potential impacts relating to the unauthorized release of animals in the community are several. In many cases, the specimens are exotic tropical species unable to survive local winter temperatures and will die as a result. In other cases, whether native or non-native, released animals have the potential to transmit diseases to similar local populations of wildlife. In worst cases, released animals may out-compete native species and thrive. Non-native Red-eared Sliders (aquatic turtle) and goldfish are two local examples of released animals that currently threaten the health of native species. A review of current County Administrative Regulations and animal ordinances is suggested to determine if current rules sufficiently deter the unauthorized release of both domestic animals (pet species) and wildlife into parkland and the residential community. The development of a cooperative outreach program to better educate the public about the environmental impact and cruelty issues attached to the unregulated release of wildlife and exotic animals could be undertaken by Arlington County, the Animal Welfare League of Arlington and local environmental non-profit organizations.

Appendix I – Mammals, Reptiles and Amphibians Species Occurrence and Frequency

Species	Current Status	Presence Likely	Documented 2004-2008	Historical Records
MAMMALS				
Opossum	Abundant		yes	yes
Ashen Masked Shrew	Unknown	no	no	no
Southeastern Shrew	Unknown	most likely	no	yes
Pygmy Shrew	Unknown	no	no	no
Kirtland's Short-tailed Shrew	Abundant		yes	yes
Least Shrew	Unknown	no	no	yes
Eastern Mole	Common		yes	yes
Star-nosed Mole	Unknown	no	no	no
Little Brown Bat	Unknown	yes	no	yes
Northern Myotis	Unknown	possible	no	no
Silver-haired Bat	Uncommon		yes	no
Eastern Pipistrelle	Unknown	yes	no	no
Big Brown Bat	Common		yes	yes
Evening Bat	Unknown	possible	no	no
Eastern Red Bat	Common		yes	yes
Hoary Bat	Unknown	possible	no	yes
Eastern Cottontail	Uncommon - Common		yes	yes
Fisher's Eastern Chipmunk	Common		yes	yes
Woodchuck	Uncommon		yes	yes
Northern Gray Squirrel	Abundant +		yes	yes
Eastern Fox Squirrel	Extirpated		no	yes
Talkative Red Squirrel	Extirpated		no	yes
Southern Flying Squirrel	Common - Abun-dant		yes	yes
American Beaver	Uncommon		yes	yes
Marsh Rice Rat	Unknown	most likely extirpated	no	no
Eastern Harvest Mouse	Unknown	possible	no	yes

** non-native species ** non-native/naturalized species*

Species	Current Status	Presence Likely	Documented 2004-2008	Historical Records
Woodland Deer Mouse	Common		yes	no
Prairie Deer Mouse	Unknown	watch list	no	no
Northern White-footed Mouse	Common - Abundant		yes	yes
Allegheny Wood Rat	Extirpated		no	probable
Common Gapper's Red-backed Vole	Unknown	no	no	no
Meadow Vole	Common		yes	yes
Pine Vole	Unknown	yes	no	yes
Southern Bog Lemming	Unknown	no	no	no
Large-toothed Muskrat	Rare		yes	yes
Norway Rat **	Abundant		yes	yes
Black Rat **	Unknown	some years	no	yes
House Mouse **	Abundant		yes	yes
Meadow Jumping Mouse	Unknown	possible	no	yes
Red Fox	Abundant +		yes	yes
Common Gray Fox	Rare		yes	yes
Coyote	Rare		citizen observations	no
Gray Wolf	Extirpated		no	yes
Black Bear	Rare		no	yes
Raccoon	Abundant +		yes	yes
Long-tailed Weasel	Unknown	may persist in small numbers	no	yes
Common Mink	Unknown	transients possible	no	yes
Northern River Otter	Rare		yes	yes
Striped Skunk	Rare		citizen observations	yes
Bobcat	Extirpated		no	yes
White-tailed Deer	Uncommon - Common		yes	yes

** non-native species ** non-native/naturalized species*

Species	Current Status	Presence Likely	Documented 2004-2008	Historical Records
TURTLES				
Eastern Snapping Turtle	Common		yes	yes
Eastern Painted Turtle	Common		yes	yes
Spotted Turtle	Extirpated		no	yes
Wood Turtle	Extirpated		no	yes
Eastern River Cooter	Unknown	no	no	no
Florida Cooter *	Unknown	watch list	no	no
Northern Red-bellied Cooter	Uncommon		yes	yes
Yellow-bellied Slider *	Rare		yes	no
Red-eared Slider *	Common		yes	no
Eastern Mud Turtle	Unknown	yes	no	yes
Stinkpot	Uncommon		yes	yes
Eastern Box Turtle	Common		yes	yes
LIZARDS				
Eastern Fence Lizard	Unknown	most likely extirpated	no	yes
Common Five-lined Skink	Uncommon		yes	no
Southeastern Five-lined Skink	Unknown	no	no	no
Broad-headed Skink	Uncommon		yes	yes
Little Brown Skink	Unknown	possible	no	yes
SNAKES				
Worm Snake	Uncommon		yes	yes
Northern Scarletsnake	Not present by range	no	no	no
Northern Black Racer	Rare		yes	yes
Northern Ring-neck Snake	Uncommon		yes	no
Red Cornsnake	Not Present	no	no	erroneous record
Eastern Ratsnake	Common		yes	no
Eastern Hog-nosed Snake	Extirpated		no	yes
Mole Kingsnake	Unknown	most likely extirpated	no	yes

** non-native species ** non-native/naturalized species*

Species	Current Status	Presence Likely	Documented 2004-2008	Historical Records
Eastern Kingsnake	Unknown	not likely	questionable collection	yes
Eastern Milksnake	Extirpated		no	yes
Northern Watersnake	Common		yes	yes
Northern Rough Greensnake	Uncommon		yes	yes
Queen Snake	Rare - Uncommon		yes	yes
Northern Brownsnake	Common		yes	yes
Northern Red-bellied Snake	Unknown	possible	no	yes
Common Ribbonsnake	Rare		yes	yes
Eastern Gartersnake	Common		yes	yes
Eastern Smooth Earth Snake	Unknown	likely	no	yes
Northern Copperhead	Uncommon		yes	yes
Cottonmouth	Not Present By Range	no	no	erroneous record
Timber Rattlesnake	Extirpated		no	yes
SALAMANDERS				
Jefferson Salamander	Not Present By Range	no	no	no
Spotted Salamander	Rare		yes	no
Marbled Salamander	Extirpated		no	yes
Northern Dusky Salamander	Common		yes	yes
Northern Two-lined Salamander	Rare		yes	yes
Three-lined Salamander	Rare		yes	yes
Four-toed Salamander	Unknown	most likely extirpated	no	no
Red-spotted Newt	Extirpated		no	yes
Eastern Red-backed Salamander	Common - Abundant		yes	yes
White-spotted Slimy Salamander	Unknown	yes	no	yes

** non-native species ** non-native/naturalized species*

Species	Current Status	Presence Likely	Documented 2004-2008	Historical Records
Eastern Mud Salamander	Extirpated		no	no
Northern Red Salamander	Rare		yes	yes
FROGS AND TOADS				
Eastern Cricket Frog	Extirpated		no	yes
Eastern American Toad	Rare		yes	yes
Fowler's Toad	Extirpated		no	yes
Cope's Gray Treefrog	Rare		yes	no
Green Treefrog	Unknown	most likely extirpated	no	yes
Northern Spring Peeper	Uncommon		yes	yes
Upland Chorus Frog	Extirpated		no	yes
American Bullfrog	Common		yes	yes
Northern Green Frog	Common		yes	yes
Pickerel Frog	Extirpated		released specimen	yes
Southern Leopard Frog	Extirpated		no	yes
Wood Frog	Rare		yes	yes
Eastern Spadefoot Toad	Not Present	extirpated or not in range	no	no

** non-native species ** non-native/naturalized species*

Appendix II – 2007 Odonate Survey Site Locations and Habitat Descriptions

Barcroft Park: A series of forested wetlands, including a magnolia bog, seepage swamp and woodland seeps; drainage swales, wet ditch, and Four Mile Run stream; historic floodplain with forest edge and early stage reforestation (meadow); picnic grounds and athletic fields

Benjamin Banneker Park: Upper reaches of Four Mile Run stream with remnant floodplain forest and seepage swamp; forest edge with athletic fields

Chain Bridge: Mouth of Pimmit Run stream at the Potomac River; floodplain forest and scoured river bank

Cherry Valley Park: floristically disturbed urban park adjacent to Rt. 66; sunny aspect with two small storm water management ponds; paved bike trail and managed turf

Ballston Beaver Pond: Highly vegetated storm water management facility between Rt. 66 and Fairfax Drive; access difficult without boat

Fort C. F. Smith Park and Historic Site: Two large managed meadows dominated by herbs and shrubs adjacent to wood edge and managed turf grass

Four Mile Run: Mouth of Four Mile Run from Eads Street to the Potomac River; stream and river edge

Gravelly Point: National Park Service parkland adjacent to Reagan National Airport (D.C.); Potomac River edge with sunny managed turf, trails and parking lot

Gulf Branch Nature Center: Forested stream edge adjacent to small spring-fed pond; woodland walking paths and parking lot

Long Branch Nature Center: Two small vegetated artificial ponds; perennial stream, forest edge, trails and small managed herbaceous meadow

Pimmit Run: Forested stream valley with perennial stream and woodland paths; wet meadow and road-edge

Potomac Overlook Regional Park: Forested perennial stream with woodland paths; grassy fields and small artificial pond

Roaches Run Waterfowl Sanctuary: Tidal water impoundment adjacent to Potomac River; tidal freshwater marsh, tidal swamp and pond edge; access limited without boat

Roosevelt Island: Potomac River edge; walking bridge, island pathways and parking lot on boundary between Arlington County and D.C.

Sparrow Pond: Small vegetated storm water management facility in Glencarlyn Park adjacent to Four Mile Run stream; stream-side bike paths with sunny edge, herbaceous meadow growth and playground with managed turf grass

Upton Hill Regional Park: Forested park with remnant seepage swamp and springs

Appendix III – Odonate Species Recorded in Fairfax County (Not Observed in Arlington County in 2007)

% column = estimated likelihood of species being observed in Arlington County in future surveys (1 = likely; 2 = possible, but unlikely residents or visitors; 3 = very unlikely)

Common Name	Scientific Name	Habitat Preference	%
Sparkling Jewelwing	*Calopteryx dimidiata*	streams, small rivers	3
Elegant Spreadwing	*Lestes inaequalis*	ponds	2
Slender Spreadwing	*Lestes rectangularis*	ponds	2
Eastern Red Damsel	*Amphiagrion saucium*	grassy seeps	3
Aurora Damsel	*Chromagrion conditum*	ponds, swamps, bogs	3
Blue-ringed Dancer	*Argia sedula*	rivers	1
Double-striped Bluet	*Enallagma basidens*	ponds, lakes	3
Turquoise Bluet	*Enallagma divagans*	streams	3
Skimming Bluet	*Enallagma geminatum*	ponds	1
Slender Bluet	*Enallagma traviatum*	ponds	2
Vesper Bluet	*Enallagma vesperum*	ponds	3
Furtive Forktail	*Ischnura prognata*	seepage swamps	3
Rambur's Forktail	*Ischnura ramburii*	still, brackish water	3
Sphagnum Sprite	*Nehalennia gracilis*	sphagnum bogs	3
Gray Petaltail	*Tachopteryx thoreyi*	forest seeps	2
Comet Darner	*Anax longipes*	shallow ponds	1
Occelated Darner	*Boyeria grafiana*	rivers, streams	3
Fawn Darner	*Boyeria vinosa*	rivers, streams	1
Springtime Darner	*Basiaeschna janata*	streams	1
Harlequin Darner	*Gomphaeschna furcillata*	swamps, bogs	3
Taper-tailed Darner	*Gomphaeschna antilope*	bogs	3
Ashy Clubtail	*Gomphus lividus*	rivers, streams	2
Sable Clubtail	*Gomphus rogersi*	streams	2

Common Name	Scientific Name	Habitat Preference	%
Skillet Clubtail	*Gomphus ventricosus*	rivers	3
Cobra Clubtail	*Gomphus vastus*	rivers	1
Midland Clubtail	*Gomphus fraternus*	rivers	2
Arrow Clubtail	*Stylurus spiniceps*	rivers	1
Laura's Clubtail	*Stylurus laurae*	rivers	3
Eastern Least Clubtail	*Stylogomphus albistylus*	streams, rivers	2
Common Sanddragon	*Progomphus obscurus*	rivers, streams	2
Eastern Ringtail	*Erpetogomphus designatus*	rivers	1
Tiger Spiketail	*Cordulegaster erronea*	small streams, seepages	2
Twin-spotted Spiketail	*Cordulegaster maculata*	small streams	3
Brown Spiketail	*Cordulegaster bilineata*	small streams, seepages	2
Arrowhead Spiketail	*Cordulegaster obliqua*	small streams, seepages	3
Stream Cruiser	*Didymops transversa*	streams, rivers	1
Royal River Cruiser	*Macromia taeniolata*	rivers, streams	1
Uhler's Sundragon	*Helocordulia uhleri*	streams	3
Slender Baskettail	*Tetragoneuria costalis*	ponds	2
Mocha Emerald	*Somatochlora linearis*	forested streams	1
Clamp-tipped Emerald	*Somatochlora tenebrosa*	streams	1
Umber Shadowdragon	*Neurocordulia obsoleta*	rivers	1
Stygian Shadowdragon	*Neurocordulia yamaskanensis*	rivers	2
Blue Corporal	*Ladona deplanata*	shallow ponds	2
Yellow-sided Skimmer	*Libellula flavida*	bogs, grassy seeps	3
Golden-winged Skimmer	*Libellula auripennis*	ponds	2
Bar-winged Skimmer	*Libellula axilena*	temporary pools, ponds	2
Little Blue Dragonlet	*Erythrodiplax miniscula*	ponds	2
Carolina Saddlebags	*Tramea carolina*	ponds	1
Striped Saddlebags	*Tramea calverti*	ponds	2

Common Name	Scientific Name	Habitat Preference	%
Banded Pennant	*Celithemis fasciata*	marshes, shallow ponds	2
Calico Pennant	*Celithemis elisa*	marshes, shallow ponds	2
Martha's Pennant	*Celithemis martha*	marshes	3
Four-spotted Pennant	*Brachymesia gravida*	brackish waters, ditches, ponds	2
Blue-faced Meadowhawk	*Sympetrum ambiguum*	temporary pools	3
Autumn Meadowhawk	*Sympetrum vicinum*	shallow ponds, marshes	1
Band-winged Meadowhawk	*Sympetrum semicinctum*	marshes	3
Ruby Meadowhawk	*Sympetrum rubicundulum*	small pools, ponds	2
Cherry-faced Meadowhawk	*Sympetrum internum*	small pools, ponds	3

*Chart excerpted from Munroe and Rabin. 2007 Survey of Dragonflies and Damselflies of Arlington County, Virginia

Appendix IV –Observations of Moth Species in Arlington, Virginia 2005-2010

For reference purposes, the following list of macro-moth species are listed in alphabetical order by family and species from Opler, et al. *Butterflies and Moths of North America*. Bozeman, MT: Big Sky Institute. 2010. Note – The placement of family groups within the Order Lepidoptera is under frequent revision.

Common Name	**Family / Species**	**Month of Observation/ Collection**
Family *Arctiidae*		
Banded Tiger Moth	*Apantesis vittata*	September 2007
Yellow-Collared Scape Moth	*Cissips fulvicollis*	October 2008
Virginia Ctenucha	*Ctenucha virginica*	September 2010
Delicate Cycnia Moth	*Cycnia tenera*	July 2008
Milkweed Tussock Moth	*Euchaeles egle*	July 2010
Great Leopard Moth	*Hypercompe scribonia*	September 2007
Fall Webworm	*Hyphantria cunea*	September 2010
Isabella Tiger Moth	*Pyrrharctia isabella*	September 2005
Virginia Tiger Moth	*Spilosoma virginica*	September 2005
Family *Crambidae*		
Grape Leaffolder Moth	*Desmia funeralis*	July 2008
Orange Mint Moth	*Pyrausta orphisalis*	July 2010
Dogbane Saucrobotys	*Saucrobotys futilalis*	September 2010
Family *Erebidae*		
Sweetheart Underwing	*Catocala amatrix*	September 2005
Family *Gelechiiae*		
Goldenrod Gall Moth	*Gnorimoschema gallaesolidaginia*	October 2005
Family *Geometridae*		
Maple Spanworm Moth	*Ennomos magnaria*	October 2006
Tulip-tree Beauty	*Epimecis hortaria*	September 2005
Lesser Grapevine Looper	*Eulithis diversilineata*	June 2007
Large Lace-border Moth	*Scopula limboundata*	June 2007
Family *Gracillariidae*		
Digitate Locust Miner	*Parectopa robiniella*	No Date
Family *Lasiocampidae*		
Eastern Tent Caterpillar Moth	*Malacosma americanum*	April 2006

Common Name	Family / Species	Month of Observation/ Collection
Forest Tent Caterpillar Moth	*Malacosma disstria*	May 2006
Family *Limacodidae*		
Saddleback Caterpillar	*Acharia stimulea*	Summer 2005
Family *Lymantriidae*		
Gypsy Moth	*Lymantria dispar*	June 2008
Definite Tussock Moth	*Orgyia definite*	July 2008
White-marked Tussock Moth	*Orgyia leucostigma*	No Date
Family *Noctudidea*		
American Dagger Moth	*Acronicta americana*	No Date
Funerary Dagger Moth	*Acronicta funeralis*	July 2006
Smeared Dagger Moth	*Aronicta oblinita*	September 2009
Iris Borer Moth	*Macronoctua onusta*	August 2005
Yellow-striped Armyworm	*Spodoptera ornithogalli*	August 2005
Family *Notodontidae*		
Black-spotted Prominent	*Dasylophia anguina*	July 2008
Family *Pterophoridae*		
Morning-glory Plume Moth	*Emmelina monodactyla*	August 2005
Family *Pyralidae*		
Clover Hayworm	*Hypsopygia costalis*	August 2005
Indian Meal Moth	*Plodia interpunctella*	No Date
Meal Moth	*Pyralis farinalis*	July 2005
Family *Saturniidae*		
Luna Moth	*Actias luna*	No Date
Orange-tipped Oakworm	*Anisota senatoria*	September 2009
Tulip Tree Silkmoth	*Callosamia angulifera*	June 2006
Promethea Silk Moth	*Callosamia promethean*	September 2007
Regal Moth	*Citheronia regalis*	August 2005
Cecropia Silkmoth	*Hyalophora cecropia*	No Date
Family *Sesiidae*		
Eupatorium Borer Moth	*Carmenta bassiformis*	July 2010
Maple Callus Borer Moth	*Synanthedon acerni*	July 2007
Family *Sphingidae*		
Nessus Sphinx Moth	*Amphion floridensis*	June 2006

Common Name	Family / Species	Month of Observation/ Collection
Catalpa Sphinx Moth	*Ceratomia catalpae*	Summer 2005
Snowberry Clearwing	*Hemaris diffinis*	August 2010
White-lined Sphinx	*Hyles lineate*	September 2010
Family *Yponomeutidae*		
Ailanthus Webworm	*Atteve punctella*	September 2005
American Ermine Moth	*Yponometa multipunctella*	May 2006
Family *Zygaenidae*		
Grapeleaf Skeletonizer	*Harrisiia americana*	September 2007

Note: Chart adapted from data contained in *Survey of Butterflies of Arlington County, Virginia* (Abugattas 2008).

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Appendix VI – Acknowledgments

The following individuals, groups and organizations have provided assistance in the preparation of this report and are recognized for their contributions:

Alan Schreck – wildlife photos.

Alonso Abugattas, Naturalist, Long Branch Nature Center, Department of Parks, Recreation and Cultural Resources, Arlington County, Virginia – Lepidoptera research and report.

Andy Rabin, Odonata specialist – odonate research and report.

Ann Beam, Animal Welfare League of Arlington – wildlife data records.

Anthony Bulmer – small mammal survey.

Brent Steury, Natural Resources Program Manager, G. W. Memorial Parkway (NPS) – roadkill data and manuscript review (Part II).

Charles Smith, Senior Natural Resource Specialist, Fairfax County Park Authority – wildlife data and manuscript review (Part II).

Citizen Sentinel Volunteers

David Farner – Park Manager, Fort C. F. Smith Park, Department of Parks, Recreation and Cultural Resources, Arlington County, Virginia – avifauna research and report.

John White – wildlife photos, herp identification and manuscript review (Part II).

Leslie Sturges, President of Bat World NOVA – wildlife records and manuscript review (bats).

Kevin Munroe, Odonata specialist – odonate research and report.

Project Wildlife Watch Volunteers

Salamander Search Team Volunteers

Smithsonian Institution, Museum of Natural History
Department of Mammals – historical collections data.
Department of Herpetology – historical collections data.

Staff of Long Branch, Gulf Branch and Potomac Overlook Nature Centers – inventory assistance, wildlife data and reports.

Virginia Department of Game and Inland Fisheries – historical collection data.

Walter Bulmer (Ret.) – Professor of Biology, Northern Virginia Community College – project advice.