CHAPTER 3

WATERSHED SUMMARIES

The 30 watersheds in the County have been subdivided into 14 groups for reporting purposes. This was done based on characteristics of area, geography and, in most cases, physiographic province and proximity of watersheds to each other.

CHAPTER 3

Summaries for each watershed include a map of land cover and a brief description of generalized patterns in development. Also included are graphical depictions of primary land uses based upon 30 square-meter Landsat thematic mapper data collected in 1992. The National Land Cover Data Key (NLCD) was the basis for classifying the various land use categories (see Vogelmann et al., 1988). It should be noted that the two classes of residential development specified in the graphic, "High Intensity" versus "Low Intensity," are largely measures of communities with multi- versus single-family dwellings, respectively. These should not be confused with references in the text to low-, moderate-, and high-*density* development, terms frequently used to highlight current levels of imperviousness within subwatersheds. Definitions of land use categories are as follows:

Open Water – All areas of open water; typically 25 percent or greater cover of water (per $30m^2$ pixel).

Low Intensity Residential – Includes areas with a mixture of constructed materials and vegetation. Constructed materials account for 30 to 80 percent of the cover. Vegetation may account for 20 to 70 percent of the cover. These areas most commonly include single-family housing units. Population densities will be lower than in high intensity residential areas.

High Intensity Residential – Includes highly developed areas where people reside in large numbers. Examples include apartment complexes and row houses. Vegetation accounts for less than 20 percent of the cover. Constructed materials account for 80 to 100 percent of the cover.

Commercial/Industrial/Transportation – Includes infrastructure (e.g.) roads, railroads, ect.) and all highly developed areas not classified as High Intensity Residential.

Barren (exposed) – Areas characterized by bare rock, gravel, sand, silt, clay, or other earthen material, with little or no "green" vegetation present regardless of its inherent ability to support life. Vegetation, if present, is more widely spaced and scrubby than that in the "green" vegetated categories; lichen cover may be extensive.

Forested Upland – Areas characterized by tree cover (natural or semi-natural woody vegetation, generally greater than 6 meters tall); tree canopy accounts for 25 to 100 percent of the cover.

Pasture/Hay – Areas of grasses, legumes or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops.

Wetlands – Areas where the soil or substrate is periodically saturated with or covered with water as defined by Cowardin et al.

CHAPTER 3

The data tables for each watershed include rankings for the four major components of the overall composite site condition rating (IBI, Habitat Score, Fish Taxa Richness and Current % Impervious Surfaces) as well as Projected % Impervious Surfaces. Both Fish Taxa Richness rankings (High, Moderate, Low and Very Low) and Current % Impervious Surfaces were classified on a 5-category scale (Very Poor, Poor, Fair, Good and Excellent). A taxa table including all fish species found in the watershed groups and the number of sites where they were found is also included.

Where appropriate, a map of volunteer monitoring sites and data description has been included.

A map of the management category designations is included in each watershed group summary. The management groups are drawn from the individual composite ratings in the Data Summary Table and other factors discussed in the Management Categories of the Methods chapter.

Included in some Watershed Group Summaries are descriptions of other programs or initiatives that are currently going on in those watersheds.

The fish depicted throughout the chapter represent species found within Fairfax County. The color plates are courtesy of the New York State Department of Environmental Conservation. Biological profiles were compiled from Jenkins and Burkhead (1994). Insect color plates are courtesy of Dr. Reese Voshell.

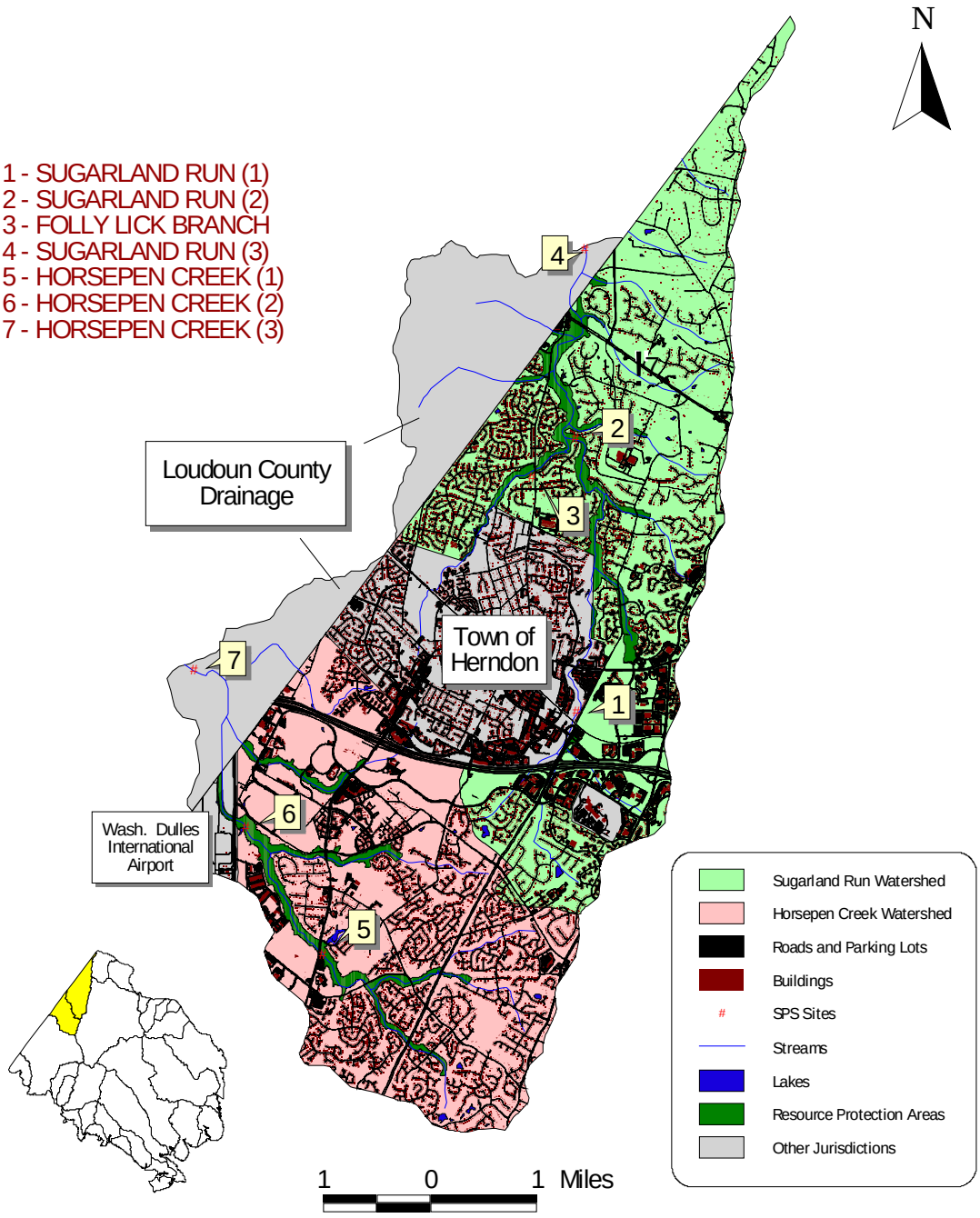
As described in Chapter 2, estimates of future imperviousness for the individual watersheds were developed using County zoning information. It is important to note that these values reflect future development *potential*, and are used here only as a general, conservative framework for guiding the prioritization of County watersheds. There are several factors that may contribute to over and under estimations of future imperviousness based on zoning information including:

- Site conditions (e.g. soils and slopes) which prevent a parcel from being fully developed.
- Protected resources such as parks, Resource Protection Areas, wetlands and floodplains that also reduce the developable area.
- Differences between zoning and the County's Comprehensive Plan.

CHAPTER 3

SUGARLAND RUN AND HORSEPEN CREEK WATERSHED SUMMARY

Land Cover

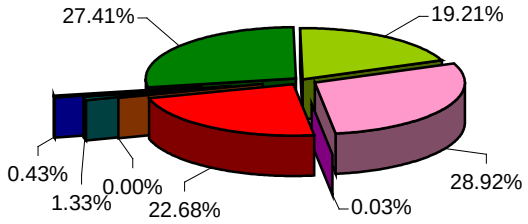

N
1 - SUGARLAND RUN (1)
2 - SUGARLAND RUN (2)
3 - FOLLY LICK BRANCH
4 - SUGARLAND RUN (3)
5 - HORSEPEN CREEK (1)
6 - HORSEPEN CREEK (2)
7 - HORSEPEN CREEK (3)
Loudoun County Drainage
Town of Herndon
Wash. Dulles International Airport
1
2
3
4
5
6
7
Sugarland Run Watershed
Horsepen Creek Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

CHAPTER 3

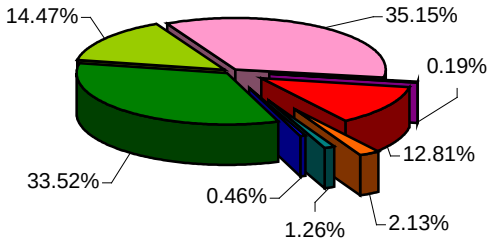
Watershed Description

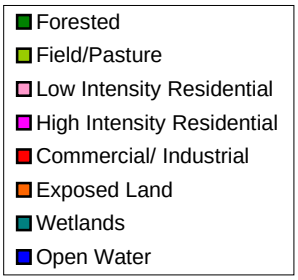
The Horsepen Creek and Sugarland Run watersheds are located in the northwestern portion of Fairfax County. Horsepen Creek, with an area of 9.6 square miles within Fairfax County, is part of the larger Goose Creek Watershed, which has an area of approximately 85.9 square miles. The majority lies within the jurisdiction of either Loudoun County or Washington Dulles International Airport. Sugarland Run is a smaller watershed, with an area of 22.9 square miles, roughly one-third of which lies outside the County's borders. Both drainages fall within the Triassic Basin physiographic province. No major impoundments occur in the Fairfax portions of the watersheds, and only two small regional ponds are contained within the combined area.

Land Uses in the Fairfax County Horsepen Creek Watershed



Land Uses in the Fairfax County Sugarland Run Watershed





Although the Goose Creek watershed is dominated by forests, pastures and fields, the Fairfax County portion of the basin is heavily developed, with levels of imperviousness ranging between 20-25%. Horsepen Creek begins in Chantilly, crosses under Sully Road (Rte 28), and flows onto Dulles Airport property. From there it enters Loudoun County.

Eroded stream bank and undercut tree root systems are common along the Sugarland Run mainstem.

The Sugarland Run watershed shows a similar land use distribution on both sides of the Fairfax/Loudoun border, with almost 50% of the watershed consisting of low-density residential or commercial areas. The Sugarland Run mainstem begins in the heavily developed area of Reston, flows north under the Washington-Dulles Access and Toll Road (Rte 267), and continues on through the Town of Herndon. It then meets with Follylick Branch, a smaller system that also drains part of Herndon, and then leaves the County on its way to the Potomac River.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Sugarland Run 1 (SUSU01)	Poor	Fair	Fair	Low	33.5	52
2 Sugarland Run 2 (SUSU02)	Fair	Fair	Good	Moderate	29.8	48
3 Folly Lick Branch (SUFL01)	Fair	Fair	Fair	Low	26.1	42
4 Sugarland Run 3 (SUSU03)	Poor	Fair	Very Poor	Low	23.6	40
5 Horsepen Creek 1 (HCHC01)	Poor	Fair	Poor	Very Low	22.4	35
6 Horsepen Creek 2 (HCHC02)	Very Poor	Poor	Very Poor	Very Low	21.1	37
7 Horsepen Creek 3 (HCHC03)	Fair	Fair	Fair	Low	21.5	42

Sugarland Run and Horsepen Creek Fish Species List

Common Name	Number of Sites Where Species Occurred (7 Total Sites)
White Sucker	7
Green Sunfish	7
Bluntnose Minnow	7
Creek Chub	7
Blacknose Dace	6
Yellow Bullhead	6
Fantail Darter	5
Bluegill	5
Redbreast Sunfish	4
Pumpkinseed	4
Longnose Dace	4
Central Stoneroller	4
Rosyside Dace	3
Largemouth Bass	3
Greenside Darter	2
Tessellated Darter	2
Banded Killifish	2
Spottail Shiner	2
Satinfin Shiner	1
Creek Chubsucker	1
Eastern Silvery Minnow	1
Golden Shiner	1

Central Stoneroller

Campostoma anomalum

Size: to 7 inches
Habitat: riffles and runs in clear, moderate- to high-gradient streams
Feeding Group: herbivore
Tolerance: moderate
Known also as a "creek cow," the stoneroller is well suited to grazing. Its lower jaw has a hard ridge, which it uses to scrape algae from rocks. It also has the longest intestine of any American minnow, which allows better digestion of plant material. During the spring breeding season, males become covered in hard tubercles, which are used in courtship battles.

CHAPTER 3

Watershed Condition Summary

Measures of biological and habitat integrity throughout the Fairfax County portions of these two watersheds show each to be substantially degraded. This situation corresponds to the high levels of development seen in both areas.

Fish taxa richness was generally Fair and Poor for the Sugarland and Horsepen watersheds, respectively. The number of distinct species identified was relatively low throughout both drainages, and many of the species collected were classified as generalists and tolerant of degraded stream conditions.

A similar pattern is evident in measures of benthic macroinvertebrate community health. Aquatic worms and midges dominated samples throughout both drainages. Both groups are generally classified as being more tolerant of degraded stream conditions such as excessive sediment deposition, unstable habitat, and pollution. None of the samples collected in either drainage contained more than a few intolerant or "sensitive" organisms.

The overall instream habitat quality of these two watersheds is generally poor, and like the habitat scores countywide, sediment deposition and the related measure of embeddedness were consistently the lowest scoring components of the ranking. Active channel widening or downcutting, moderate to severe erosion, and unstable banks characterized most stream reaches throughout both regions. The one high habitat ranking seen along the Sugarland Run mainstem was likely a local occurrence and as such, was not representative of overall conditions. The rating in the Good category in this location was largely a function of the underlying substrate—bedrock and large boulders not found in other locations—that helped reduce the amount of channel erosion during the high discharge events that the entire area regularly experiences.

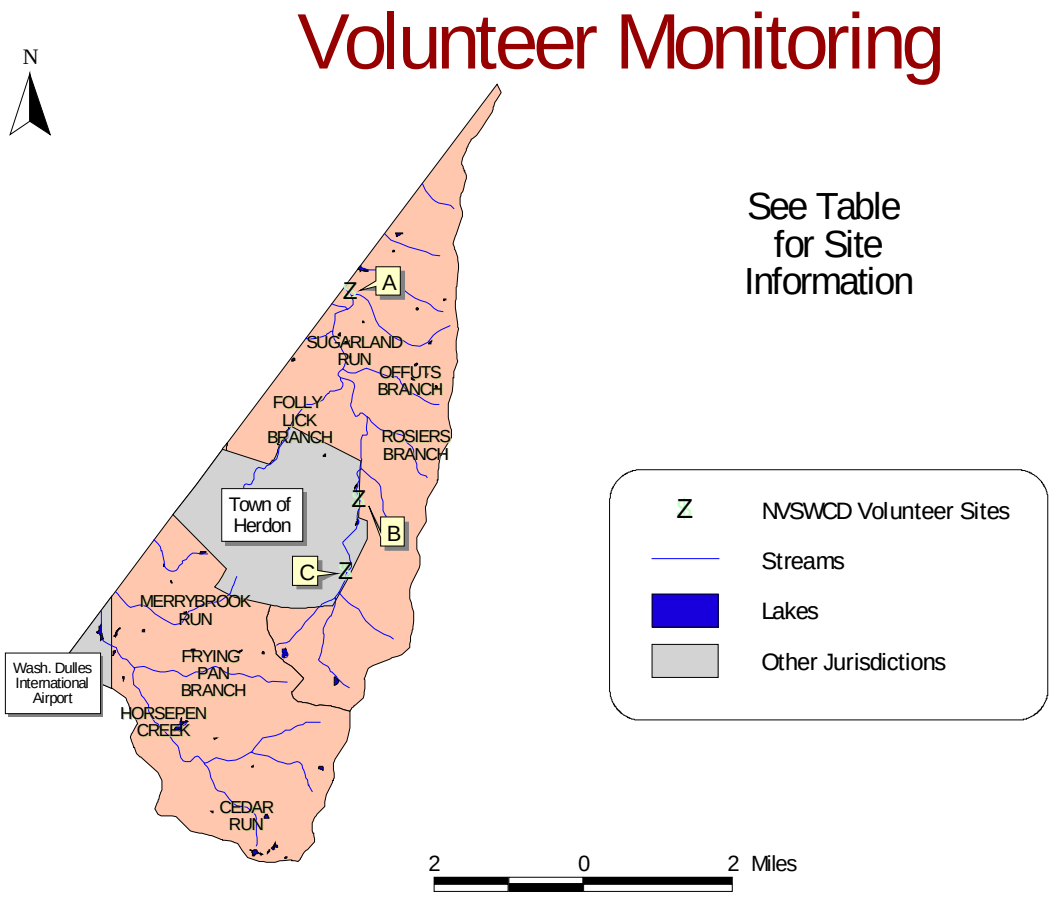
The portions of the Horsepen Creek and Sugarland Run watersheds that lie within Fairfax County are both intensely developed, and all systems in both basins drain areas with high levels (>20%) of impervious cover. This trend is seen almost uniformly in the assessments of biological and habitat integrity throughout the respective stream systems, and the ultimate composite rankings in both are correspondingly low.

As is the case in other watersheds, the highly degraded condition of the Horsepen Creek and Sugarland Run systems can be seen as a function of land use. While evidence from this and other assessments suggest that higher quality conditions may exist locally in relatively isolated stream reaches, the general pattern places both of the drainages among the most impacted in the County.

CHAPTER 3

Volunteer Data Summary

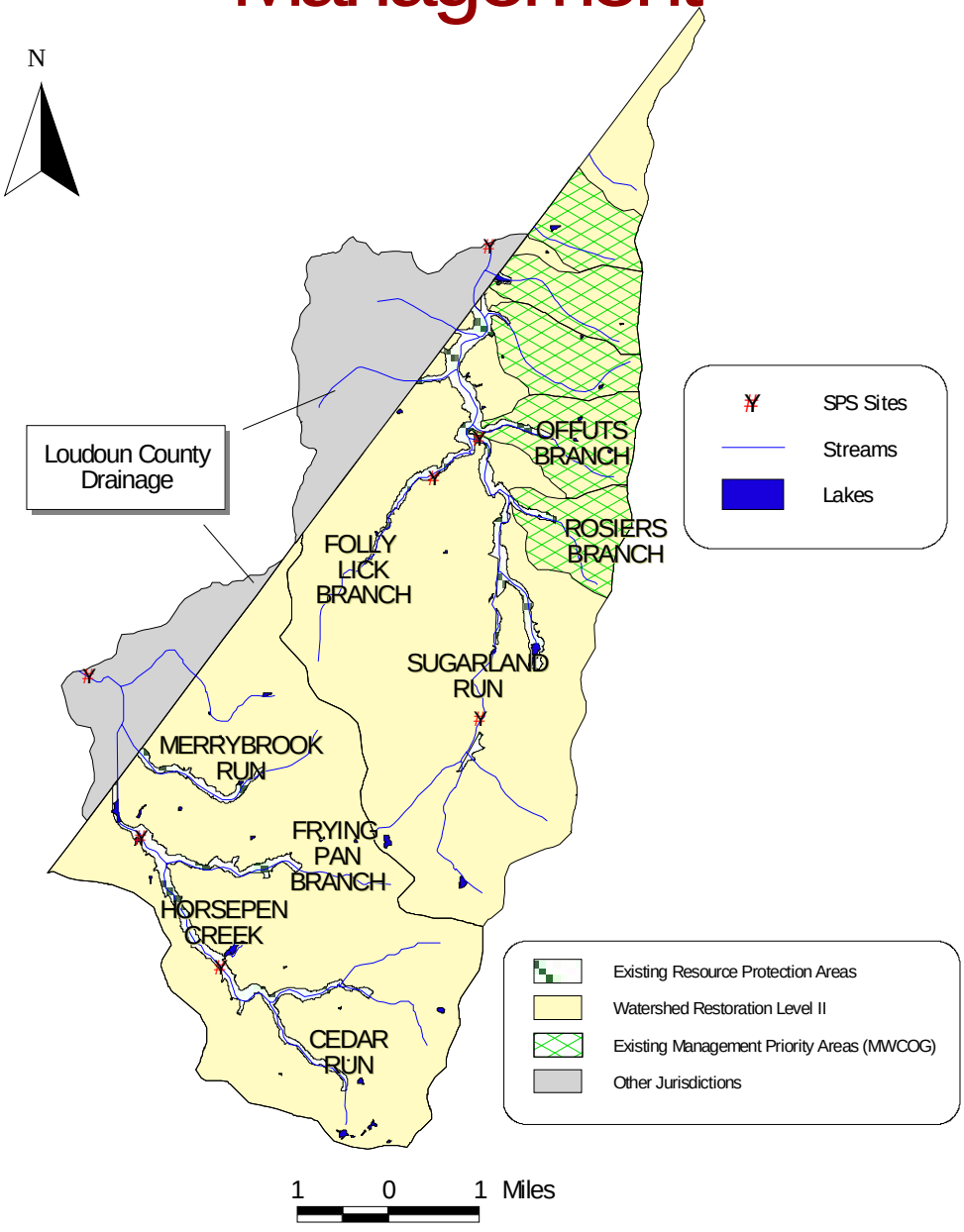
There are currently three active volunteer monitoring sites in the Sugarland Run watershed, each of which is coordinated by the Northern Virginia Soil and Water Conservation District (NVSWCD). They are all located on the mainstem, one immediately downstream of Leesburg Pike (Rte 7) and the others just east of the Herndon Parkway.



Data from these sites correspond well with the findings of the SPS study. Although past monitoring has found unexpectedly good biological integrity in some localities, rankings of recent samples have generally ranged in the lower categories. The SPS study highlighted significant degradation in many of these areas.

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	SLR3	9	####	Fair	Had Excellent ratings in '97, now varies from Poor - Good
B	SLR1	5	####	Fair	Varies from Poor - Fair
C	SLR2	2	####	Poor	Too few samples, but both were Poor

Management



Management Category Description

Sugarland and Horsepen watersheds are highly impacted systems in terms of both biological and habitat quality. Intense development is ongoing in both areas, and there

remains a great deal of potential for further degradation of stream quality. This entire area is classified as a Watershed Restoration Level II Area.

OTHER INITIATIVES

Metropolitan Washington Council of Governments Study

The study by the Metropolitan Washington Council of Governments (COG) used Rapid Stream Assessment Technique to evaluate physical, chemical and biological stream quality throughout the Sugarland Run watershed. The recommendations are as follows:

- Perform a comprehensive watershed-wide retrofit/stream restoration inventory. This work, together with results from both the two RSAT studies and Fairfax County's new biological monitoring program, would serve as the basis for a comprehensive Sugarland Run watershed restoration/protection plan. The plan should have a focus on identifying tributary areas that warrant maximum protection as well as reducing stormwater runoff impacts from existing uncontrolled developed areas.
- Perform annual water chemistry, macroinvertebrate, fisheries, physical habitat and channel morphology monitoring of Sugarland Run and its tributaries. Areas that should be given high priority include Rosiers Branch, Offuts Branch, Herndon Junction Branch, Seneca Road Tributary and Parrish Farm Tributary.
- Perform further analysis of fish barriers on Sugarland mainstem portions of the major tributaries. It is also recommended that one-pass electrofishing surveys of these streams be performed to assess existing fish communities.
- Perform riparian restoration of open canopied sections of the following streams: Stuart Road Tributary mainstem – below the Cameron stormwater management pond and Caris Glenne Drive Tributary (Offuts Branch) – upper and middle sections.
- Officially name all stream tributaries to promote citizen awareness.
- Consider incorporating vegetated riparian buffer strips specifically designed to help reduce nutrient and thermal loadings at both the Herndon Centennial and Algonkian Park Golf Course sites.
- Employ extraordinary erosion and sediment stormwater management controls for the construction of Wiehle Ave extended, especially thermally sensitive techniques.
- Implement further stormwater retrofit and/or stream bank stabilization analysis at Lowes Island Tributary, Rosiers Branch, Old Holly Drive Tributary, Offuts Branch and Muddy Branch.
- Removal of two large logjams in Folly Lick Branch is recommended.
- Further analyze a headcutting problem in the Seneca Road Tributary.
- Consider implementing environmental education/outreach programs in Fairfax and Loudoun counties.
- Utilize local volunteer and environmental groups in Fairfax and Loudoun Counties, such as Friends of Sugarland Run, Izaak Walton League, Save Our Streams and Fairfax County Park Authority's "Stream Valley Stewards – A Watershed Initiative" program in monitoring stream quality conditions.

CHAPTER 3

Friends of Sugarland Run

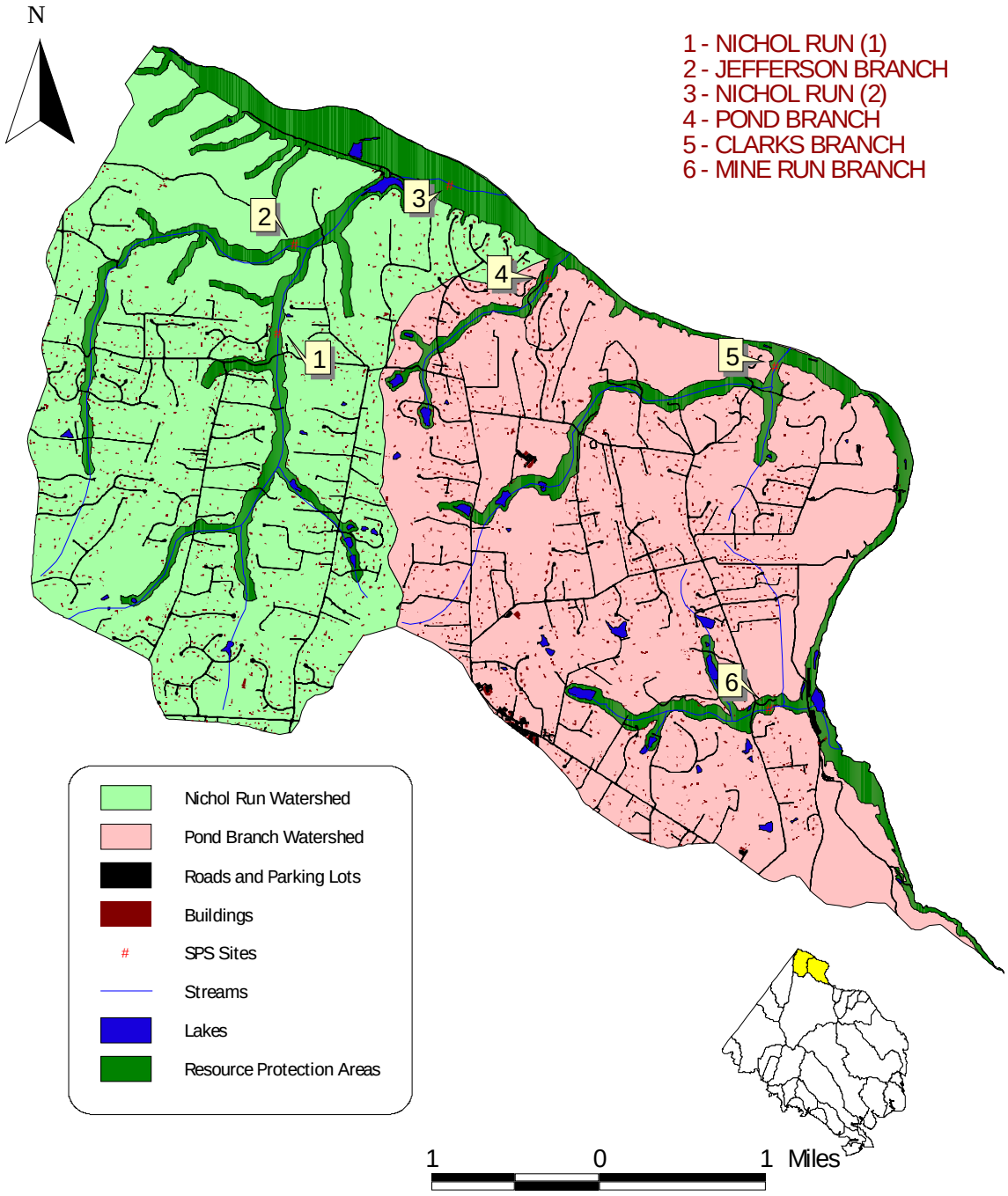
The Friends of Sugarland Run (FOSR) is a nonprofit citizens group that works on behalf of, and with the help of, the local community to protect, restore and enhance the natural, historical, educational, economic and recreational resource value of the entire Sugarland Run stream valley in Fairfax and Loudoun Counties. FOSR is working to make the Sugarland Run watershed a place where a diversity of animals and plants can thrive, a place for the community to enjoy as a piece of natural heritage of Northern Virginia for current and future generations. Some of the volunteer projects sponsored by the FOSR include stream clean-ups, water quality monitoring, construction site monitoring, tree planting, trail system planning and educational workshops. FOSR members attended public meetings and commented on development projects, road projects and the proposed mitigation projects as a result of an oil spill in 1993. FOSR hosted Project Clearwater to educate citizens about recognizing and reporting sediment problems to help construction site inspectors improve runoff controls. FOSR worked with local and state agencies to implement some of the recommendations from the COG study.

Greenside Darter
Etheostoma blenniodes
Size: to 4 inches
Habitat: rocky substrates in clear, fast-flowing streams of moderate gradient
Feeding Group: insectivore
Tolerance: moderate – intolerant
This small species feeds on insect larvae. It has a unique upper jaw that is believed to enable it to suck snails out of their shells. It cannot tolerate heavy erosion and sedimentation.

CHAPTER 3

POND BRANCH AND NICHOL RUN WATERSHED SUMMARY

Land Cover

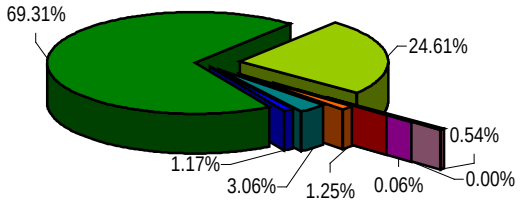

N
1 - NICHOL RUN (1)
2 - JEFFERSON BRANCH
3 - NICHOL RUN (2)
4 - POND BRANCH
5 - CLARKS BRANCH
6 - MINE RUN BRANCH
1
2
3
4
5
6
Nichol Run Watershed
Pond Branch Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
1 0 1 Miles

CHAPTER 3

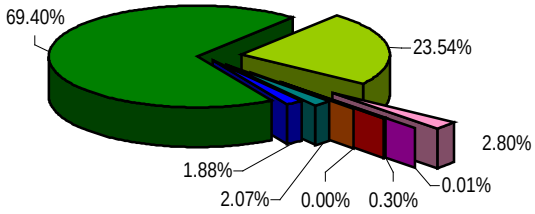
Watershed Description

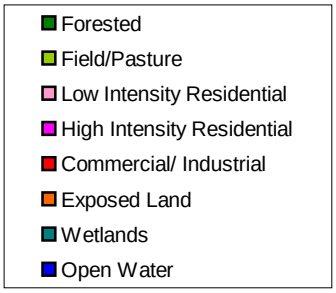
Nichol Run and Pond Branch watersheds are lightly developed areas at the northern extent of Fairfax County. Since the area is primarily forest and comprised of private residences on lots of two or more acres, these watersheds have impervious levels near 5%. There are no major lakes or impoundments in these watersheds, but numerous smaller, privately owned ponds occur.

Land Uses in the Nichol Run Watershed



Land Uses in the Pond Branch Watershed





The Nichol Run watershed consists of two main systems, Nichol's Run and Jefferson Branch, both of which flow through low-density residential areas. Jefferson Branch drains from the western portion of the watershed and travels through a protected area controlled by The Potomac River Nature Conservancy. Jefferson Branch empties into the Nichols Run mainstem, the combined flow hitting the Potomac River a mile farther downstream.

The Pond Branch watershed is actually a collection of several small independent tributaries that feed into the Potomac River. Pond Branch, Clark's Branch, and Mine Run all meander through low-density residential areas before meeting the Potomac. The lower reaches of Mine Run are contained within Great Falls National Park.

A section of Clarks Branch in the Pond Branch watershed showing signs of stream bank undercutting.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
Nichol Run 1 (NINI01)	Good	Excellent	Fair	Low	4.9	10
Jefferson Branch (NIJB01)	Good	Fair	Excellent	Low	3.8	10
Nichol Run 2 (NINI02)	Good	Poor	Fair	High	4.1	10
Pond Branch (PNPN01)	Good	Good	Poor	Moderate	5.2	9
Clarks Branch (PNCL01)	Good	Good	Fair	High	4.4	10
Mine Run Branch (PNMR01)	Excellent	Good	Good	Low	5.2	10

Pond Branch and Nichol Run Fish Species List

Common Name	Number of Sites Where Species Occurred (6 Total Sites)	Common Name	Number of Sites Where Species Occurred (6 Total Sites)
White Sucker	6	Bluegill	2
Longnose Dace	6	Longear Sunfish	2
Creek Chub	6	Common Shiner	2
Blacknose Dace	5	Smallmouth Bass	2
Rosyside Dace	4	Largemouth Bass	2
Central Stoneroller	4	Golden Shiner	2
Fantail Darter	4	Silverjaw Minnow	2
Yellow Bullhead	3	Margined Madtom	2
Greenside Darter	3	Bluntnose Minnow	2
Spotfin Shiner	2	Potomac Sculpin	1
Creek Chubsucker	2	Redear Sunfish	1
Tessellated Darter	2	Golden Redhorse	1
Eastern Mosquitofish	2	Spottail Shiner	1
Redbreast Sunfish	2	Black Crappie	1
Green Sunfish	2	Fallfish	1
Pumpkinseed	2	American Eel	1

CHAPTER 3

Watershed Condition Summary

Although exhibiting signs of impact locally, the subwatersheds within Pond Branch and Nichol Run represent some of the least degraded systems in Fairfax County.

Although this region as a whole maintained relatively rich fish communities (a total of 32 fish taxa were identified), scores for sites in individual subwatersheds varied widely. Values for sites on both Nichol's Run and Clark's Branch were exceptionally high, with taxa counts of 22 and 24, respectively. It should be noted, however, that both of these sites were placed near the mouth of each stream at the Potomac River, and proximity to this major system may have artificially inflated the richness measures. It is uncertain at this point whether or not these ratings are an accurate reflection of upstream conditions.

Measures of benthic macroinvertebrate community integrity generally contrasted with the fish rankings. With the exception of one site (NINI02), all of the subwatersheds were classified as Fair or better. Of special note are the results from the two sites in the Nichol Run drainage, which differed dramatically from one another and highlight the potential influence of some unknown stressor along the stream's length.

Although some areas received low scores for sediment deposition, embeddedness and bank stability, overall habitat quality at sites throughout the two drainages generally ranked in the highest categories. While active channel widening is taking place in many streams, there are also isolated areas that are beginning to develop a new equilibrium with their altered flow regimes.

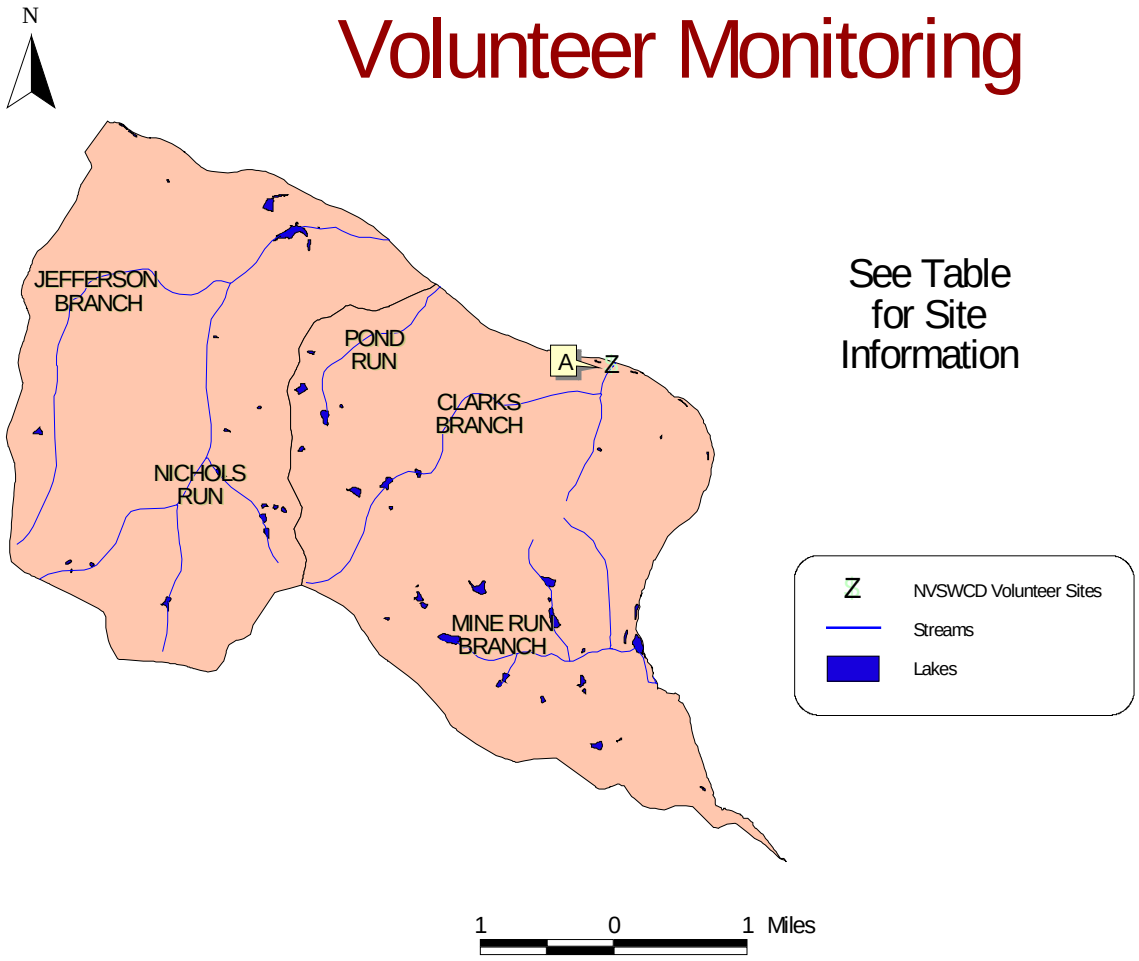
Nichol Run and Pond Branch exhibit some of the lowest levels of imperviousness of all the County's watersheds. The land within the Nichol Run basin is approximately 3.6% impervious, and the maximum level for any area within Pond Branch is 4.3%. Following this trend, the composite scores for all sites fell within the Good or Excellent categories.

Despite signs of significant degradation locally, both drainages contain relatively intact aquatic systems and, as such, represent some of the more valuable resources in the County. However, uncertainty still exists regarding conflicting measures of biological integrity at some sites, in particular those along the Nichol's Run mainstem. Also, the assessments made to date highlight the need to account for potential compounding factors influencing fish communities.

CHAPTER 3

Volunteer Data Summary

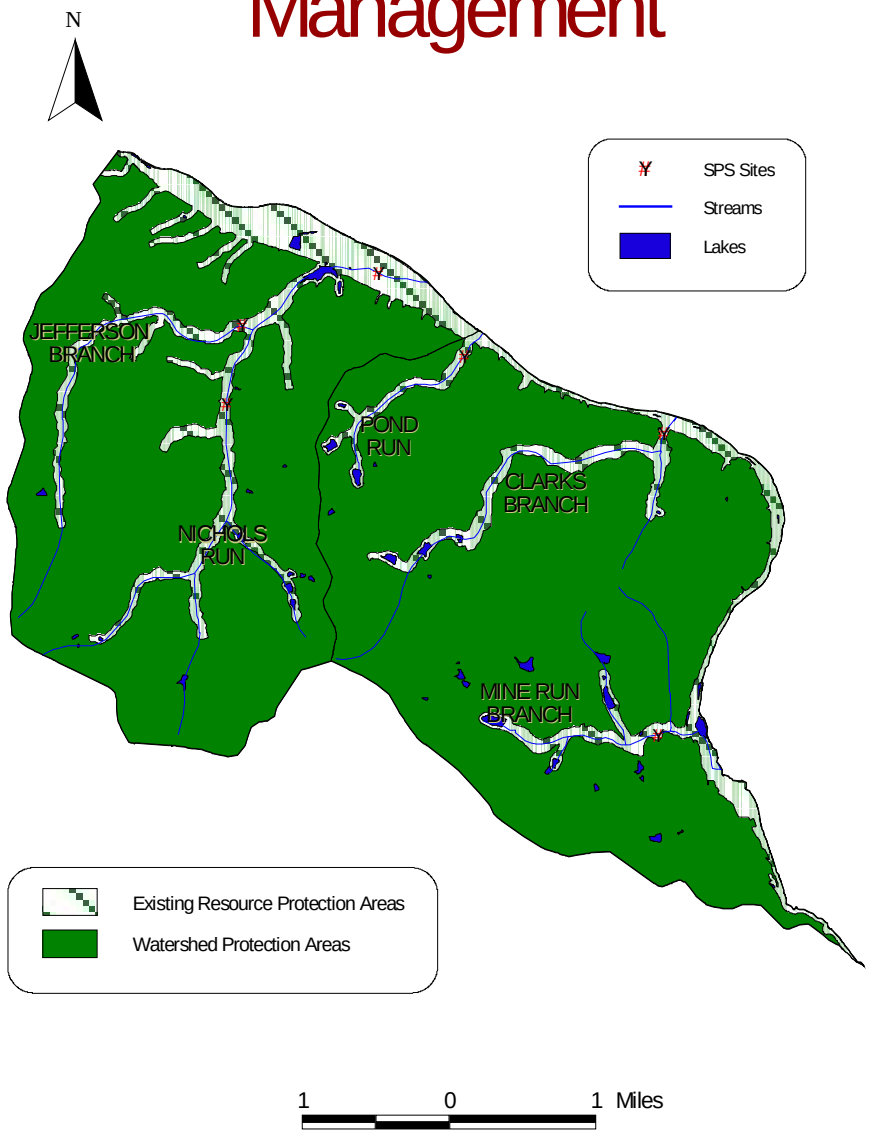
There is only one volunteer monitoring site in this region. Located on Clarks Branch in the Pond Run watershed, the station is sampled by the staff from the Riverbend Park County Park under the coordination of the Northern Virginia Soil and Water Conservation District (NVSWCD). Although the site is a relatively recent addition to the program, the data collected to date correlate well with the findings of the SPS study. Sensitive taxa, indicative of higher quality conditions, were found on several occasions.



Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	PB1	3	####	Good	Generally Good - Excellent

CHAPTER 3

Management



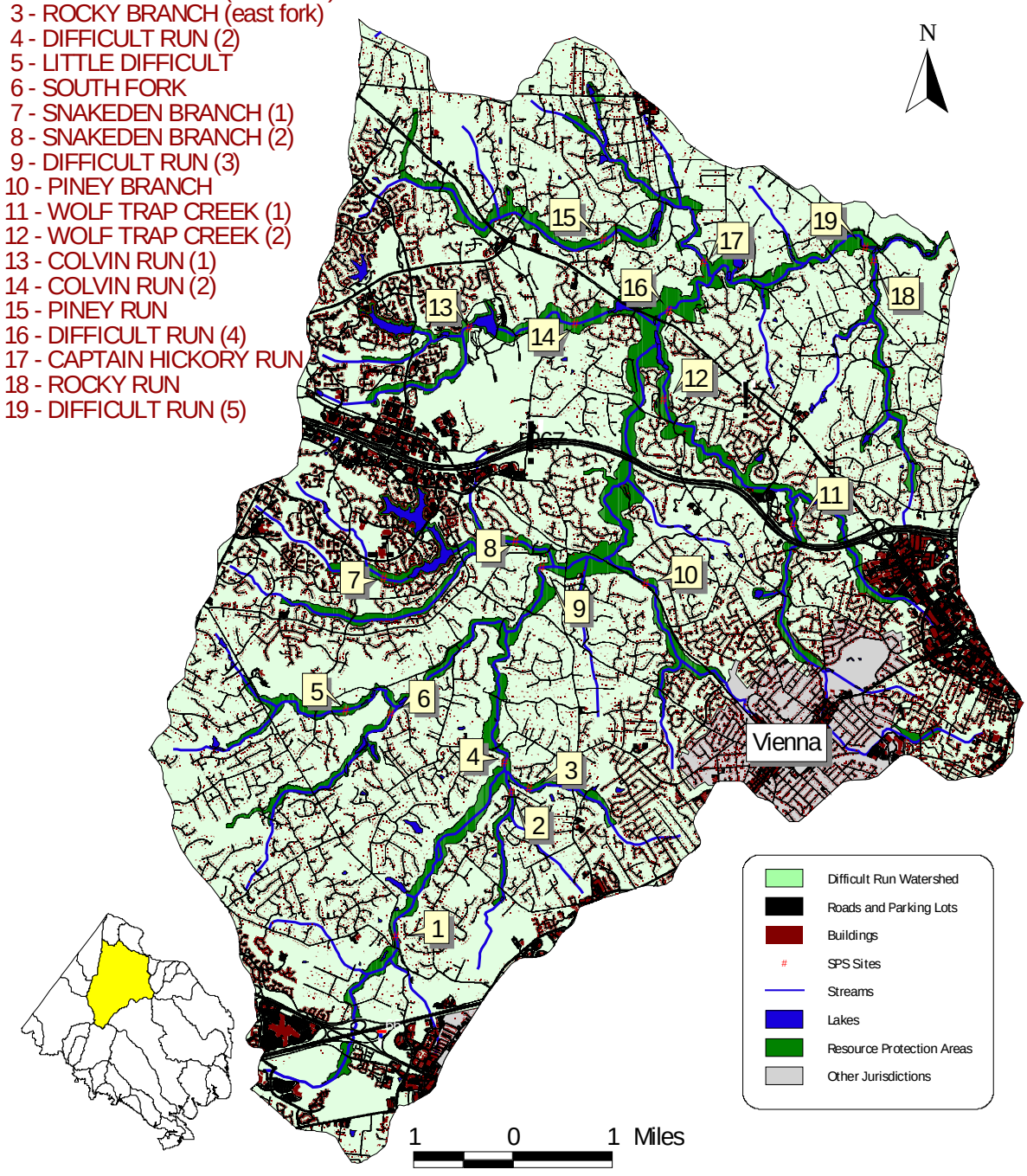
Management Category Description

The Nichol Run and Pond Branch watersheds are valuable resources in Fairfax County due to their high biological integrity and habitat quality. As such, both watersheds are classified as Watershed Protection Areas. Each should be monitored to ensure continuing high quality conditions and to look for specific factors causing lower scores in some categories. Specific assessments should focus on instream habitat degradation in both watersheds. The influence of the Potomac River on variations in fish communities throughout both drainages should also be examined. These watersheds might be good candidates to consider using innovative approaches to limit imperviousness or impacts of development.

CHAPTER 3

DIFFICULT RUN WATERSHED SUMMARY

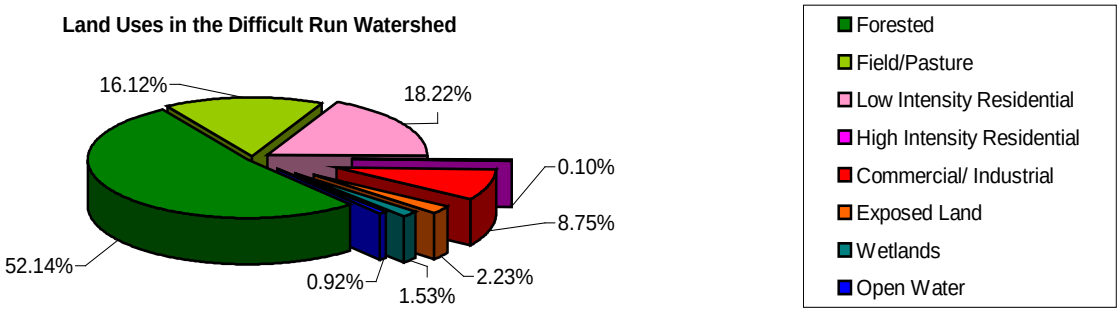
Land Cover


1 - DIFFICULT RUN (1)
2 - ROCKY BRANCH (south fork)
3 - ROCKY BRANCH (east fork)
4 - DIFFICULT RUN (2)
5 - LITTLE DIFFICULT
6 - SOUTH FORK
7 - SNAKEDEN BRANCH (1)
8 - SNAKEDEN BRANCH (2)
9 - DIFFICULT RUN (3)
10 - PINEY BRANCH
11 - WOLF TRAP CREEK (1)
12 - WOLF TRAP CREEK (2)
13 - COLVIN RUN (1)
14 - COLVIN RUN (2)
15 - PINEY RUN
16 - DIFFICULT RUN (4)
17 - CAPTAIN HICKORY RUN
18 - ROCKY RUN
19 - DIFFICULT RUN (5)
N
Vienna
Difficult Run Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

CHAPTER 3

Watershed Description

Difficult Run is the largest watershed contained within the County, with an area of just over 58 square miles. The watershed lies entirely within the Piedmont physiographic province and is characterized by rolling hills and rough terrain, commonly with slopes of 10% or more. Slightly over 5% of the watershed area is not under County jurisdiction including the City of Fairfax, the Town of Vienna, and the U.S. Government lands within Great Falls Park and the Wolf Trap Farm Park for the Performing Arts. The watershed also contains several large impoundments including Lakes Audubon (33 acres), Thoreau (42 acres), Anne (28 acres) and Fairfax (21 acres). Other impoundments include Fox, Timber, Spring, Woodside and Newport lakes, and a variety of small regional ponds.



Development levels vary widely throughout the watershed. With the gathering of small headwater systems near the Fairfax County Government Center, the City of Fairfax, and the major interchange of Routes 50 and 66, Difficult Run begins its journey to the Potomac River. Over the next 17 miles of its length, the system is influenced by a diverse group of tributary systems that reflect a wide array of subwatershed conditions, ranging from forested basins to highly developed urban environments.


Streambank erosion was common at many locations in the Difficult Run watershed.

The system's first two major tributaries flow from areas where the intensity of development is moderate to low. The first of these, Rocky Branch, flows from the east and drains a region that includes Oakton, an area with levels of imperviousness ranging from 15 to 20%. In contrast, the Little Difficult Run drainage to the west includes many multi-acre residential lots spread throughout a subwatershed that, on the whole, has imperviousness levels that are still under 10%.

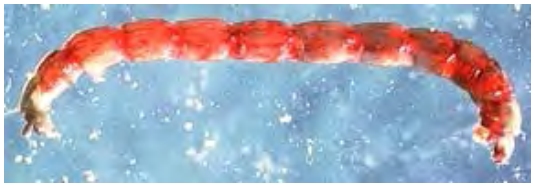
Further downstream, Difficult Run picks up tributary inputs from intensively developed regions with levels of imperviousness over 20%. Flowing from the west, Snakeden Branch and Colvin Run begin in the urbanized area of Reston and then meander through moderate-density residential communities. Similarly, Piney Branch and Wolf Trap Creek empty

into Difficult Run in areas of low-intensity development but are generated from headwater systems that drain the highly developed urban/suburban expanse of Vienna and Tyson's Corner. The Dulles Toll Road (Route 267) bisects the watershed at this point, crossing over the mainstem on its way between major urban centers.

Before reaching its confluence with the Potomac River, Difficult Run receives the input of two other major tributary systems, Captain Hickory Run (and its own major tributary, Piney Run) and Rocky Run. Each of these drain moderately developed areas containing large expanses of forest cover interspersed with low-density communities comprised of multi-acre lots. Levels of imperviousness within these subwatersheds range between 10 and 15%.

Captain Hickory Run, one of the highest quality tributaries in the County.

The lowermost section of Difficult Run is sheltered within Difficult Run Stream Valley Park, a protected area adjacent to Great Falls National Park.



Midge Larvae
Family *Chironomidae*
Habitat Classification: burrowers
Feeding Group: collector-gatherers, predators
Tolerance: moderate - tolerant
The Midge larvae are some of the most resilient aquatic insects sampled. The chironomids were the second most common macroinvertebrate sampled, with the aquatic worms being the most common. The bright red chironomids are hemoglobin rich which allows them to thrive in systems with low dissolved oxygen.

Brown Bullhead
Ameiurus nebulosus
Size: to 12 inches
Habitat: ponds, impoundments, pools and sluggish streams
Feeding Group: omnivorous
Tolerance: tolerant
This hardy fish is able to breathe air by "gulping," using its swim bladder as a crude lung. It can thus tolerate high water temperatures, which deplete the oxygen. It uses its "whiskers" as taste organs to find food in dark, murky waters. Some live to be 9 years old.

Yellow Bullhead
Ameiurus natalis
Size: to 13 inches
Habitat: pools of streams and rivers, ponds and lakes
Feeding Group: omnivorous
Tolerance: tolerant
This species associates with cover, often dense vegetation. Spawning occurs in shallow circular nests excavated near cover or in open settings, in calm water. It is native to Virginia waters.

Longear Sunfish
Lepomis megalotis
Size: to 6 inches
Habitat: warmwater ponds, pools of streams and rivers
Feeding Group: invertivore
Tolerance: intolerant
The breeding male Longear is one of Virginia's most brilliantly colored sunfish. This sunfish feeds on aquatic and terrestrial insects. It is native to the Great Lakes and Mississippi Basin and has been introduced elsewhere.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Difficult Run 1 (DFDF01)	Fair	Fair	Poor	High	21.9	46
2 Rocky Branch south (DFRB02)	Good	Excellent	Poor	High	12.2	20
3 Rocky Branch east (DFRB01)	Fair	Fair	Poor	High	16.0	18
4 Difficult Run 2 (DFDF02)	Poor	Poor	Poor	High	16.2	35
5 Little Difficult (DFLD01)	Fair	Good	Poor	Moderate	8.6	17
6 South Fork (DFSF01)	Poor	Poor	Poor	Moderate	8.9	15
7 Snakeden Branch 1 (DFSB01)	Very Poor	Very Poor	Very Poor	High	27.4	45
8 Snakedan Branch 2 (DFSB02)	Fair	Good	Good	Moderate	24.1	46
9 Difficult Run 3 (DFDF03)	Good	Fair	Fair	Moderate	12.4	23
10 Piney Branch (DFPB01)	Very Poor	Poor	Poor	Moderate	22.7	34
11 Wolftrap Creek 1 (DFWC01)	Poor	Poor	Fair	Low	24.8	41
12 Wolftrap Creek 2 (DFWC02)	Very Poor	Poor	Very Poor	Moderate	25.2	36
13 Colvin Run 1 (DFCR01)	Poor	Good	Very Poor	Moderate	27.0	48
14 Colvin Run 2 (DFCR02)	Poor	Poor	Poor	High	20.9	39
15 Piney Run (DFPR01)	Fair	Good	Poor	Low	13.3	22
16 Difficult Run 4 (DFDF04)	Fair	Good	Poor	Moderate	17.0	29
17 Captain Hickory (DFCH01)	Excellent	Good	Excellent	High	11.0	19
18 Rocky Run (DFRR01)	Good	Poor	Good	Moderate	14.7	21
19 Difficult Run 5 (DFDF05)	Good	Good	Fair	Moderate	15.7	27

Difficult Run Fish Species List

Common Name	Number of Sites Where Species Occurred (19 Total Sites)	Common Name	Number of Sites Where Species Occurred (19 Total Sites)
Blacknose Dace	19	Margined Madtom	8
Creek Chub	19	Yellow Bullhead	7
Tessellated Darter	18	Green Sunfish	6
White Sucker	18	Redbreast Sunfish	4
American Eel	17	Spottail Shiner	3
Rosyside dace	16	Fathead Minnow	2
Longnose Dace	14	Pumpkinseed	2
Central Stoneroller	13	Brown Bullhead	1
Common Shiner	13	Eastern Mudminnow	1
Bluegill	12	Fallfish	1
Cutlips Minnow	12	Fantail Darter	1
Satinfin Shiner	12	Golden Shiner	1
Swallowtail Shiner	10	Longear Sunfish	1
Largemouth Bass	9	Warmouth	1
Northern Hogsucker	9		

CHAPTER 3

Watershed Condition Summary

More so than perhaps any other watershed in the County, the Difficult Run drainage exhibits an extremely wide range of biological, habitat and land use conditions.

A total of 29 fish species were found within the watershed. Fish community assemblages at sampling locations generally exhibited taxa richness values in the moderate range, with only 2 of the 19 sampling sites scoring in the low category. On average, fish communities in the system were more diverse than many of the other County watersheds.

Overall rankings of benthic macroinvertebrate communities exhibited considerable variability throughout the watershed. Taxa richness, one component of the IBI, showed a similar pattern, with scores ranging from a low of 3 taxa in the upper Snakeden Branch (above Lake Audubon) to a high of 18 taxa in the south fork of Rocky Branch. Only 4 sample locations yielded diversity ratings that corresponded to those found at reference sites, and most communities were dominated by tolerant oligochaetes (aquatic worms), with tolerant individuals comprising 95% of the sample obtained from Piney Branch.

Habitat ratings were generally low throughout the watershed, with many systems ranking in the poor category. Two notable exceptions to this pattern were Captain Hickory Run and Rocky Run, both lightly developed drainages close to the mouth of Difficult Run. Of the 10 visually assessed components of the RBP score, sediment deposition and bank stability ratings were consistently low systemwide, reflecting the impact of stream flow volumes.

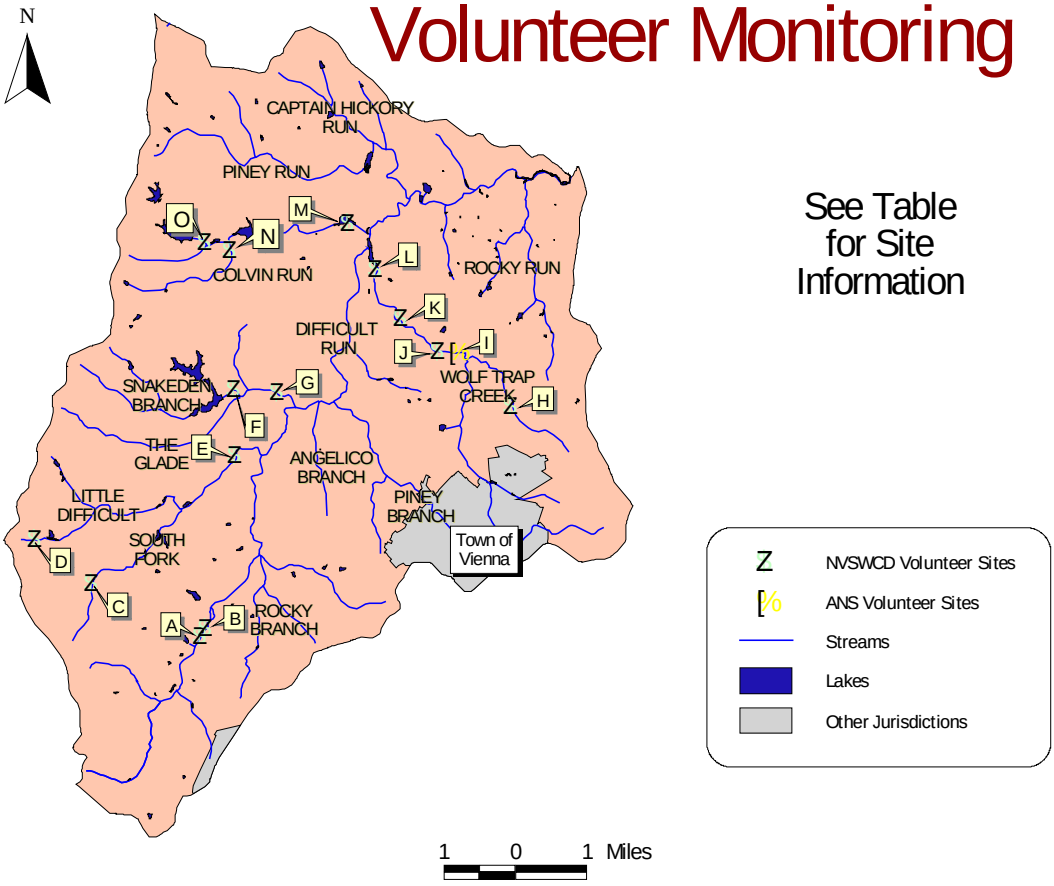
Development intensity throughout the watershed is highly variable as well, ranging from 8.2 to 27.4%, with the ultimate composite ratings reflecting this pattern. Several subwatersheds are in poor or very poor condition, with the lowest composite ratings seen in Snakeden Branch, Piney Branch and Wolftrap Creek, each a drainage with high impervious cover values and correspondingly low biological and habitat ratings. On the other end of the spectrum, Captain Hickory Run and Rocky Run drain regions of low- to moderate-intensity development and exhibit high levels of biological integrity. To a lesser extent, the same is true of Piney and Little Difficult Runs and of both the south and east forks of Rocky Branch.

These ratings seem to indicate that the watershed has been degraded, especially in localized areas, but overall still supports and maintains fairly healthy aquatic communities. More importantly, the watershed contains a variety of individual subwatersheds that remain of very high quality, a situation that is likely reflected in the mainstem environment itself, which still maintains some areas of high biological and habitat integrity, especially in its downstream reaches.

CHAPTER 3

Volunteer Data Summary

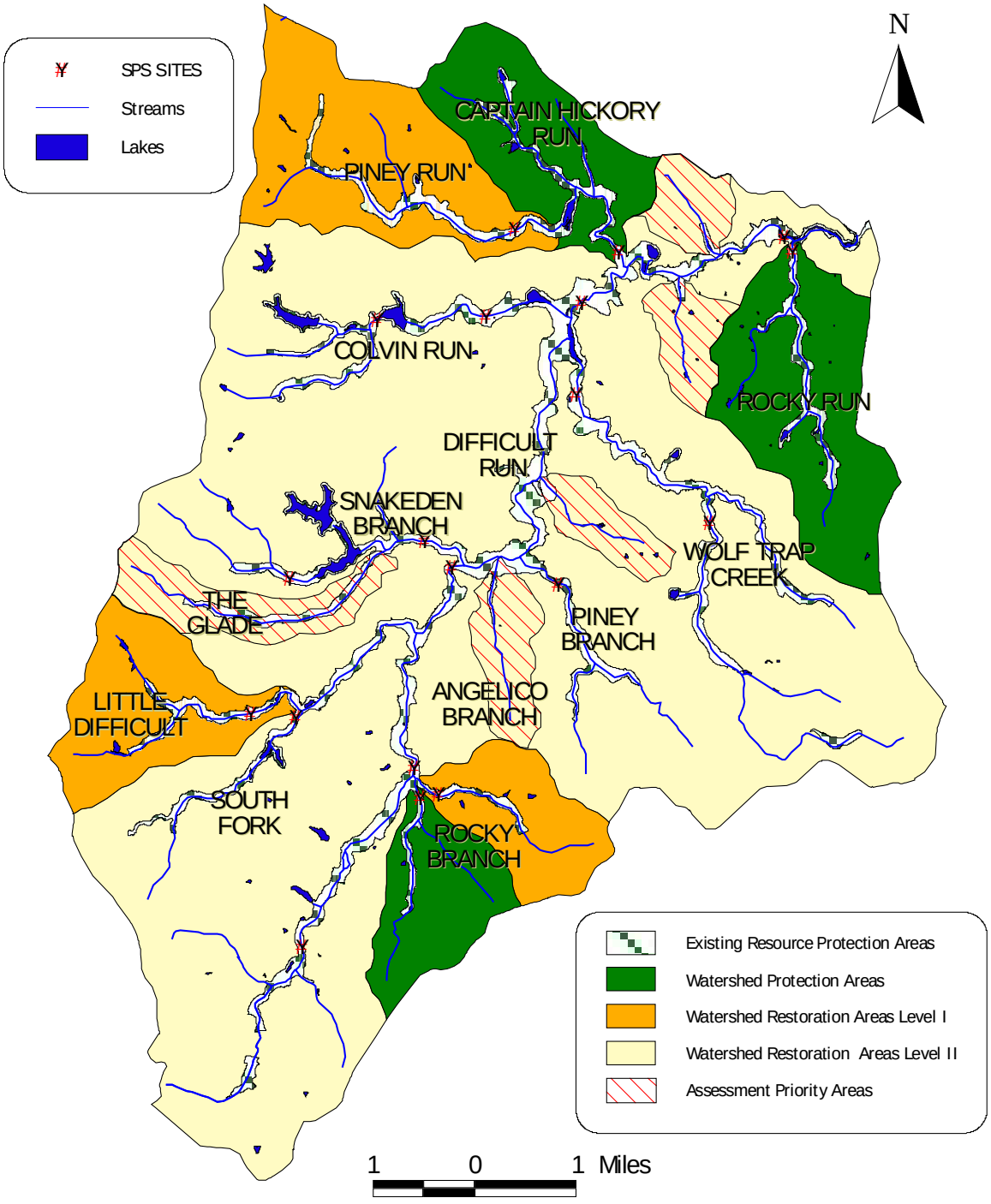
The Difficult Run Watershed currently has 15 active volunteer monitoring stations. The Northern Virginia Soil and Water Conservation District (NVSWCD) coordinates 14 of these, half of which are new additions to the program this year and have been sampled only once. The remaining site, located on Wolftrap Creek in Wolftrap Farm Park, is monitored by the Audubon Naturalist Society (ANS).



Results from the volunteer data show a wide range of water quality in the watershed as did the SPS study. The volunteer data generally supports the findings of SPS with most of the watershed in the "fair" category. Exceptions to this are the sites along Wolftrap Creek, which have shown repeated water quality ratings in the "good" range and the presence of such sensitive taxa as mayflies and stoneflies. Data from the ANS site on Wolftrap Creek also show the repeated presence of mayfly larvae. The repeated discovery of these sensitive taxa warrants future investigation of this tributary as part of an ongoing SPS program. If conditions of high biodiversity and a healthy benthic community are subsequently identified, alternative management strategies for that system may be recommended.

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	DR26	1	####	Excellent	Too few samples
B	DR25	1	####	Fair	Too few samples
C	DR24	1	####	Fair	Too few samples
D	DR22	1	####	Poor	Too few samples
E	DR23	1	####	Good	Too few samples
F	DR11	2	####	Fair	Too few samples
G	DR03	8	####	Fair	Fair in early Spring, otherwise Good/Excellent
H	DR05	9	####	Fair	Poor in late Fall - Spring, otherwise Fair
I	012	4	####	N/A	Some mayfly larvae, otherwise moderately tolerant taxa
J	DR08	5	####	Excellent	Fair/Poor in late Fall - Winter, otherwise Good/Excellent
K	DR09	6	####	Good	generally Excellent
L	DR06	5	####	Fair	generally Fair
M	DR18	2	####	Good	Too few samples
N	DR27	1	####	Poor	Too few samples
O	DR20	2	####	Poor	Too few samples, but both were Poor

Management


SPS SITES
Streams
Lakes
N
CAPTAIN HICKORY RUN
PINEY RUN
COLVIN RUN
ROCKY RUN
DIFFICULT RUN
SNAKEDEN BRANCH
WOLF TRAP CREEK
THE GLADE
PINEY BRANCH
ANGELICO BRANCH
LITTLE DIFFICULT
SOUTH FORK
ROCKY BRANCH
Existing Resource Protection Areas
Watershed Protection Areas
Watershed Restoration Areas Level I
Watershed Restoration Areas Level II
Assessment Priority Areas
1 0 1 Miles

CHAPTER 3

Management Category Description

The Difficult Run watershed is highly diverse in land use and biological condition and, as such, requires an equally diverse approach in its management. Rocky Run and Captain Hickory Run are designated as protection areas due to their high biological and habitat quality. Although the south fork of Rocky Branch received a high rating overall and is similarly designated as a Watershed Protection Area, its poor habitat condition suggests the need for active management that focuses on restoration of instream habitat quality and the development of effective stormwater controls that minimize further degradation. Further study is also needed in the Rocky Run subwatershed to identify and mitigate the factors responsible for the poor condition of its benthic community.

Little Difficult Run and the east fork of Rocky Branch are categorized as priority Watershed Restoration Level I Areas. Piney Run falls into this category as well but is of special concern due to its potential influence on Captain Hickory Run, the system into which it flows. In all three watersheds, management should focus on the instream environment since all received poor scores in the habitat category. Such efforts should be monitored for their impact on the aquatic insect and fish communities of each respective system.

The remaining portions of the watershed are classified as Watershed Restoration Level II Areas. Issues of greatest concern include the system headwaters in the southern extent of the watershed and the urban centers of Reston, Vienna, and Tysons Corner. Stormwater management controls, through retrofitting, maintenance, or installation of new facilities, should be implemented where feasible. Such an approach would have the greatest potential for enhancement of conditions in downstream environments.

As is the case countywide, all five mainstem sites remain classified as Watershed Restoration Level II Areas due to the cumulative impacts of tributary conditions on these areas. However, the three lowermost mainstem sampling sites already rank as Good or Fair in overall site condition, a situation that should elevate the priority of the entire drainage relative to other watersheds in the County. Implementing strategies that focus on tributary systems first, an approach that is applicable countywide, becomes especially important. The first step in the process should be an expansion of the stream monitoring program to include those subwatersheds specified as Assessment Priority Areas. Due to the scale of this study, there were inevitable gaps in our coverage of the County's streams. Volunteer monitoring of headwater streams in these areas could aid in future assessments of the watershed.

CHAPTER 3

OTHER INITIATIVES

The Difficult Run Community Conservancy

The Difficult Run Community Conservancy is an organization of citizens interested in the Difficult Run stream and watershed with the following goals:

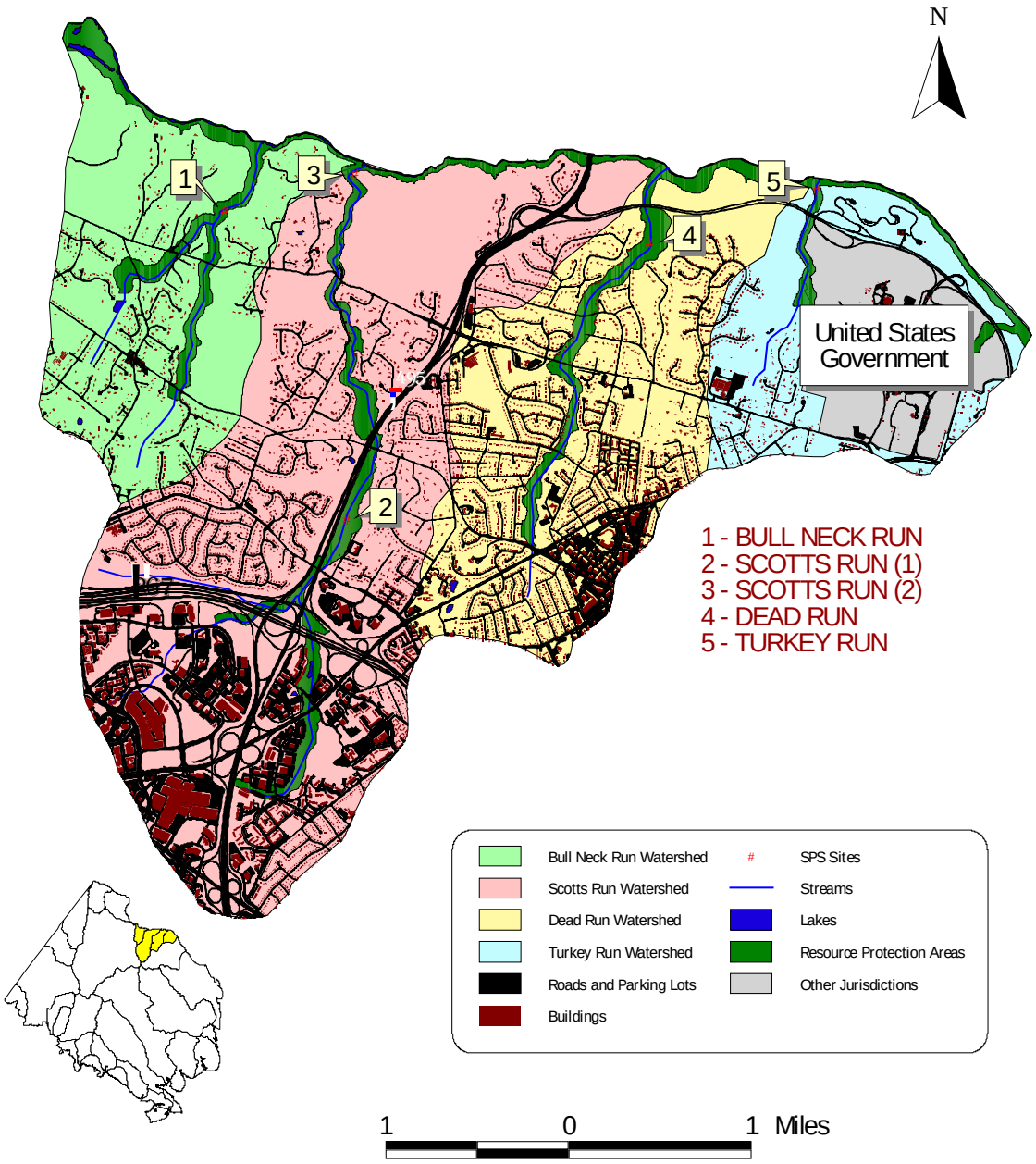
- Promote recognition of Difficult Run as a living system.
- Increase protection of, and public access to, Difficult Run Stream Valley corridor.
- Educate the public and members about issues in Difficult Run.
- Encourage and provide stewardship opportunities.
- Promote community involvement.
- Provide a communication network about issues concerning the watershed.

The Difficult Run Community Conservancy is a new organization that anticipates working with homeowners associations, other organizations and local government to improve, conserve and protect the natural resources of the Difficult Run watershed.

CHAPTER 3

BULL NECK RUN, SCOTTS RUN, DEAD RUN AND TURKEY RUN WATERSHED SUMMARY

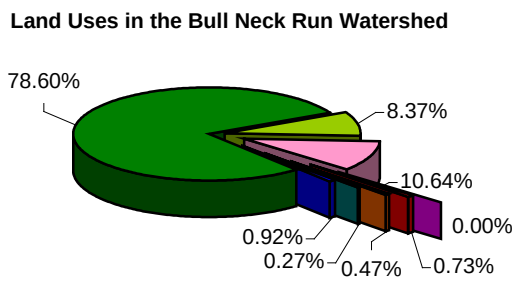
Land Cover

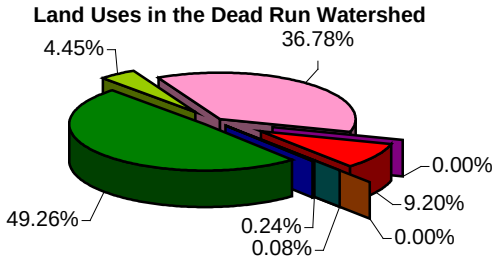

N
1
2
3
4
5
United States Government
1 - BULL NECK RUN
2 - SCOTTS RUN (1)
3 - SCOTTS RUN (2)
4 - DEAD RUN
5 - TURKEY RUN
Bull Neck Run Watershed
Scotts Run Watershed
Dead Run Watershed
Turkey Run Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

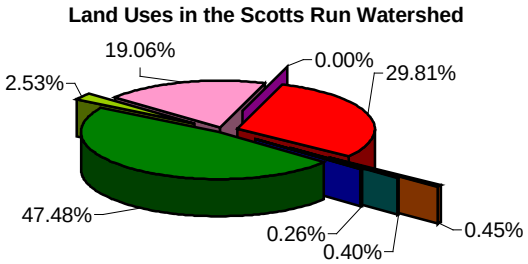
CHAPTER 3

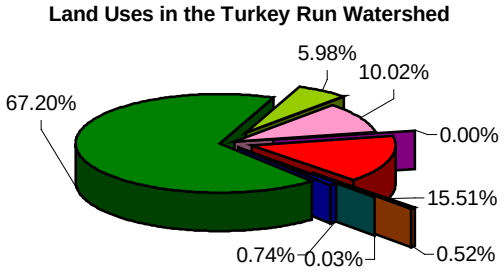
Watershed Descriptions

Rocky substrates and moderately high gradients characterize all four watersheds within this group. The respective drainages vary considerably in their level of imperviousness, with two of the watersheds draining highly urbanized areas and two remaining lightly developed. Each flows directly into the Potomac River.

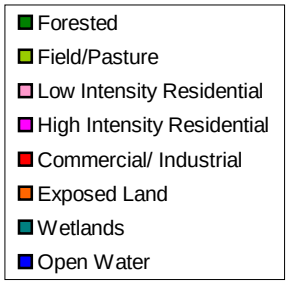








Bull Neck Run and Turkey Run have low levels of imperviousness (less than 10% each) and are dominated by forestland. From its headwaters areas adjacent to Tyson's Corner, Bull Neck Run flows generally northward, passing through low-density residential areas. Turkey Run drains the lightly developed area surrounding a large parcel of U.S. Government property and then travels through Turkey Run Park before entering into the Potomac River.



Monitoring location on Scotts Run.

Both Dead and Scotts Runs flow from headwaters in or near the highly developed Tyson's Corner area, through moderate- and low-density residential communities, and into parkland along the Potomac.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
Bull Neck Run (BNBN01)	Excellent	Good	Excellent	Low	8.3	15
Scotts Run 1 (SCSC01)	Very Poor	Poor	Poor	Very Low	39.8	63
Scotts Run 2 (SCSC02)	Poor	Poor	Excellent	Very Low	28.6	46
Dead Run (DEDE01)	Very Poor	Poor	Poor	Very Low	21.9	25
Turkey Run (TUTU01)	Excellent	Excellent	Fair	High	8.0	15

Middle Potomac Fish Species List

Common Name	Number of Sites Where Species Occurred (5 Total Sites)
Creek Chub	5
Blacknose Dace	5
White Sucker	4
Longnose Dace	2
Largemouth Bass	2
Bluegill	2
American Eel	2
Yellow Bullhead	2
Bluntnose Minnow	1
Smallmouth Bass	1
Pumpkinseed	1
Green Sunfish	1
Redbreast Sunfish	1
Eastern Silvery Minnow	1
Mosquitofish	1
Fantail Darter	1

Longnose Dace
Rhinichthys cataractae
Size: to 4 inches
Habitat: small/medium fast moving streams
Feeding Group: insectivore
Tolerance: intolerant
The Longnose Dace's streamlined body and downturned mouth allow it to live in the swiftest of currents. Another adaptation for swift current is its rudimentary gas bladder that allows this minnow to maintain itself in areas with little current velocity. Males are very territorial and aggressive and will bite and chase off any other males.

CHAPTER 3

Watershed Condition Description

Although the small watersheds that make up this group possess similar physical and geologic characteristics, they reflect two extremes of stream quality within the County.

Within the group, only Turkey Run ranked as having High fish community richness (11 distinct taxa). It should be noted, however, that this site was located near the system's mouth at the Potomac River, and the ultimate values may have been influenced by proximity to this larger system. The remaining drainages all scored poorly, each containing 6 or fewer taxa. Sites on Scotts and Dead Runs ranked in the very lowest category.

Measures of benthic community integrity were similarly divergent. Sampling along Bull Neck Run highlighted the presence of a high-quality, well-balanced community, while the Turkey Run site ranked even higher, its conditions comparable to the reference level. The remaining drainages exhibited conditions on the other end of the spectrum, with all samples from both Scotts and Dead Runs being dominated by organisms highly tolerant of degradation.

Although a disparity in rankings across the 4 watersheds was again seen with the habitat scores, some values were inconsistent with the corresponding biological scores for the respective locations. The lowermost site on Scotts Run possessed high-quality habitat locally, yet its macroinvertebrate and fish communities were of very low integrity. Such a result may have been a function of the systems underlying geology, one that is highly resistant to erosion and which may have been masking the impact of the high flow volumes the stream is known to carry during storm events. While such substrate also typifies the lower portion of the Turkey Run drainage, substantial erosion was evident in its upstream reaches, and excessive sediment deposition in many areas led to a ranking in the Fair category. Habitat quality in the remaining drainages generally corresponded with overall biological condition, Excellent in Bull Neck, and Poor throughout Dead Run and the upper sections of Scotts Run.

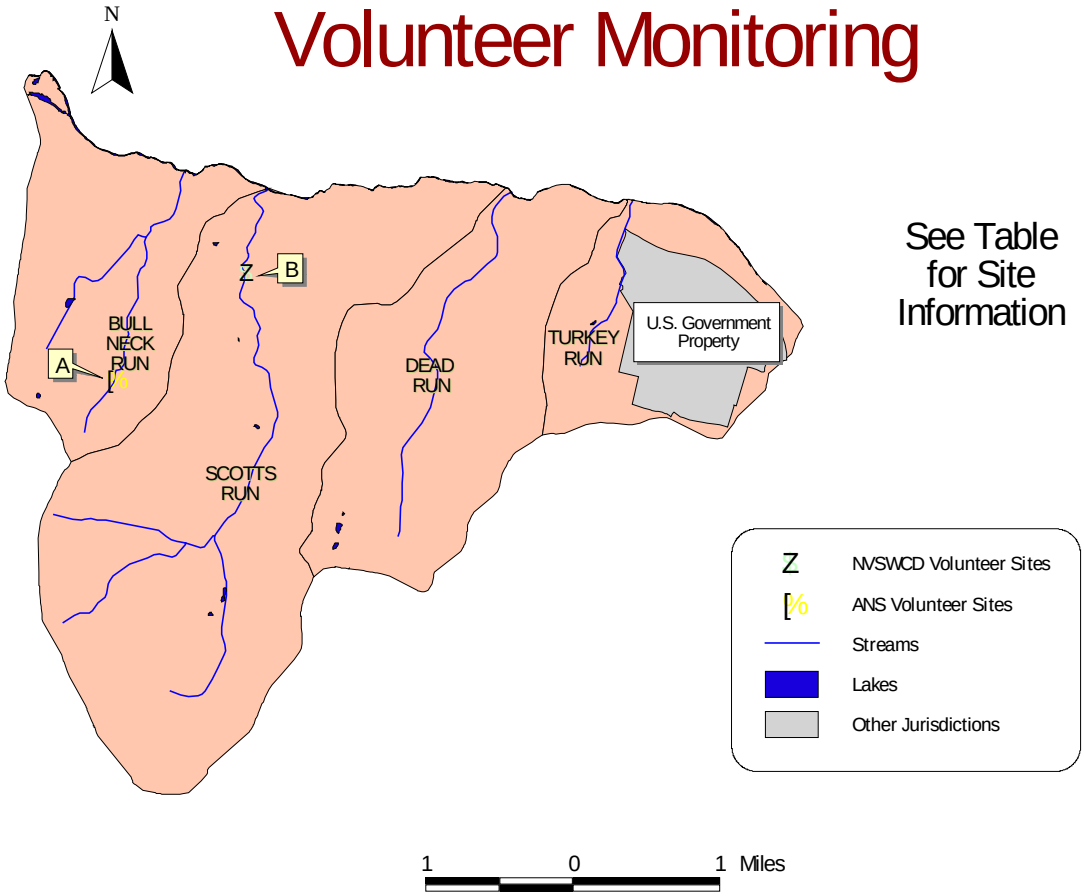
Nowhere was the difference in watershed condition more evident than with variations in the level of impervious cover. The drainage basins of Bull Neck Run and Turkey Run exhibit low-intensity land use patterns, are predominantly forested and have imperviousness values below 9%. Scotts Run and Dead Run, on the other hand, both drain major urban centers with levels of impervious cover ranging from 20 to 40%. This dramatic contrast in development intensity is reflected in the overall composite rankings.

Collectively, the watersheds in this group clearly highlight the impact that variations in land use can have on aquatic systems; those with the most development rank among the poorest quality streams in the County while those with the least, score among the best.

CHAPTER 3

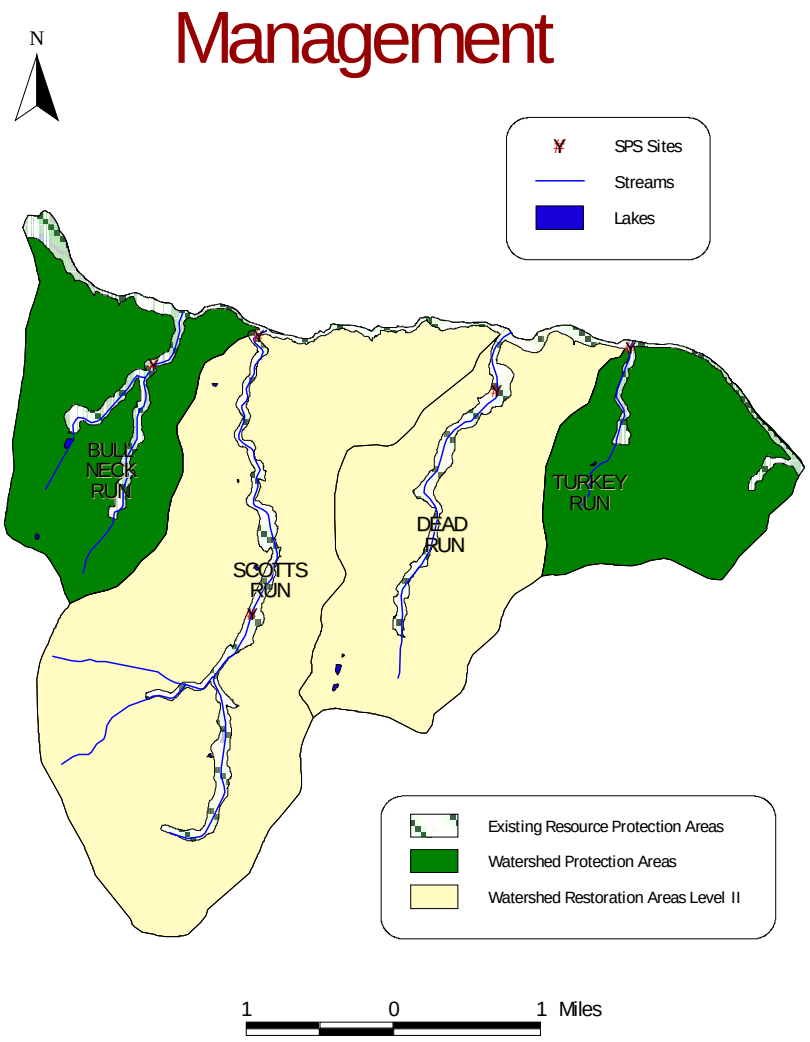
Volunteer Data Summary

Within this group there are currently two active volunteer monitoring stations. One of these is located in Scotts Run and is coordinated by the Northern Virginia Soil and Water Conservation District (NVSWCD). The other site, located on Bull Neck Run, is coordinated by the Audubon Naturalist Society (ANS). Both monitoring locations are relatively recent additions to the volunteer site inventory.



Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	019	1	####	N/A	Sensitive taxa well represented in sample
B	SCOT1	3	####	Fair	Varies from Fair - Poor

The data collected from both sites generally support the findings of the SPS study. The site at Bull Neck Run indicated the presence of a more diverse benthic community, while the site on Scotts Run highlighted significant biological impairment.



Management Category Description

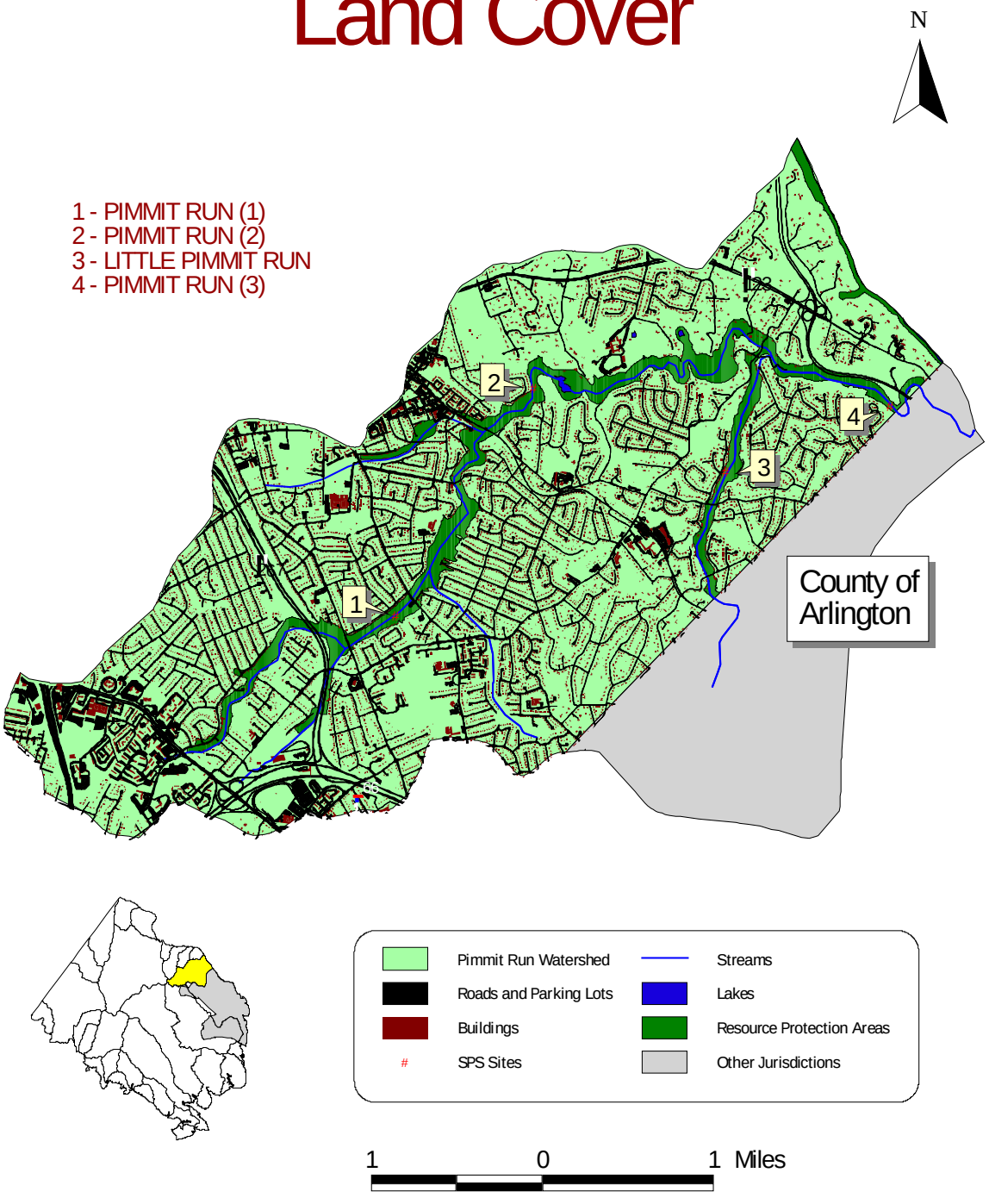
The two extremes in biological integrity, habitat condition and land use translated into wide variations in the management category recommendations. Both Dead and Scotts Runs are currently classified as Watershed Restoration Level II Areas. Many opportunities for small-scale, localized improvements exist, and efforts should focus on minimizing, as much as possible, future degradation to instream habitat in the mainstem environments.

Although the two remaining watersheds are classified entirely as Watershed Protection Areas, regular monitoring within both should continue. This is especially true within Turkey Run, where instream erosion and high sediment deposition is occurring despite seemingly low levels of development within the watershed. Further assessment of fish communities within Bull Neck is also warranted.

CHAPTER 3

PIMMIT RUN WATERSHED SUMMARY

Land Cover


N
1 - PIMMIT RUN (1)
2 - PIMMIT RUN (2)
3 - LITTLE PIMMIT RUN
4 - PIMMIT RUN (3)
1
2
3
4
County of Arlington
Pimmit Run Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

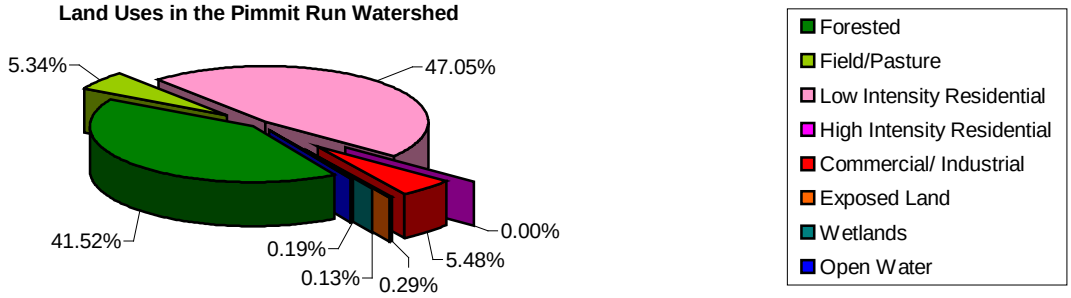
CHAPTER 3

Watershed Description

The lowermost site on the Pimmit Run mainstem.

The Pimmit Run Watershed, located in the northeastern portion of Fairfax County, has a total area of 12.6 square miles, nearly one-fifth of which is contained within the jurisdiction of Arlington County. Low- to moderate density residential communities, primarily comprised of single family houses, dominate the drainage, which exhibits overall levels of imperviousness in excess of 25%. No major impoundments or regional ponds occur within the watershed.

The headwaters of the Pimmit Run Watershed combine in the heavily developed area between Tyson's Corner and Falls Church. The mainstem then flows northeast, crossing under two large, heavily traveled road corridors. It continues through the town of McLean, joins with the Little Pimmit Run tributary, and enters Arlington County on its way to the Potomac River.



Net Spinning Caddisflies
Family *Hydropsychidae*
Habitat Classification: clingers
Feeding Group: collector-filterer
Tolerance: moderate to intolerant
These caddisflies build spider-like nets to filter material from the water column. The caddisfly then climbs out onto the net to collect any food present. These insects take up oxygen through the finger-like gills on their abdomens.

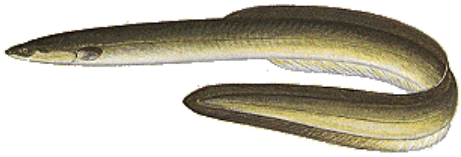
CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
Pimmit Run 1 (PMPM01)	Very Poor	Poor	Very Poor	Very Low	26.2	40
Pimmit Run 2 (PMPM02)	Poor	Fair	Poor	Low	26.8	36
Little Pimmit Run (PMLP01)	Very Poor	Poor	Fair	Very Low	20.9	22
Pimmit Run 3 (PMPM03)	Poor	Poor	Good	Very Low	24.2	30

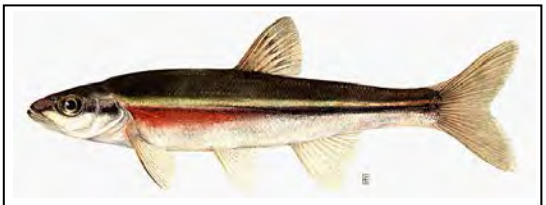
Pimmit Run Fish Species List

Common Name	Number of Sites Where Species Occurred (4 Total Sites)
American Eel	4
White Sucker	4
Blacknose Dace	4
Creek Chub	4
Rosyside Dace	3
Redbreast Sunfish	3
Longnose Dace	3



American Eel
Anguilla rostrata

Size: to 39 inches
Habitat: medium/large streams, varied substrates
Feeding Group: generalist predator
Tolerance: tolerant
The American eel is one of the County's most remarkable fish. Beginning in the fall, adult eels travel from as far as the Appalachian Mountains downstream to the Atlantic Ocean. They spawn in the Sargasso Sea, between Bermuda and the Bahamas, then die. The eggs hatch into tiny, transparent larvae, which ride the tides back up the bays and rivers and into the creeks from which their



Rosyside Dace
Clinostomus funduloides

Size: to 4 inches
Habitat: pools of clear, moderate size streams with little silt
Feeding Group: insectivore
Tolerance: intolerant
This colorful minnow can be found hovering in small groups within pools. It has a blue-green dorsal color, yellow & black stripe and a characteristic red blaze behind the gills. It does not tolerate degraded stream conditions, particularly heavy siltation.

CHAPTER 3

Watershed Condition Summary

Pimmit Run is one of the more developed watersheds in Fairfax County and is characterized by low biological and habitat integrity.

Fish community richness was very low at all sampling locations. Only seven fish taxa were found throughout the drainage, and the majority of these species are classified as being highly tolerant of degraded conditions. However, some evidence suggests that instream barriers may also be playing a role in limiting the distribution of some species.

Measures of benthic macroinvertebrate community integrity were consistently low, with no site ranking above the Fair category. Highly tolerant midges and aquatic worms generally dominated communities at all monitoring locations.

Exposed sanitary pipe running across Little Pimmit Run indicates considerable erosion by the stream.

Channelized streams, unstable sediment bars and extensive areas of bank shoring typify the majority of this watershed. Exposed sewer lines were also evident in some locations, reflecting active channel incision and/or widening taking place in many stream segments. The habitat scores were generally Poor to Fair, with the only notable exception being the lowermost mainstem site which scored well largely as a result of the erosion-resistant substrate that dominates this portion of the watershed. Low ratings for sediment deposition, bank stability, and riparian zone quality were common in the upper reaches of the drainage.

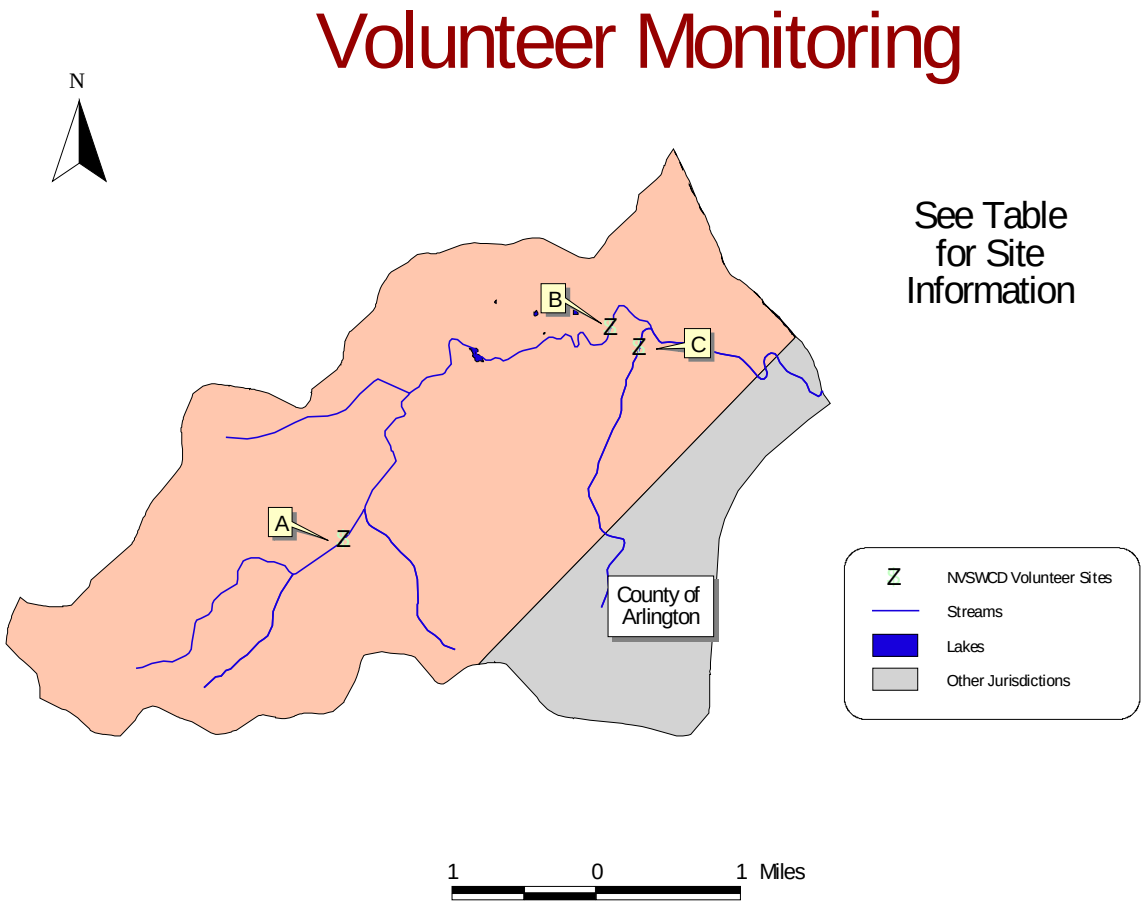
Development intensity is high throughout the Pimmit Run drainage, with all areas exhibiting levels of imperviousness in excess of 20%. This corresponds with the low rankings of biological and habitat quality, and this trend carries through to the overall composite ratings. All sites scored among the very lowest within Fairfax County.

As is the case in several of the more developed watersheds, conditions within Pimmit Run reflect the initial stormwater management approach of conveying runoff to streams as quickly as possible. Other factors may be at play in limiting some aspect of biological health within the basin—such as barriers to fish movement and ultimate distribution—but the widespread pattern of degradation seen suggests that the historic approach to stormwater management is most responsible for the substantial impacts seen systemwide.

CHAPTER 3

Volunteer Data Summary

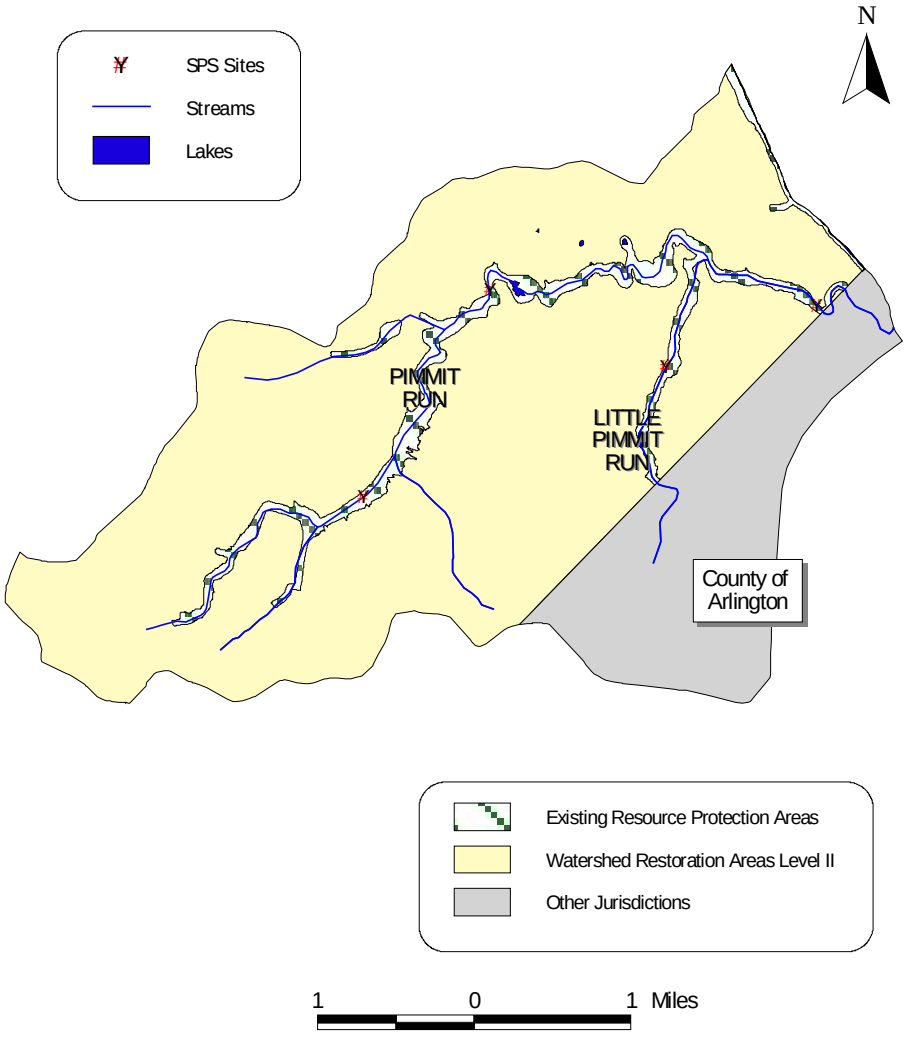
There are currently three active volunteer monitoring sites in the Pimmit Run Watershed, all of which are coordinated by the Northern Virginia Soil and Water Conservation District. One site is on Little Pimmit Run tributary while the remaining two are located on the system's mainstem.



Results from volunteer monitoring support the findings of the SPS study, showing significant impairment at all three monitoring stations. Volunteer efforts generally highlighted low biological integrity throughout the drainage, with most locations being rated in the lower categories of their ranking system.

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	PIM3	1	####	Fair	Too few samples
B	PIM2	2	####	Fair	Too few samples, but both were Fair
C	PIM1	4	####	Fair	Generally Poor

Management



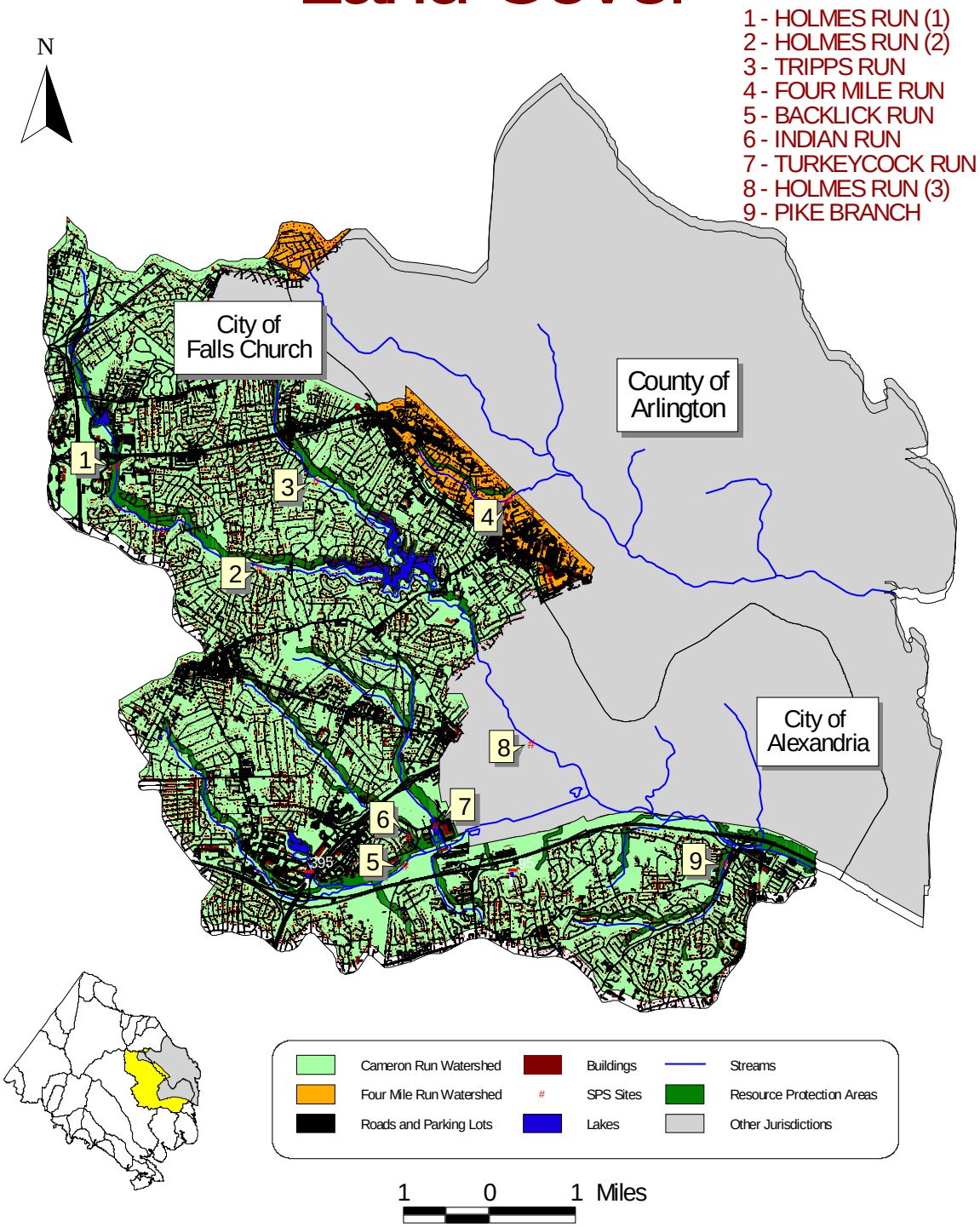
Management Category Description

Development within the watershed is extensive and has been occurring steadily for the last 50 years. Many communities in the area are quite old, as is the existing stormwater infrastructure draining them. And like many of the more impaired watersheds, the headwaters of the main stem originate within areas with the highest levels of imperviousness. The watershed as a whole is classified as a Watershed Restoration Level II Area and could benefit most from community education efforts and retrofitting of stormwater management facilities. Cooperation with Arlington County will likely be required to improve existing conditions especially in the headwaters of Little Pimmit Run.

CHAPTER 3

CAMERON RUN AND FOUR MILE RUN WATERSHED SUMMARY

Land Cover


1 - HOLMES RUN (1)
2 - HOLMES RUN (2)
3 - TRIPPS RUN
4 - FOUR MILE RUN
5 - BACKLICK RUN
6 - INDIAN RUN
7 - TURKEYCOCK RUN
8 - HOLMES RUN (3)
9 - PIKE BRANCH
N
City of Falls Church
County of Arlington
City of Alexandria
1
2
3
4
5
6
7
8
9
395
Cameron Run Watershed
Four Mile Run Watershed
Roads and Parking Lots
Buildings
SPS Sites
Lakes
Streams
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

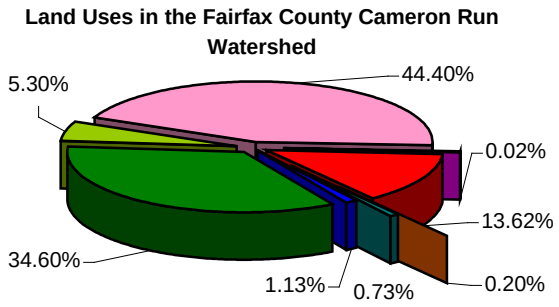
CHAPTER 3

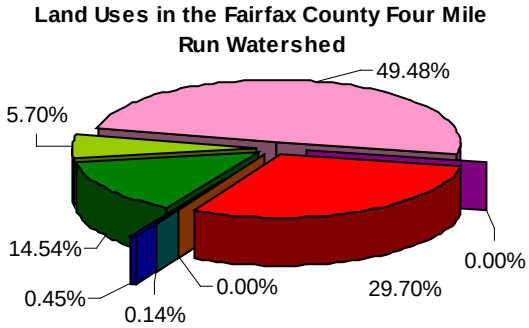
Watershed Description

The Cameron and Four Mile Run watersheds, located in the eastern portion of Fairfax County, extend over both the Piedmont Upland and Coastal Plain physiographic provinces. Although Cameron Run has a total area of approximately 42 square miles, only 31.5 square miles are within Fairfax County jurisdiction; the remaining area lies within either the cities of Alexandria and Falls Church, or Arlington County. Similarly, only two small areas of the Four Mile Run watershed fall within the borders of Fairfax County. The only impoundments within the region are found in the Cameron Run watershed: Lake Barcroft (137 acres), Fairview Lake (15 acres) and four regional ponds.

Poor habitat quality characterizes much of Four Mile Run.

Both of these watersheds are highly urbanized. All sites sampled had subwatershed imperviousness values exceeding 20%, with several of these over 30%. The Long Branch tributary of Four Mile Run, which flows through the highly developed area of Seven Corners and Bailey's Crossroads, had an imperviousness value of over 40%, the highest sampled in this study. The major land use category throughout the watersheds is residential, consisting largely of older, single family homes.





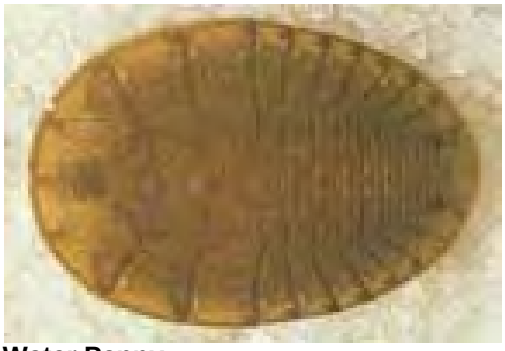
The Cameron Run watershed contains two large tributary systems that come together to form the Cameron Run mainstem. The northern part of the watershed is dominated by the first of these, Holmes Run, which drains the area between Tyson's Corner and the cities of Vienna and Falls Church. It flows south and east and crosses beneath four major road corridors before emptying

into Lake Barcroft. There its flow is combined with Tripps Run, a smaller but still substantial tributary originating in the City of Falls Church.

Backlick Run in the Cameron Run watershed suffers from extreme levels of deposition.

The other major contributor of the Cameron Run system is Backlick Run, which begins in Annandale and closely parallels the Capital Beltway (I-495) for most of its length. Backlick Run increases with the addition of Indian Run and Turkeycock Run, both of which drain the high-density residential area around Annandale. After the confluence with Turkeycock Run, Backlick Run immediately enters the City of Alexandria and continues on to meet with Holmes Run.

With the merging of the two major systems, the Cameron Run mainstem begins its eastward flow, first traveling under I-495 and then picking up the input of Pike Branch and a variety of smaller tributaries before emptying into the Potomac River.



Water Penny
Family *Psephenidae*
Habitat Classification: clingers
Feeding Group: scrapers
Tolerance: moderate
These beetle larvae are very hard to spot. They tend to live on the underside of rocks in swiftly moving water. Their outer shell protects the larvae from predators and reduces the drag created by swiftly moving water. They will move slowly along the rocks in search of plant material to scrape off and eat.

Blacknose Dace
Rhinichthys atratulus
Size: to 3 inches
Habitat: small/medium streams, varied substrates
Feeding Group: omnivorous
Tolerance: tolerant
Omnivorous feeding and adaptability to many different habitats allow this fish to survive under degraded conditions. In severely impacted streams, the Blacknose Dace is often the dominant, if not only, fish present.

Creek Chub
Semotilus atromaculatus
Size: to 8 inches
Habitat: small/medium creeks, various substrates
Feeding Group: generalist omnivore/predator
Tolerance: tolerant
Like the Blacknose Dace this species is highly tolerant of degraded habitat conditions. Creek Chub breed in the spring and can live up to 7 years. This species constructs nests typically in gravel and/or sand along runs and at the tail end of pools.

Mummichog
Fundulus heteroclitus
Size: to 3 inches
Habitat: brackish, seasonally in tidal fresh creeks
Feeding Group: omnivorous
Tolerance: moderate
The Mummichog is generally associated with estuarine habitats but will sometimes venture into fresh water. Spawning occurs between April and the end of August, with eggs being laid at levels where only a spring high tide can reach them. Clutch sizes range from 10 to 300 eggs.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Holmes Run 1 (CAHR01)	Poor	Poor	Poor	High	29.1	47
2 Holmes Run 2 (CAHR02)	Very Poor	Very Poor	Poor	Very Low	26.6	42
3 Tripps Run (CATR01)	Very Poor	Very Poor	Very Poor	Very Low	31.8	35
4 Four Mile Run (FMLO01)	Very Poor	Poor	Very Poor	Very Low	43.7	51
5 Backlick Run (CABA01)	Very Poor	Poor	Very Poor	Low	30.3	42
6 Indian Run (CAIR01)	Very Poor	Fair	Poor	Very Low	26.8	35
7 Turkeycock Run (CATK01)	Poor	Very Poor	Fair	Low	23.2	35
8 Holmes Run 3 (CAHR03)	Very Poor	Fair	Very Poor	Low	28.3	33
9 Pike Branch (CAPK01)	Very Poor	Fair	Very Poor	Very Low	25.0	32

Cameron Run and Four Mile Run Fish Species List

Common Name	Number of Sites Where Species Occurred (9 Total Sites)
Blacknose Dace	9
White Sucker	6
Creek Chub	5
Tessellated Darter	4
Bluegill	4
Yellow Bullhead	3
Satinfin Shiner	3
Swallowtail Shiner	3
Rosyside Dace	2
Redbreast Sunfish	2
Bluntnose Minnow	2
Largemouth Bass	2
Pumpkinseed	1
American Eel	1
Spotfin Shiner	1
Mummichog	1
Least Brook Lamprey	1
Green Sunfish	1
Golden Shiner	1
Black Crappie	1

CHAPTER 3

Watershed Condition Summary

The Cameron Run and Four Mile Run watersheds, both drainages containing some of the oldest and most highly developed areas in Fairfax County, have substantially degraded biological and habitat integrity.

Fish communities are of poor quality in both of these watersheds. The highest number of fish taxa found at any one site in the two watersheds was 13 with over half of the monitoring sites containing three or fewer taxa. Tolerant species dominated these communities.

Highly tolerant midges generally dominated benthic macroinvertebrate communities at all sites in both watersheds, and none contained a single representative of sensitive taxa indicative of higher quality conditions.

Many of the streams in this area are highly altered to accommodate large volumes of stormwater runoff. Examples of this include extensive areas of channelized or straightened stream reaches, many with banks stabilized by concrete, rip-rap, gabion baskets or a combination of all three. In some extreme cases, stream reaches were conveyed through a series of open cement channels and underground pipes. This high level of stream modification heavily influences the overall RBP habitat scores, which were poor to very poor throughout both watersheds.

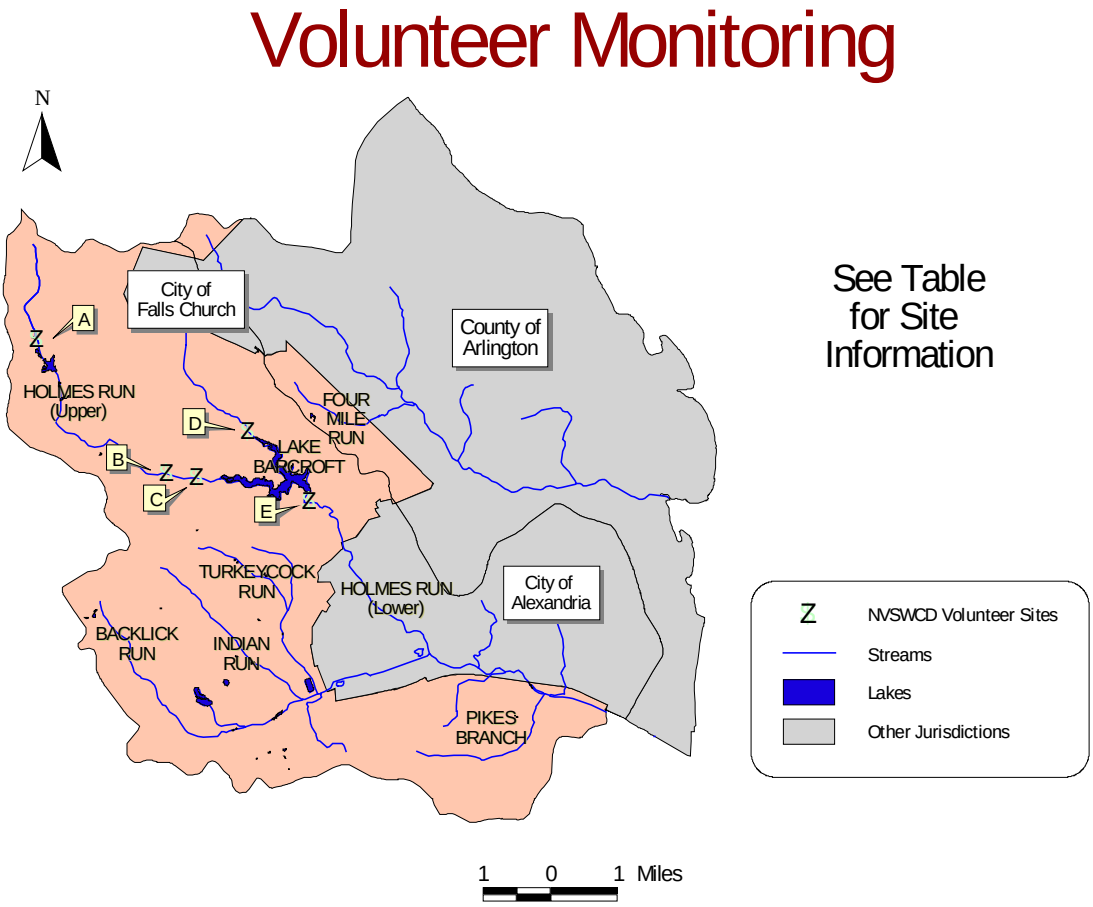
Levels of imperviousness are very high in each of the two drainages. Nearly 44% of the small section of the Four Mile Run watershed contained within the County border is comprised of impervious cover, while levels seen in the Cameron Run drainage exceed 23% in every subwatershed. The overall composite ratings for sites in both areas are similarly extreme, with all areas scoring among the very lowest within Fairfax County.

Conditions throughout both regions reflect the emphasis on treating streams solely as conveyances for stormwater discharge, an approach consistent with the period in which most of their communities were originally developed. In this light, the entire area can be viewed as being uniformly degraded from historic stormwater management approaches.

CHAPTER 3

Volunteer Data Summary

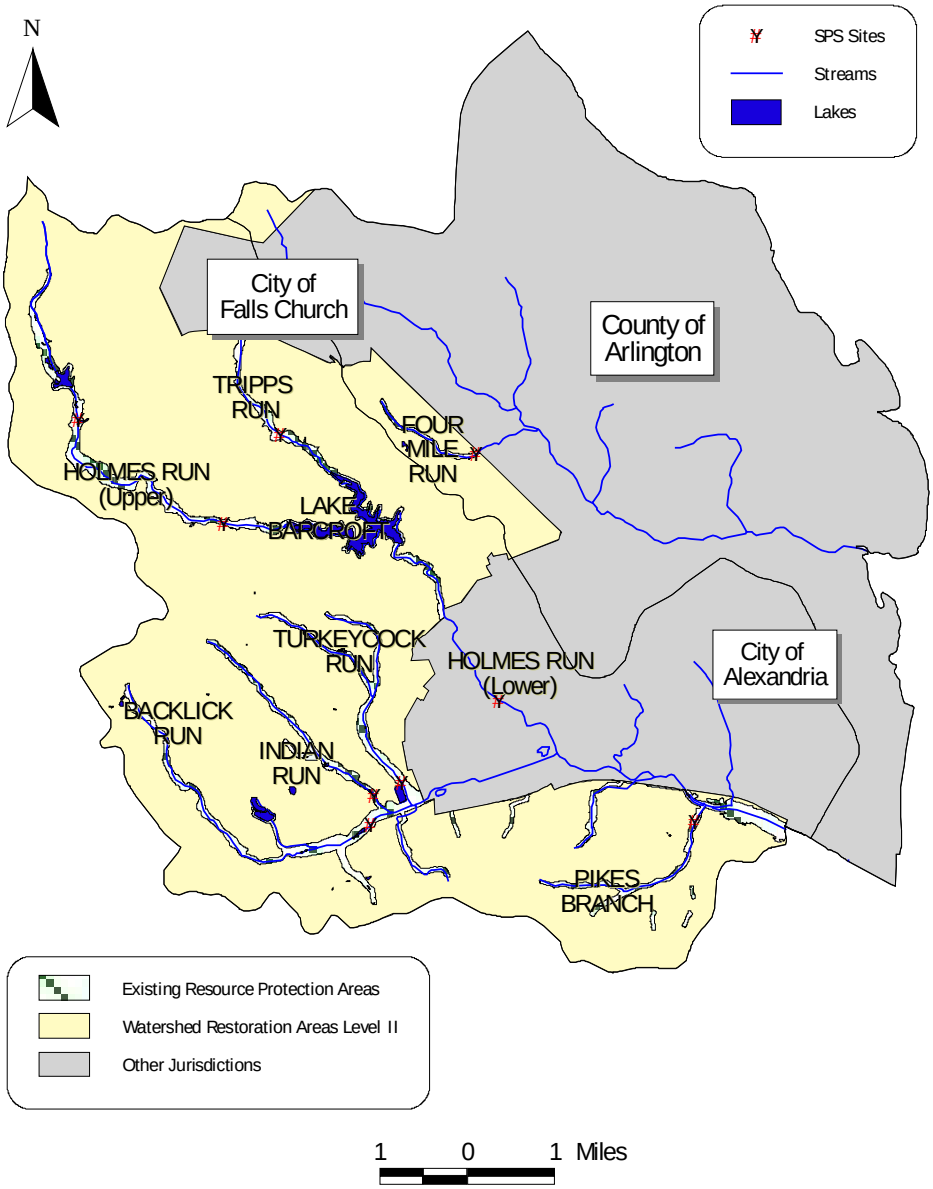
There are currently five active volunteer monitoring stations in the Cameron Run Watershed. The Northern Virginia Soil and Water Conservation District (NVSWCD) coordinates all of these sites. Three of these sites are sampled by the Lake Barcroft Watershed Improvement District (WID) as part of the agency's regular water quality monitoring activities.



Results from volunteer monitoring within the watersheds support those of the SPS Study. With few exceptions, ratings were generally in the lower categories.

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	CAM1	4	#####	Poor	Varies from Fair - Poor
B	CAM2	4	#####	Fair	Generally Poor
C	CAM3	7	#####	Fair	Generally Fair - Good
D	CAM4	8	#####	Fair	Generally Fair - Good
E	CAM5	8	#####	Fair	Generally Poor

Management



Management Category Description

All of the Cameron Run and Four Mile Run watersheds are classified as Watershed Restoration Level II Areas, reflecting the uniformly degraded condition of streams throughout both drainages. Due to the age and pattern of development in these watersheds, this area may be well suited to pilot projects related to retrofitting stormwater management facilities, promoting of citizen stewardship and education,

promoting Low Impact Development (LID) techniques at infill development sites and other innovative techniques. This is particularly true in the smaller order tributaries and headwater areas which could most benefit from enhancement efforts; restoring these areas would provide not only localized benefits, but should lead to improvements in the downstream environment as well. In many cases, inter-jurisdictional cooperation with the Cities of Falls Church and Alexandria, and Arlington County will be needed.

OTHER INITIATIVES

Lake Barcroft Watershed Improvement District

Founded in 1973, the fee-based Lake Barcroft Watershed Improvement District (WID) has implemented a variety of watershed improvement projects in the region surrounding the impoundment. Revenues collected from homeowners within the community provide the foundation for a variety of projects including sediment removal from the lake or contributing waterways, trash removal, algae and aquatic vegetation control, benthic macroinvertebrate and fecal coliform monitoring, street sweeping, dam maintenance and other stormwater management, water quality and health-related activities.

City of Falls Church Monitoring

The City of Falls Church received a grant from the Chesapeake Bay Local Assistance Department to monitor the effect of BMPs within city limits. The City and Fairfax County are currently sharing data and discussing areas of mutual concern with an eye toward developing beneficial strategies of stream improvement that cross jurisdictional boundaries.

Arlington County Watershed Management Plan

Arlington County, under a grant from Virginia Department of Environmental Quality (DEQ), developed a Watershed Management Plan for the County.
Examples of their recommendations include:

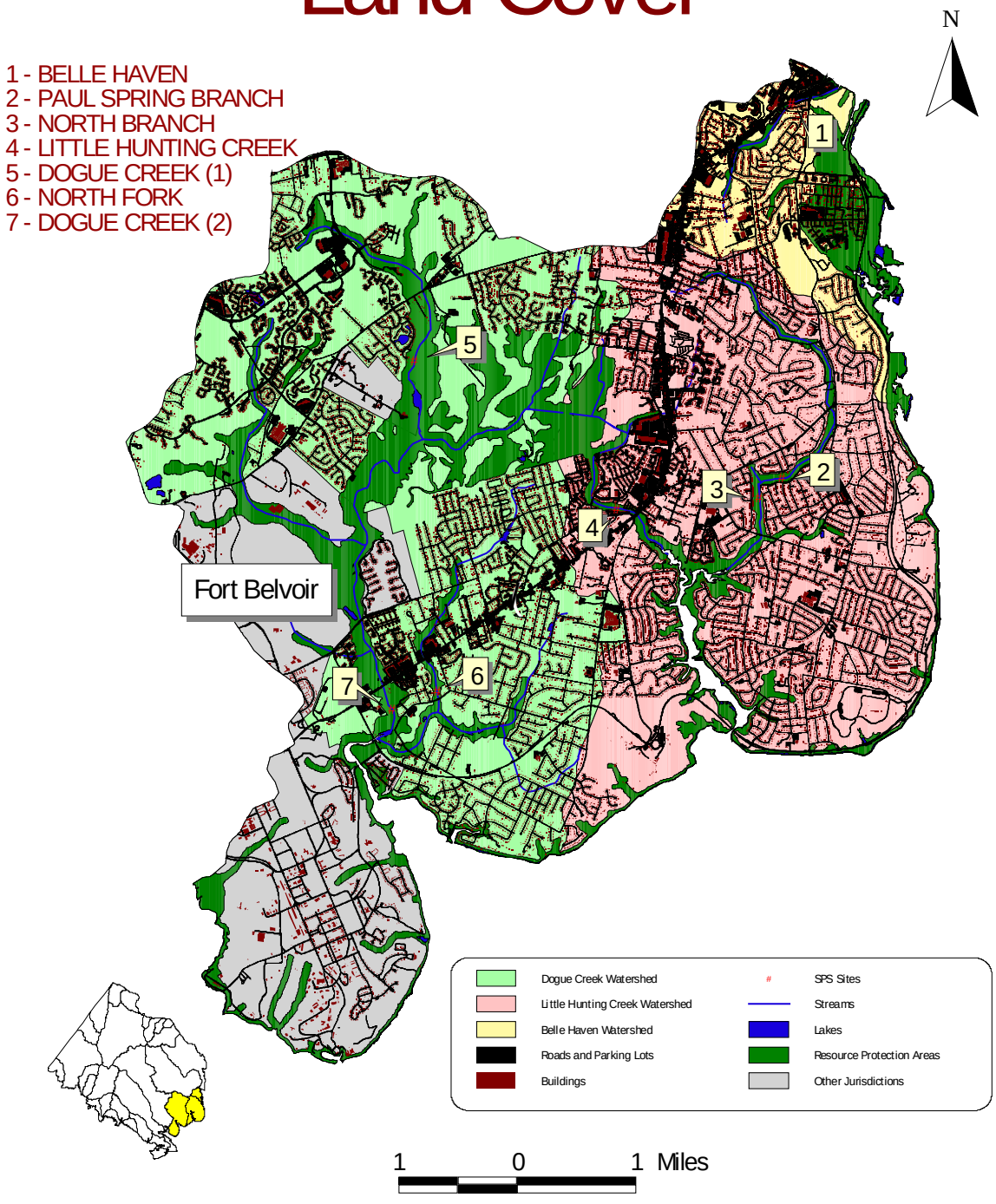
- Retrofitting BMPs
- Enforcing existing ordinances as strictly as possible for new developments
- Improving provisions of the Storm Water Detention Ordinance and Chesapeake Bay Preservation Ordinance
- Using NPDES to full extent
- Stabilizing badly eroded channels
- Restoring instream habitat
- Re-establishing riparian cover in accordance with the Chesapeake Bay Program
- Improving of stream aesthetics
- Restoring the most degraded stream reaches
- Continuing and improving public outreach programs

CHAPTER 3

DOGUE CREEK, LITTLE HUNTING CREEK

AND BELLE HAVEN WATERSHED SUMMARY

Land Cover

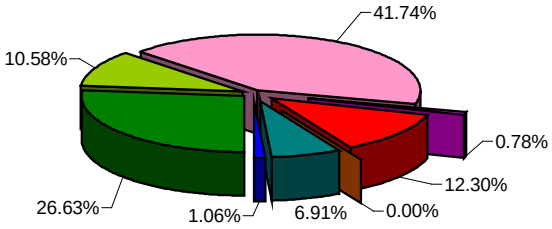

1 - BELLE HAVEN
2 - PAUL SPRING BRANCH
3 - NORTH BRANCH
4 - LITTLE HUNTING CREEK
5 - DOGUE CREEK (1)
6 - NORTH FORK
7 - DOGUE CREEK (2)
N
Fort Belvoir
Dogue Creek Watershed
Little Hunting Creek Watershed
Belle Haven Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

CHAPTER 3

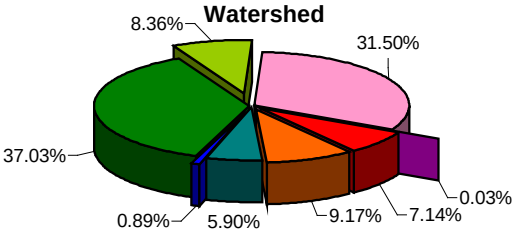
Watershed Description

Dogue Creek, Little Hunting Creek and Belle Haven watersheds are located in southeastern Fairfax County. Out of the total drainage area of 28 square miles, 3.6 are not under County jurisdiction, lying within Fort Belvoir Military Reservation, the U.S. Coast Guard facility, Fort Hunt National Park and other federal parklands. These watersheds are located in the Coastal Plain physiographic province, a region containing significant areas of flat, often marshy terrain with slopes of less than 15%. Each system is tidally influenced at its confluence with the Potomac. Overall development is very high in most places, with many communities in the area dating back to the 1940's. Impoundments within the watershed are limited to one small regional wet pond.

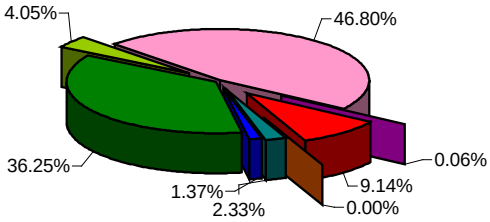
Land Uses in the Belle Haven Watershed

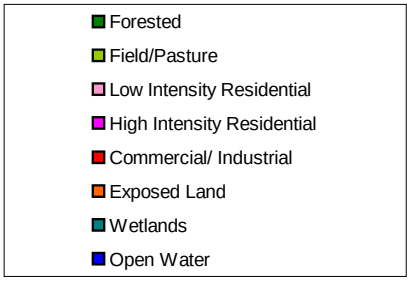


Land Uses in the Dogue Creek Watershed



Land Uses in the Little Hunting Creek Watershed





The North Fork of Dogue Creek shows the low-gradient character typical of Coastal Plain streams.

After its beginning as a collection of small streams within a moderate density residential/commercial area, Dogue Creek flows under Telegraph Road (Rt. 611) and into the protected area of Huntley Meadows Park, where it flattens into a wetland system with many stream channels. The stream then passes into the property of the Fort Belvoir Military Reservation, crosses Richmond Highway, and then meets with the North Fork of Dogue Creek. A mile further downstream, the combined system widens into a cove before emptying into the Potomac River.

The Little Hunting Creek watershed consists of two main tributaries. The first of these, Little Hunting Creek itself, drains the commercial and high-density residential areas along the Richmond Highway corridor which have levels of imperviousness over 30%. The second tributary system, North Branch and its own tributary, Paul Springs Branch, drains part of the Richmond Highway corridor. These areas have imperviousness levels between 20-25%. After the confluence of the respective systems, the mainstem continues for a mile before flowing into the Potomac River.

Instream and riparian zone litter was common throughout many portions of Little Hunting Creek.

The Belle Haven watershed is an assortment of small tributaries flowing directly into the Potomac River. This watershed is highly urbanized, with streams flowing through pipes or culverts in many areas. Hunting Creek, the representative tributary monitored in this study, had levels of impervious cover in excess of 35%, one of the highest levels seen in the County.

Banded Killifish
Fundulus diaphanus
Size: approximately 3 inches
Habitat: tidal fresh/slightly brackish waters and upland streams
Feeding Group: insectivore/invertivore
Tolerance: tolerant
It is a hardy fish, able to survive a wide range of salinity, turbidity and temperature variations. They are known to breed throughout the summer. Few survive beyond 2 years.

Black Crappie
Pomoxis nigromaculatus
Size: to 18 inches
Habitat: lakes, swamps, slow moving creeks and rivers
Feeding Group: predator
Tolerance: moderate
The Black Crappie is one of the most popular panfishes in Virginia. They generally live about 6-7 years. They tend to spawn in April, and the females will lay between 11,000 to 188,000 eggs.

Goldfish
Carassius auritus
Size: to 18 inches
Habitat: vegetated areas of sluggish pools
Feeding group: omnivorous
Tolerance: tolerant
Even though it is mostly known as an aquarium fish, the Goldfish does occur in Virginia streams. This fish is able to survive in water temperatures up to 105^{o}F. Not originally native to North America, the Goldfish was introduced from Asia in the late 1600's.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Belle Haven (BEBE01)	Very Poor	Very Poor	Very Poor	Very Low	36.4	50
2 Paul Spring Branch (LHPS01)	Very Poor	Poor	Very Poor	Very Low	24.4	29
3 North Branch (LHNB01)	Very Poor	Poor	Very Poor	Very Low	23.7	28
4 Little Hunting Creek (LHLH01)	Very Poor	Very Poor	Poor	Moderate	32.2	47
5 Dogue Creek 1 (DCDC01)	Good	Good	Fair	High	19.1	36
6 North Fork 1 (DCNF01)	Poor	Very Poor	Fair	Low	24.3	32
7 Dogue Creek 2 (DCDC04)	Good	Fair	Fair	Moderate	14.1	26

Lower Potomac Fish Species List

Common Name	Number of Sites Where Species Occurred (6 Total Sites)
White Sucker	5
Blacknose Dace	5
American Eel	4
Creek Chubsucker	4
Tessellated Darter	4
Eastern Mosquitofish	4
Creek Chub	4
Brown Bullhead	3
Goldfish	3
Pumpkinseed	3
Bluegill	3
Yellow Bullhead	2
Satinfin Shiner	2
Banded Killifish	2
Mummichog	2
Eastern Mudminnow	2
Least Brook Lamprey	1
Redbreast Sunfish	1
Green Sunfish	1
Warmouth	1
Largemouth Bass	1
Golden Shiner	1
Spottail Shiner	1
Swallowtail Shiner	1
Black Crappie	1

CHAPTER 3

Watershed Condition Summary

Although all three of the independent watersheds that comprise this group are similar in terms of relief and underlying geology, their respective systems represent wide variations in biological integrity among drainages within the Coastal Plain.

While a total of 25 individual fish taxa were collected across this entire region, values from the individual watersheds ranged considerably, with totals of three, twelve and fifteen unique taxa for Belle Haven, Little Hunting and Dogue Creek drainages, respectively. This same gradient is seen in the actual taxa richness scores for each site, with the mainstem of Dogue Creek ranking in the uppermost categories. Of special note is the presence of goldfish, an exotic species, throughout the Dogue Creek system; sampling highlighted the presence of a naturalized population of these fish in both its North Fork and mainstem environments.

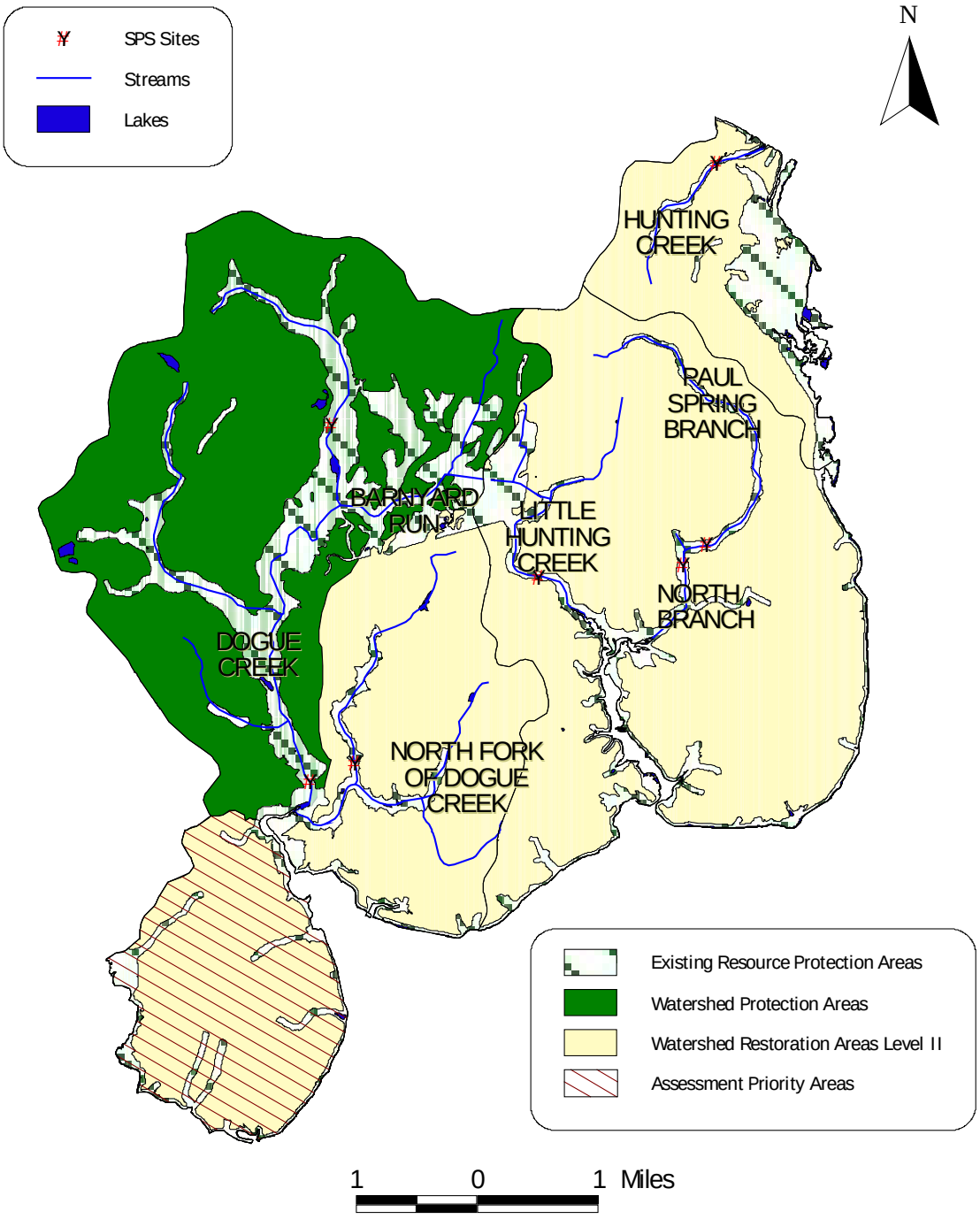
With the exception of the site on the Dogue Creek mainstem, all monitoring locations in the combined areas exhibited low quality benthic macroinvertebrate communities, with several subwatersheds in the Belle Haven and Little Hunting drainages ranking among the lowest of all Coastal Plain systems. Of the 1,618 benthic organisms identified within these watersheds, the overwhelming majority were representatives of taxa known to be tolerant of degraded conditions.

Although problems of sediment deposition limited habitat quality across this entire region, this same overall pattern between the separate watersheds was still evident. Measures of instream conditions were extremely poor throughout Little Hunting and Belle Haven (one site on the Little Hunting mainstem was also notable for an exceedingly high level of instream and riparian zone litter). Monitoring sites in Dogue Creek ranked consistently higher, each falling in the Fair category.

On average, the systems within this region drain areas with high levels of impervious cover, some even approaching the upper end of the range seen in the entire County. The Dogue Creek mainstem again remains as the only exception. Although it is exempt from the five-acre minimum lot size requirement, Ft. Belvoir Military Reservation contains some of the largest expanses of undeveloped land in the area. Together with Huntley Meadows, Fort Belvoir helps to protect Dogue Creek. Composite scores from all three of the watersheds corresponded to the trend seen in each category and highlighted the overall integrity of portions of the Dogue Creek watershed.

The highly altered nature of stream systems in Belle Haven and Little Hunting are a reflection of the limited levels and efficiency of stormwater controls implemented during the initial development of these areas. This is in stark contrast to large portions of the neighboring Dogue Creek watershed. As such, this relatively high-quality resource should be considered even more valuable given its isolation and uniqueness as one of the County's few remaining higher quality Coastal Plain environments.

Management


SPS Sites
Streams
Lakes
N
HUNTING CREEK
PAUL SPRING BRANCH
BARNYARD RUN
LITTLE HUNTING CREEK
NORTH BRANCH
DOGUE CREEK
NORTH FORK OF DOGUE CREEK
Existing Resource Protection Areas
Watershed Protection Areas
Watershed Restoration Areas Level II
Assessment Priority Areas
1 0 1 Miles

CHAPTER 3

Management Category Description

The entire mainstem of Dogue Creek is classified as a Watershed Protection Area and should be monitored closely. Active measures are needed to improve instream habitat conditions at the small scale. Inter-jurisdictional cooperation between the County and Fort Belvoir will be required to ensure this area remains high quality.

The rest of this watershed group, Little Hunting, Belle Haven, and Dogue Creek North Fork, are classified as Watershed Restoration Level II Areas. Retrofitting of stormwater management facilities should be seen as a potential management focus in many areas. Of special note are the revitalization efforts potentially slated for the Richmond Highway corridor, which may present opportunities for improvement, at least locally, through the use of LID techniques at infill development sites. Community education efforts would be beneficial throughout the region.

OTHER INITIATIVES

Kingstowne Restoration

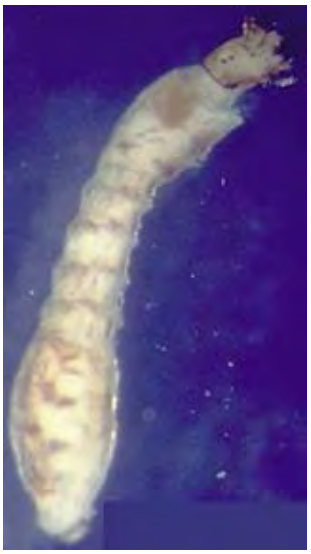
A section of Dogue Creek watershed was restored through a partnership between Fairfax County, Northern Virginia Soil and Water Conservation District, Natural Resources Conservation Service and two citizen groups. The project, initiated in 1998 and completed in 1999, used bioengineering techniques to restore a severely entrenched and eroded section of stream. To more efficiently dissipate flow energy during storm events, stream channel morphology was adjusted to reflect local conditions. Vegetation was added to stabilize streambanks. Monitoring of the site is ongoing, and the project remains a showcase for restoration approaches potentially applicable to many other County streams.

Kingstowne Environmental Monitoring

Residential and commercial development upstream of Telegraph Road has posed a threat to Huntley Meadows Park within the Dogue Creek drainage. The Kingstowne Environmental Monitoring Program, designed to detect and minimize runoff problems associated with development, is in its fourteenth year of sampling. Efforts at four sites in the Kingstowne area involve monitoring sediment levels, water chemistry and, as of 1999, benthic macroinvertebrate community integrity. To date, the results of the sampling show that despite controls achieving generally above 80% removal of sediment, benthic quality was fair to very poor, and current recommendations include controlling stormwater runoff and monitoring sources of habitat alteration and chemical inputs.

Huntley Meadows Park Monitoring

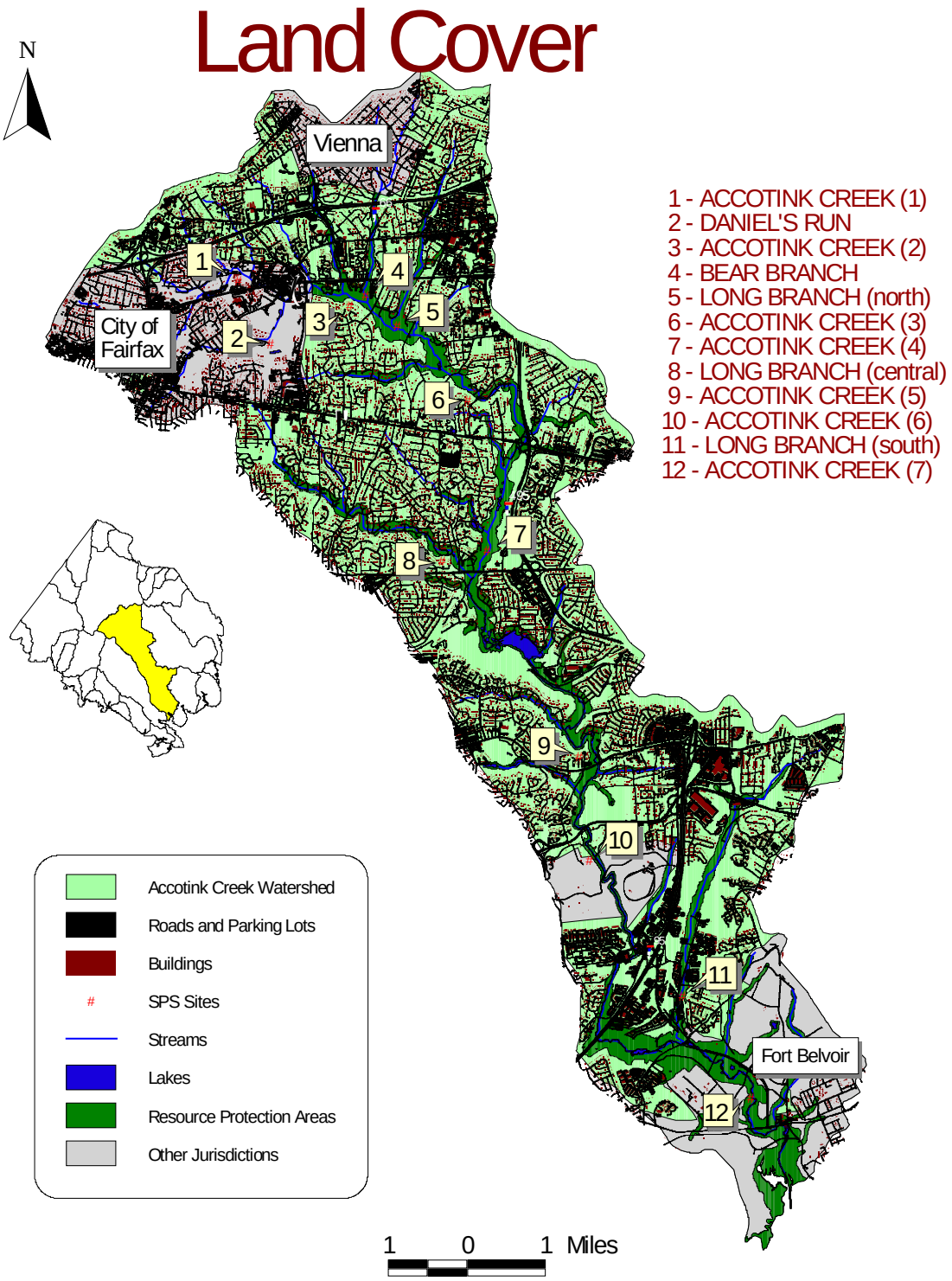
Huntley Meadows Park is a valuable natural resource, containing 1,425 acres of wildlife habitat. Approximately 800 acres of the park is classified as freshwater non-tidal emergent, scrub-shrub or forested wetlands. The park staff and citizen volunteers monitor benthic macroinvertebrates and habitat quality within the park at six sites, three along Dogue Creek and three in the Huntley Meadows Central Wetland. The wetland area contains greater diversity of aquatic insects than Dogue Creek, but tolerant organisms typically dominated communities in both sample areas. The habitat in Huntley Meadows is generally good with a few problem areas such as sediment deposition, embeddedness and high stream velocity. The dual purpose of its program is to evaluate aquatic macroinvertebrate communities and physical habitats in Dogue Creek watershed and to involve citizens in water quality monitoring issues through volunteer opportunities and community education efforts.



Blackfly Larvae
Family *Simuliidae*
Habitat Classification: clingers
Feeding Group: collector-filterer
Tolerance: moderate
Next to mosquitos, blackflies are some of the most well known insects to humans. The larval stage is very well adapted to living in fast moving currents. The larva will hold on to the bottom with "suction cups" located on its posterior end. It will then extend two fans from its head to filter any particulate matter out of the water column.

CHAPTER 3

ACCOTINK CREEK WATERSHED SUMMARY

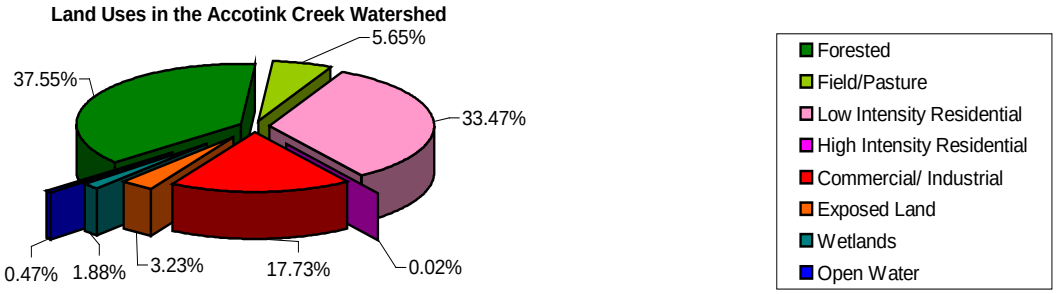

Land Cover
N
Vienna
City of Fairfax
Fort Belvoir
1
2
3
4
5
6
7
8
9
10
11
12
1 - ACCOTINK CREEK (1)
2 - DANIEL'S RUN
3 - ACCOTINK CREEK (2)
4 - BEAR BRANCH
5 - LONG BRANCH (north)
6 - ACCOTINK CREEK (3)
7 - ACCOTINK CREEK (4)
8 - LONG BRANCH (central)
9 - ACCOTINK CREEK (5)
10 - ACCOTINK CREEK (6)
11 - LONG BRANCH (south)
12 - ACCOTINK CREEK (7)
Accotink Creek Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

CHAPTER 3

Watershed Description

The Accotink Creek watershed has an area of 51.1 square miles, or 12.4% of the County. Approximately 13.4 square miles of this area are outside of County jurisdiction, located in the Town of Vienna, City of Fairfax, Fort Belvoir Military Reservation and other U.S. Government installations. The watershed includes areas of both Piedmont Uplands and Coastal Plain physiographic provinces. Only one major impoundment, Lake Accotink (68 acres), and six smaller regional ponds occur in the watershed.

Accotink Creek is characterized by heavy development throughout most of the watershed. Over half of the region is either commercial or low-density residential. Of all the major subwatersheds in the basin, only Long Branch (central) had an imperviousness value of less than 25%.



Highly eroded stream banks are common throughout the Accotink watershed.

The headwaters of Accotink Creek begin in the highly urbanized area of Fairfax City where it also joins with its first tributary, Daniel's Run. The mainstem soon increases in size with the addition of two large tributaries, Bear Branch and Long Branch (north), each draining the highly developed Vienna suburbs. Heading generally southeastward on a path to the Potomac River, the system runs under several major road corridors as it travels through a series of high-density residential areas. Along the way it receives input from the second Long Branch (central), itself a major system draining moderate density residential communities to the east. After passing through the protected area of the Lake Accotink reservoir system, it travels under the Franconia-Springfield Parkway and enters the Coastal Plain physiographic province. The mainstem then picks up additional input from Long Branch (south), which drains the eastern side of Springfield. On its final leg, Accotink Creek meanders slowly through the property of Fort Belvoir Military Reservation — the only large expanse of relatively undeveloped land in the entire watershed — and finally enters a freshwater tidal marsh at Accotink Bay, itself on the edge of the larger Gunston Cove.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Accotink Creek 1 (ACAC01)	Very Poor	Poor	Very Poor	Low	35.2	35
2 Daniel's Run (ACDR01)	Very Poor	Very Poor	Poor	Very Low	25.5	25
3 Accotink Creek 2 (ACAC02)	Very Poor	Fair	Very Poor	Moderate	31.3	37
4 Bear Branch (ACBB01)	Very Poor	Very Poor	Poor	Low	25.1	43
5 Long Branch North (ACLC01)	Very Poor	Very Poor	Poor	Low	37.6	44
6 Accotink Creek 3 (ACAC03)	Very Poor	Poor	Poor	Moderate	29.7	36
7 Accotink Creek 4 (ACAC04)	Poor	Poor	Poor	Moderate	28.6	35
8 Long Branch Central (ACLB01)	Poor	Poor	Fair	Moderate	23.6	24
9 Accotink Creek 5 (ACAC05)	Poor	Very Poor	Good	Moderate	27.4	34
# Accotink Creek 6 (ACAC06)	Poor	Poor	Good	Moderate	27.1	35
# Long Branch South (ACLA01)	Poor	Poor	Good	Low	30.3	49
# Accotink Creek 7 (ACAC07)	Poor	Poor	Poor	Moderate	26.3	36

Accotink Creek Fish Species List

Common Name	Number of Sites Where Species Occurred (12 Total Sites)	Common Name	Number of Sites Where Species Occurred (12 Total Sites)
White Sucker	12	**Northern Hogsucker**	3
Creek Chub	12	Common Shiner	3
Tessellated Darter	11	Largemouth Bass	3
Green Sunfish	10	Brown Bullhead	2
Swallowtail Shiner	10	Common Carp	2
Blacknose Dace	10	River Chub	2
Creek Chubsucker	9	Banded Killifish	1
Yellow Bullhead	8	Eastern Mosquitofish	1
American Eel	8	Eastern Silvery Minnow	1
Satinfin Shiner	7	Longear Sunfish	1
Bluegill	7	Spottail Shiner	1
Rosyside Dace	6	Yellow Perch	1
Pumpkinseed	6	Longnose Dace	1
Redbreast Sunfish	4	Fallfish	1
Golden Shiner	4	Eastern Mudminnow	1

CHAPTER 3

Watershed Condition Summary

Streams in the Accotink Creek watershed are substantially degraded, with the majority of tributary systems exhibiting poor habitat and biological conditions.

Thirty different fish taxa were collected from the12 SPS sampling sites in the watershed. While reasonably high species taxa counts were obtained from many locations along the length of the mainstem, most tributary systems generally lacked such diversity, even accounting for their smaller size.

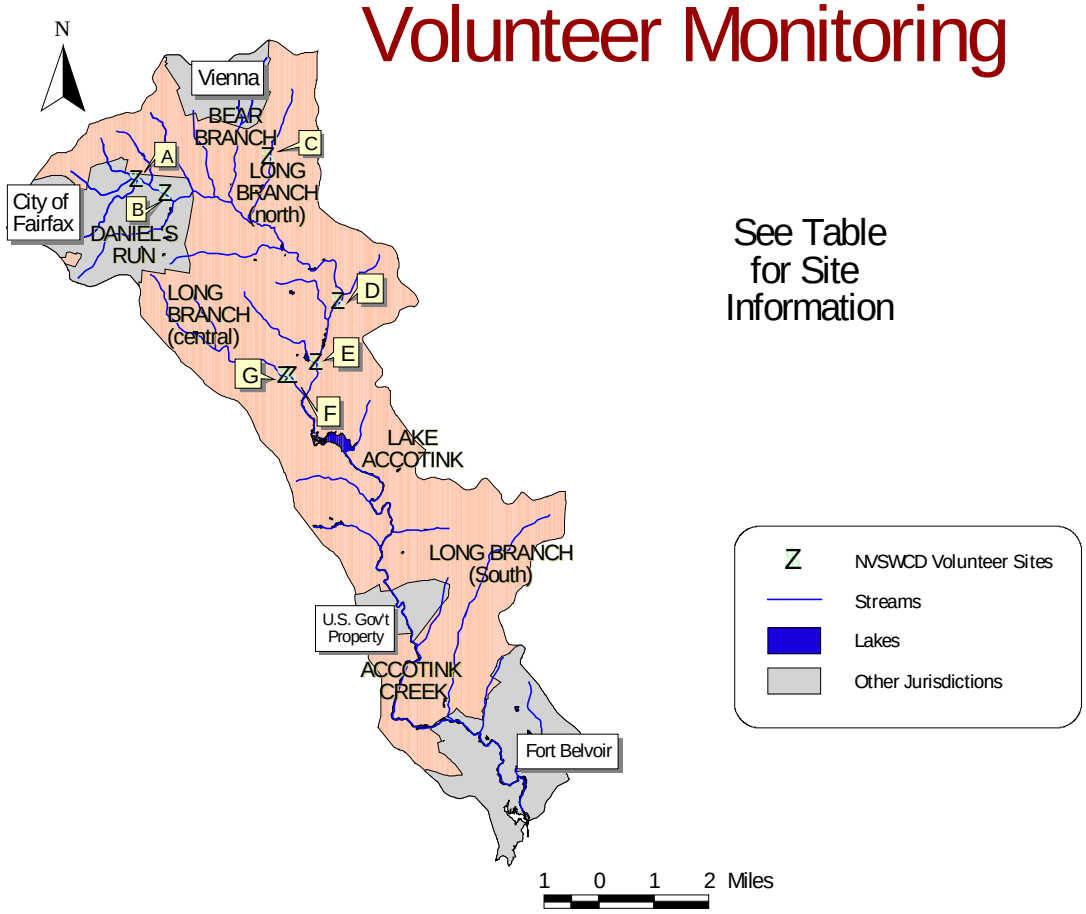
Measures of benthic macroinvertebrate community health were consistently low throughout the entire watershed. In fact, samples from three sites in the drainage, Daniel's Run in Fairfax City, Long Branch North and one site on the mainstem, yielded the lowest IBI scores seen in the entire county. For all watershed samples combined, nearly 100% of the 2,400 individual insects collected are categorized as being tolerant of degraded conditions.

With the exception of Long Branch Central and the lower mainstem of Accotink Creek itself, habitat conditions throughout the watershed were poor. Most of the small tributary systems were severely incised (entrenched), and an overall pattern of active stream widening was evident. The watershed contains extensive areas of unstable habitat, with sloughed and eroded banks, large unstable sediment bars and numerous tree falls and logjams.

The headwaters of Accotink Creek originate in the urbanized areas of Fairfax City and the Town of Vienna, and with the exception of the large parcel of Ft. Belvoir near its mouth, the system flows through areas with levels of imperviousness in excess of 25%. Rankings across the watershed are similarly consistent, with all sites being rated as poor or very poor overall.

The relatively good habitat ratings of the lowermost mainstem sites are the only contrast to the low ecological integrity seen in streams systemwide. While these results may simply reflect the ability of larger-order systems to better absorb and buffer the effects of high flow volumes (at least relative to smaller, lower-order tributaries), the impact may also be indicative of the influence of the upstream dam at Lake Accotink. Reservoir systems have been shown to trap sediments and reduce the intensity and erosive energy of storm flows, and such hydrologic control may be a component responsible for the increased stability in the downstream environment. However, these systems can limit the migration of aquatic species.

Volunteer Monitoring

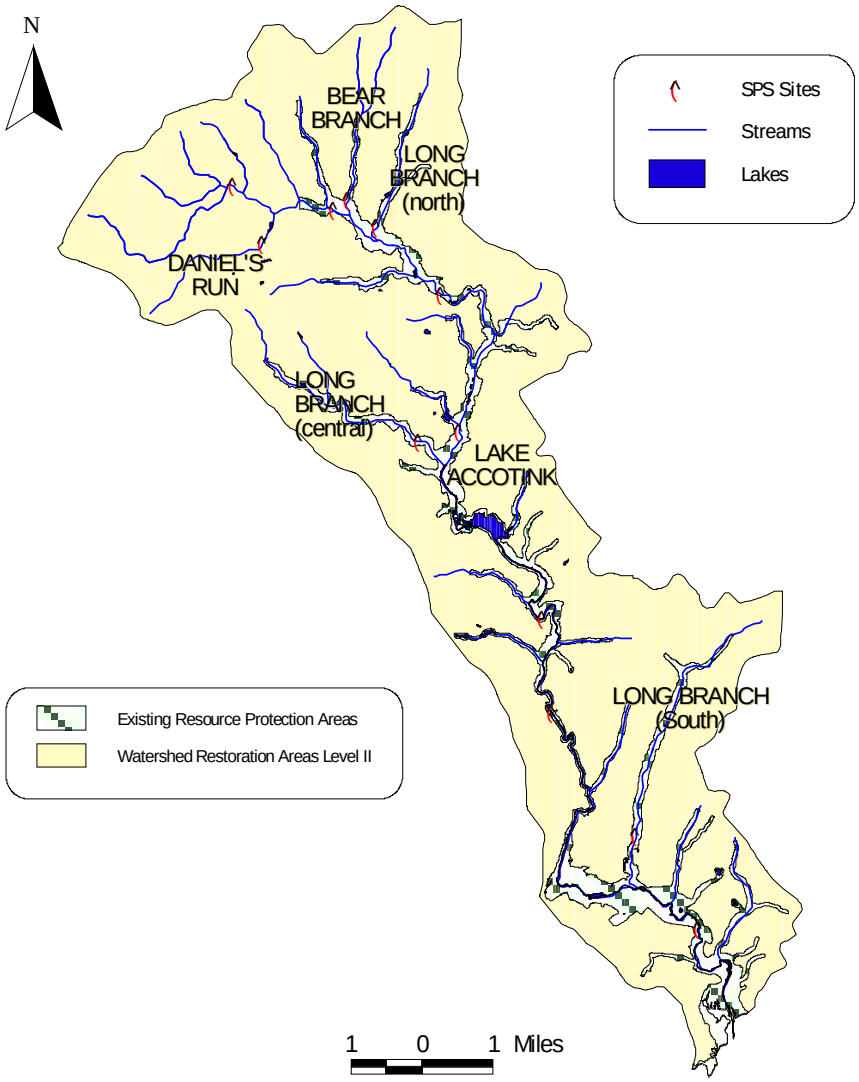


Volunteer Data Summary

There are seven active volunteer monitoring sites within the Accotink Creek Watershed, each of which is coordinated by the Northern Virginia Soil and Water Conservation District (NVSWCD). All but one of these sites are recent additions to the volunteer monitoring inventory. New volunteer monitoring efforts would be useful in many of the tributary environments, as well as locations on the mainstem downstream of Lake Accotink. To date, the volunteer data collected is consistent with the results of SPS monitoring; most of the sites sampled exhibited "Poor" water quality ratings, and none received a ranking higher than "Fair".

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	ACC10	1	####	Fair	too few samples
B	ACC5	2	####	Poor	too few samples, although they were both Poor
C	ACC4	2	####	Poor	too few samples, although they were both Poor
D	ACC2	30	####	Poor	varies from Fair - Poor
E	ACC6	2	####	Fair	too few samples, although the previous one was Poor
F	ACC7	2	####	Fair	too few samples, although the previous one was Poor
G	ACC8	1	####	Fair	too few samples

Management



Management Category Description

Accotink Creek presents a challenge in management. The entire watershed is classified as Watershed Restoration Level II Area, and many opportunities for localized improvements exist. In areas outside of County jurisdiction such as Fairfax City and Fort Belvoir, inter-agency cooperation will be required. The SPS Study shows that stream conditions improve slightly upstream and downstream of Lake Accotink, and

more research is warranted to assess the impact of the reservoir system on the mainstem environment.

OTHER INITIATIVES

USGS Fecal Source Tracking

A 4.5 mile segment of Accotink Creek in Fairfax County, beginning at the confluence of Crook Branch and Accotink Creek to the start of Lake Accotink, was placed on the 1998 Virginia 303(d) Total Maximum Daily Load (TMDL) priority list for fecal coliform impairment. In December 1998, the United States Geological Survey (USGS), the Virginia Department of Conservation and Recreation (DCR), Virginia Department of Environmental Quality (DEQ) and Fairfax County entered into a partnership to pursue a bacteria source tracking study for Accotink Creek as part of a statewide study. Bacteria source tracking is a relatively new technique employed nationwide to positively identify the sources (e.g. human, waterfowl, deer, pets, and other warm-blooded animals) of fecal coliform in streams using genetic fingerprinting. Along with bacteria source tracking the USGS will also develop a fecal coliform TMDL for the Accotink Creek watershed. A TMDL is the loading capacity or greatest load a waterbody can receive without violating water quality standards. The TMDL calculation includes estimates of point source (e.g. municipal and industrial discharges) and nonpoint source (e.g. runoff from urban areas) loads. There are no permitted point source dischargers of fecal coliform bacteria in the Accotink Creek watershed study area. Therefore, the primary sources of fecal coliform bacteria are from nonpoint sources and may include direct runoff, stormwater outfalls, or failing septic systems. The TMDL development process will involve determining the primary sources of fecal pollution, evaluating load allocation scenarios to determine whether water quality standards in the impaired water body will be met, and implementing a plan to reverse the impairment over a certain timeframe.

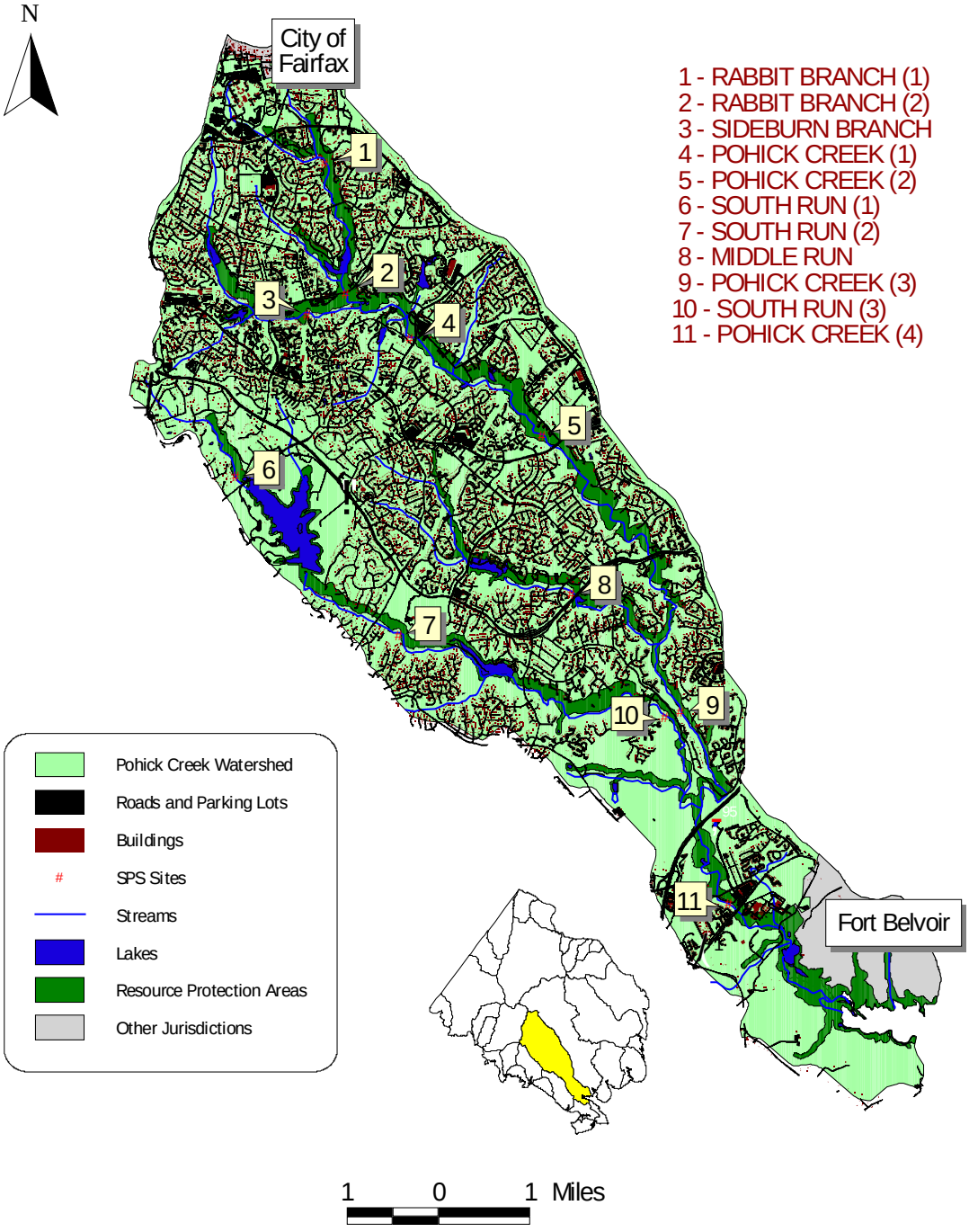
White Sucker
Catostomus commersoni
Size: to 16 inches
Habitat: most freshwater habitats of at least moderate size
Feeding Group: generalist invertivore
Tolerance: tolerant
This widespread and common sucker is highly tolerant of degraded stream conditions. It uses sensitive “taste buds” in its lips to locate food. Large juveniles and adults occupy pools that are fairly deep or that have structural shelter.

Common Carp
Cyprinus carpio
Size: to 28 inches or more, up to 60 pounds
Habitat: virtually any medium or large-sized, slow-moving freshwater habitat
Feeding Group: omnivore
Tolerance: tolerant
The common carp is an introduced species from Europe and Asia, where it has been cultivated for centuries. It is adaptable and hardy. They often feed by rooting in the mud for clams, worms, plants and whatever else they can find. It is a member of the minnow family.

CHAPTER 3

POHICK CREEK WATERSHED SUMMARY

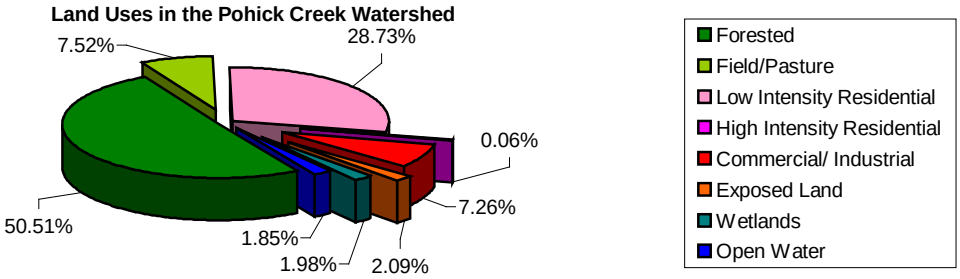
Land Cover


N
City of Fairfax
1 - RABBIT BRANCH (1)
2 - RABBIT BRANCH (2)
3 - SIDEBURN BRANCH
4 - POHICK CREEK (1)
5 - POHICK CREEK (2)
6 - SOUTH RUN (1)
7 - SOUTH RUN (2)
8 - MIDDLE RUN
9 - POHICK CREEK (3)
10 - SOUTH RUN (3)
11 - POHICK CREEK (4)
Fort Belvoir
Pohick Creek Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

CHAPTER 3

Watershed Description

The Pohick Creek watershed, with a drainage area of approximately 34 square miles, comprises eight percent of Fairfax County. Approximately 3.2 square miles of this area are outside of County jurisdiction, lying within Fairfax City or Fort Belvoir. Although the watershed is still predominantly forested, levels of impervious cover are generally very high throughout. There are several impoundments within the watershed including the County's largest, Burke Lake (213 acres), a community-owned park area and regional detention facility. Other impoundments include Barton, Braddock, Mercer, Royal, Huntsman and Woodglen Lakes, all of which were constructed in the late 1970's as part of a pilot, watershed-wide water quality management program known as Public Law 566 (PL566). There are also eight smaller regional stormwater facilities in the watershed.



The headwaters of the system consist of two main tributaries. The first of these, Sideburn Branch, had the highest imperviousness value in the entire watershed at 28.3%. The other tributary, Rabbit Branch, begins in the highly developed areas near George Mason University and Fairfax City. The two systems come together to form the Pohick Creek proper.


Some sections of South Run have exceptionally high quality habitat.

The mainstem travels for several miles through residential communities, collecting input from minor tributaries until it passes under the Fairfax County Parkway (Rte. 7100). Two large tributaries then add to its volume. Middle Run drains Huntsman Lake and a moderately developed residential area; South Run, the largest tributary system in the watershed, drains Burke Lake and Lake Mercer, as well as most of the low-density southwestern side of the watershed. Further downstream, below the Rte. 1 crossing, the Lower Potomac Pollution Control Plant discharges its effluent into the mainstem as it flows toward the Fort Belvoir Military Reservation. Toward its mouth, Pohick Creek is tidally influenced and gradually turns into a freshwater wetland before emptying into Pohick Bay.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Rabbit Branch 1 (PCRA01)	Fair	Fair	Fair	Low	24.4	31
Rabbit Branch 2 (PCRA02)	Fair	Fair	Poor	High	24.2	28
Sideburn Branch (PCSI01)	Very Poor	Very Poor	Poor	High	28.3	40
Pohick Creek 1 (PCPC01)	Fair	Fair	Fair	High	25.8	36
5 Pohick Creek 2 (PCPC02)	Poor	Poor	Fair	Low	25.5	36
South Run 1 (PCSR03)	Good	Fair	Good	Low	10.5	16
7 South Run 2 (PCSR02)	Fair	Poor	Poor	Moderate	9.0	18
Middle Run (PCMI01)	Good	Fair	Good	Moderate	25.5	30
Pohick Creek 3 (PCPC03)	Poor	Poor	Poor	Moderate	24.9	34
South Run 3 (PCSR01)	Excellent	Fair	Excellent	Moderate	12.1	33
Pohick Creek 4 (PCPC04)	Good	Poor	Good	High	20.3	35

Pohick Creek Fish Species List

Common Name	Number of Sites Where Species Occurred (11 Total Sites)	Common Name	Number of Sites Where Species Occurred (11 Total Sites)
Tessellated Darter	11	River Chub	5
Blacknose Dace	11	Margined Madtom	5
White Sucker	10	Creek Chubsucker	4
Swallowtail Shiner	10	Northern Hogsucker	3
Creek Chub	10	Largemouth Bass	3
Satinfin Shiner	8	Brown Bullhead	3
Cutlips Minnow	8	Banded Killifish	2
Common Shiner	8	Pumpkinseed	2
American Eel	8	Rosyside Dace	2
Yellow Bullhead	7	Eastern Mosquitofish	1
Longnose Dace	7	Golden Shiner	1
Redbreast Sunfish	6	Spottail Shiner	1
Green Sunfish	5	Bluntnose Minnow	1
Bluegill	5	Fantail Darter	1

CHAPTER 3

Watershed Condition Summary

Although heavily developed throughout most of its length, the Pohick Creek watershed holds stream systems ranging in quality from some of the worst to some of the best seen in the County.

With few exceptions, fish richness was relatively high throughout the drainage. Only three out of the 11 monitoring sites ranked below the Moderate level. At two separate sites on the Pohick Creek mainstem, a total of 20 or more distinct taxa were identified (a total of 28 were found throughout the entire watershed). Of special note are the two tributary sites in this watershed with the lowest fish taxa counts. Each of these, one on the upper sections of South Run and one on upper Rabbit Branch, was upstream of major impoundments which had the potential to influence the measure by acting as barriers to fish movement.

Measures of benthic macroinvertebrate community integrity were consistently low throughout the watershed, with no sites ranking above the Fair category. Assemblages at each monitoring site were generally dominated by midges and aquatic worms, organisms that are highly tolerant of disturbance. Representatives of the two respective groups accounted for 90% of all the individuals identified in the watershed.

Ratings of habitat integrity ranged widely throughout the drainage. Many of the tributaries and a major portion of the mainstem are experiencing moderate to severe erosion. Active channel widening and significant sediment deposition were common. Several sites on South Run exhibited good habitat condition, a situation that may have been influenced by the two major impoundments on the system. This is especially true of the lowermost site, immediately below Lake Mercer, which received the highest habitat score seen inside Fairfax County and showed signs of near full recovery. The lowermost reaches on Pohick Creek itself were found to be generally more stable.

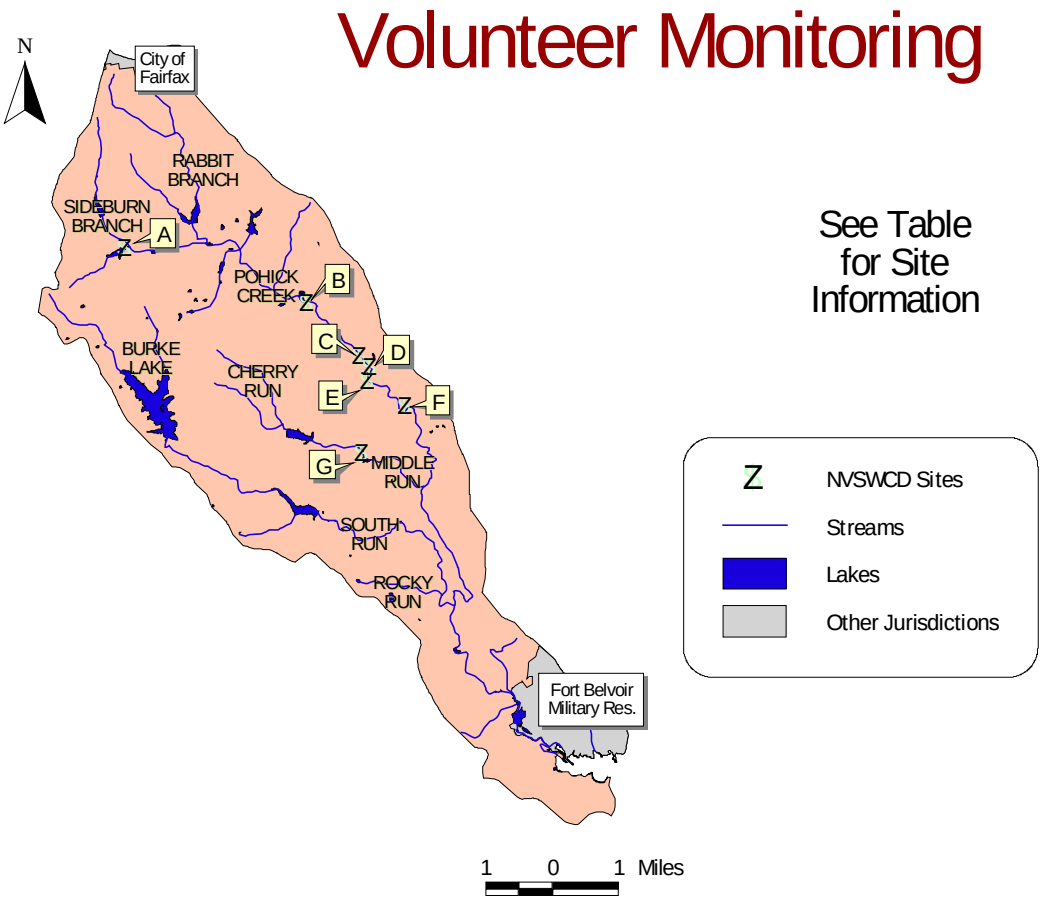
With the exception of the South Run subwatershed (9 to 12% impervious cover), all drainages exhibited levels of imperviousness in excess of 20%. While the sites with lower levels of development intensity were generally the highest in overall composite rating, not all sites fit this trend; several heavily developed areas scored well while other drainages received only modest ratings despite low land use. Middle Run was particularly anomalous in that it scored exceptionally well overall, yet it drained a region with more that 25% impervious cover.

The overall ratings suggest that while the watershed has been degraded throughout most of its length, it maintains relatively healthy aquatic communities in some localized areas, most especially portions of South and Middle Runs. In some other areas, factors independent of land use may be influencing stream quality. This includes the impact of in-line impoundments, which hold the potential to influence both biological and physical characteristics in both the upstream and downstream environments.

CHAPTER 3

Volunteer Data Summary

There are currently seven active volunteer monitoring stations in the Pohick Creek watershed, all of which are coordinated by the Northern Virginia Soil & Water Conservation District (NVSWCD). One is located immediately downstream of Lake Barton on the tributary of Sideburn Branch that drains the lake and another is on Sangster Branch, near the Fairfax County Parkway. The remaining five are clustered on the mainstem within approximately 2 ½ miles of each other. Given the scale of the watershed, expansion of the volunteer effort would be beneficial.



Data from the volunteer monitoring generally supports that of the SPS study, with five mainstem volunteer sites highlighting benthic communities that were generally of low integrity. With one exception, all of the volunteer sampling events have resulted in "Fair" or "Poor" ratings. Results from the site downstream of Lake Barton suggest a lesser degree of impairment, possibly due to the stabilizing influence of the impoundment itself. Further assessments are warranted in this area.

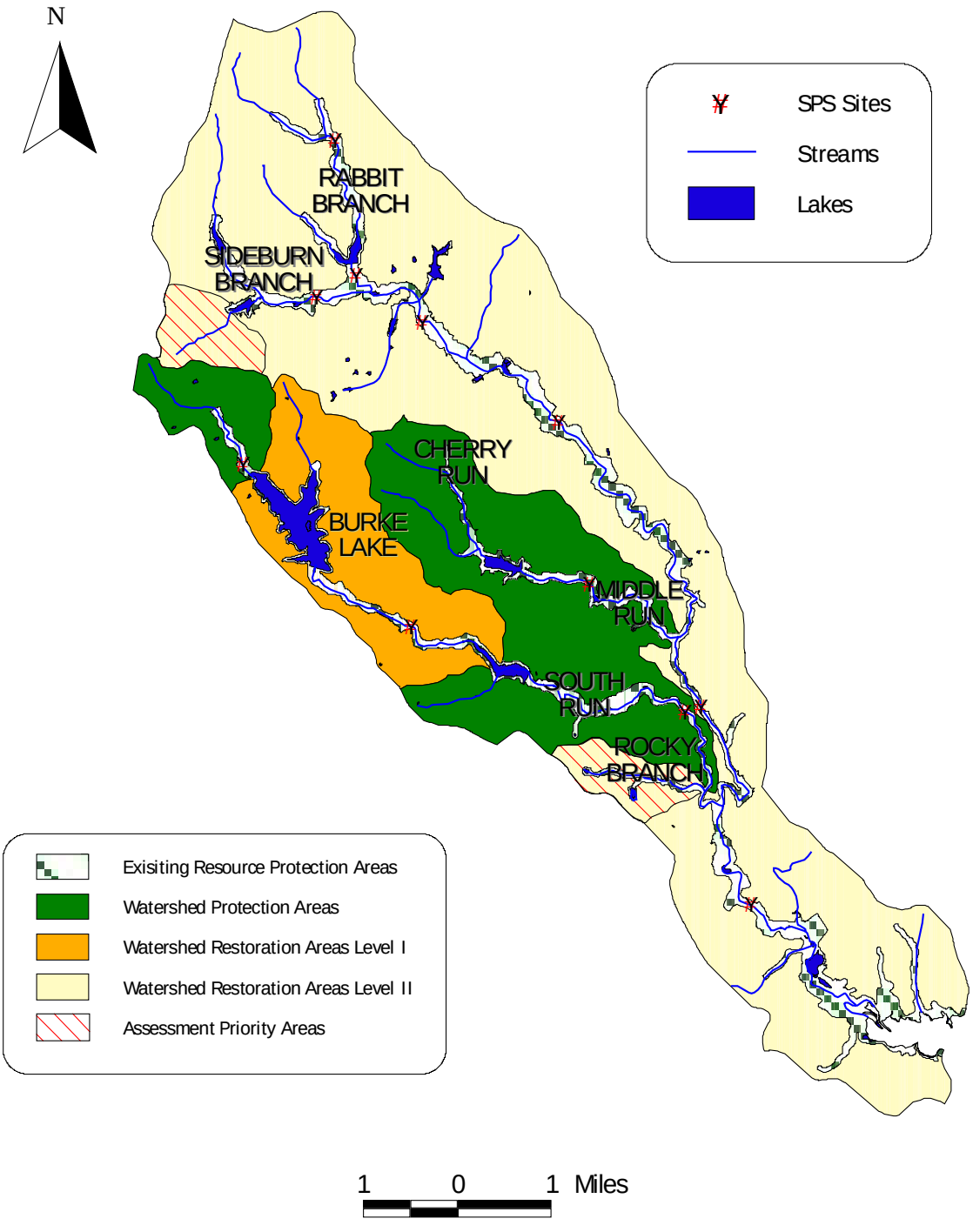
Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	POH1	11	#####	Fair	Varies from Poor - Good
B	POH5	8	#####	Poor	Usually Poor
C	POH8	2	#####	Poor	Varies from Poor - Fair
D	POH7	1	#####	Excellent	Too few samples
E	POH6	5	#####	Poor	Varies from Poor - Fair
F	POH3	14	#####	Fair	Varies from Poor - Fair
G	POH4	11	#####	Fair	Varies from Poor - Fair

Satinfin Shiner
Cyprinella analostana
Size: to 3 inches
Habitat: runs and pools in warm streams
Feeding Group: insectivore, some algae eaten
Tolerance: intolerant
The male satinfin shiner develops an iridescent, greenish-purple colors and hard, white tubercles during the breeding season. Members of this species are also known to be very vocal, using their gas bladders to produce sounds.

Common Shiner
Luxilus cornutus
Size: to 5 inches
Habitat: clear streams of moderate gradient, often in pools
Feeding Group: insectivore
Tolerance: moderate
This widespread minnow can be recognized by its tall, crescent-shaped scales. It is primarily a pool dweller but is occasionally found in fast water. Few live beyond 5 years.

Northern Hogsucker
Hypentilium nigricans
Size: to 15 inches
Habitat: riffles and runs of cool, clear rocky streams
Feeding Group: invertivore
Tolerance: intolerant
The hogsucker is adapted to rapidly flowing waters. It has characteristic, saddle-shaped marks on its back and a concavity on the top of its head, which distinguishes it from other suckers. It feeds by actively disturbing the substrate with its snout and lips.

Management


N
SPS Sites
Streams
Lakes
RABBIT BRANCH
SIDEBURN BRANCH
CHERRY RUN
BURKE LAKE
MIDDLE RUN
SOUTH RUN
ROCKY BRANCH
Exisiting Resource Protection Areas
Watershed Protection Areas
Watershed Restoration Areas Level I
Watershed Restoration Areas Level II
Assessment Priority Areas
1 0 1 Miles

CHAPTER 3

Management Category Description

The Pohick watershed represents a range of biological and habitat conditions from high to low levels of degradation. The higher quality ratings at the lowermost site along Pohick Creek mainstem elevate the priority of the watershed as a whole. To preserve the quality of this site, each of the tributaries should be examined closely for restoration potential. The former D.C Department of Corrections facility in Lorton is currently being developed, and any future activities in the area should be monitored closely to assess their potential influence on stream quality.

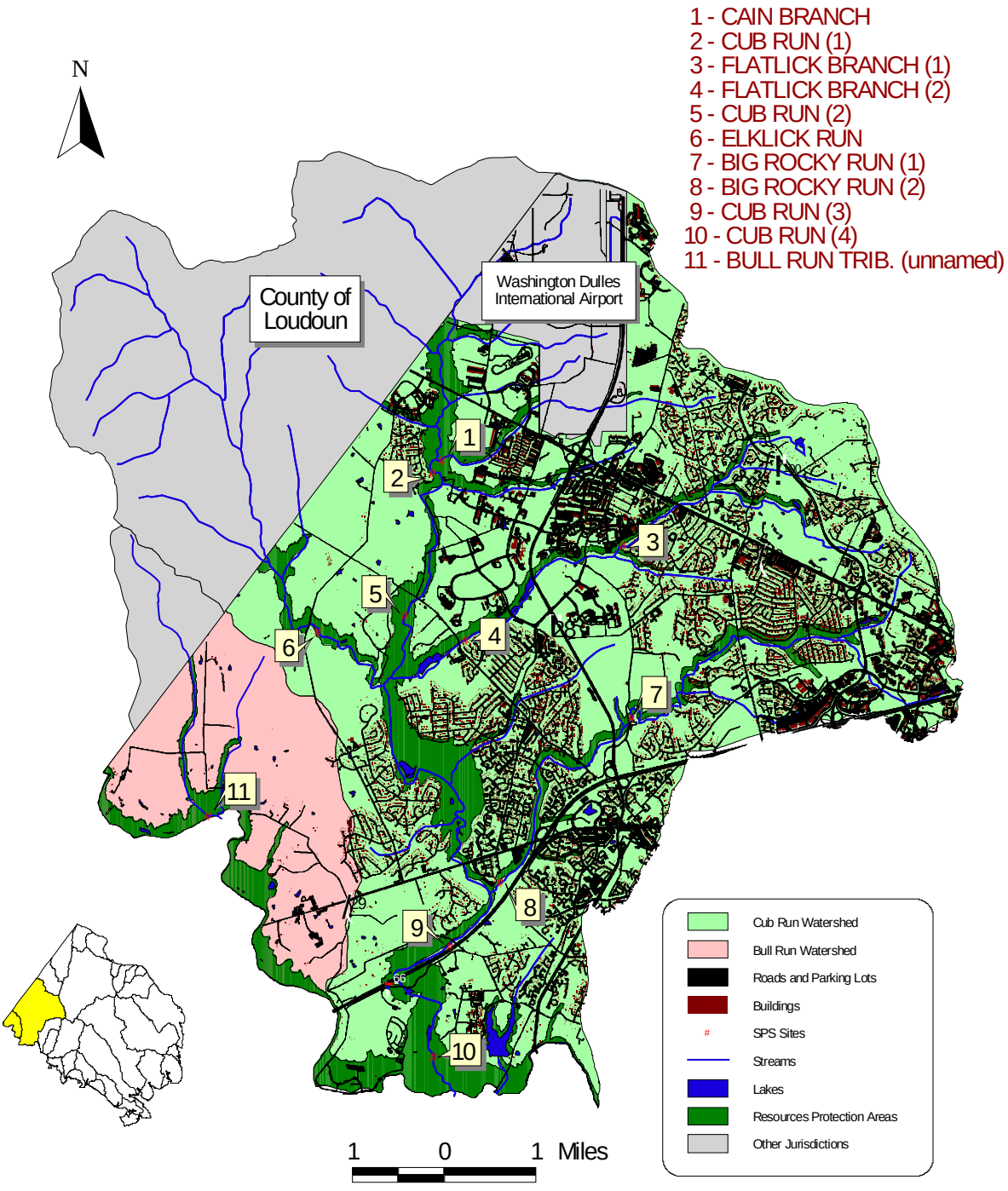
Middle Run and South Run represent the highest scoring areas in the watershed and are classified as Watershed Protection or Watershed Restoration Level I Areas. Every effort should be made to protect the high habitat quality in these tributaries, and further research is needed to determine causes of benthic impairment, especially in the stream reaches between the two major impoundments.

Efforts in the remainder of the watershed, all of which is currently classified as Watershed Restoration Level II Areas, should focus on mitigating erosion problems that are generating the excessive sediment deposition that is so widespread within the drainage. Inter-jurisdictional cooperation between the County, Fairfax City and Fort Belvoir will be needed.

Dobsonflies and Fishflies
Family *Corydalidae*
Habitat Classification: clingers
Feeding Group: predators
Tolerance: intolerant to moderate
The dobsonfly (Hellgrammite) has a very low tolerance to disturbance. They require very clean, high-oxygenated water to live. The Corydalids have been nicknamed “toe-biters” for their large jaws.

CUB RUN AND BULL RUN WATERSHED SUMMARY

Land Cover


1 - CAIN BRANCH
2 - CUB RUN (1)
3 - FLATLICK BRANCH (1)
4 - FLATLICK BRANCH (2)
5 - CUB RUN (2)
6 - ELKLICK RUN
7 - BIG ROCKY RUN (1)
8 - BIG ROCKY RUN (2)
9 - CUB RUN (3)
10 - CUB RUN (4)
11 - BULL RUN TRIB. (unnamed)
N
County of Loudoun
Washington Dulles International Airport
1
2
3
4
5
6
7
8
9
10
11
1 0 1 Miles
Cub Run Watershed
Bull Run Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resources Protection Areas
Other Jurisdictions

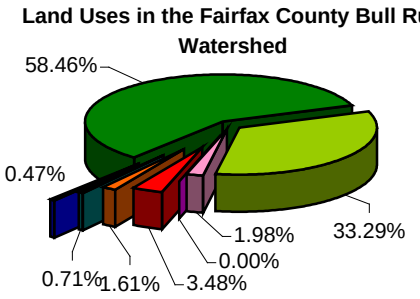
CHAPTER 3

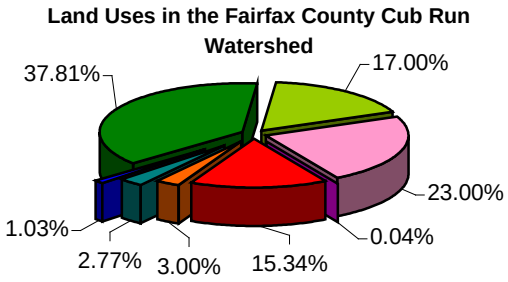
Watershed Description

The Bull Run watershed in Fairfax County is comprised of many small, independent tributaries draining directly into the Bull Run River system, the major source of the Occoquan Reservoir. Only a small portion of its total area is located within Fairfax County, with the remainder contained within the jurisdictions of Loudoun and Prince William Counties. The Fairfax portion of the watershed is mostly undeveloped with levels of imperviousness less than one percent, the lowest in the County.

Sections of streams in the Bull Run watershed have extensive riparian buffer zones.

The Cub Run watershed has an area of roughly 55 square miles, with approximately 17 square miles of this area lying outside of Fairfax in Loudoun County and Washington-Dulles International Airport. Like Bull Run, the watershed is located entirely in the Triassic Basin physiographic province. Eleven regional ponds are found within the drainage.





A variety of land uses are seen within Cub Run, ranging from highly developed urban centers to forest and pastureland. Cub Run has experienced recent growth in housing and commercial areas, mostly in the Centreville area, as suburban development continues to expand westward from Washington, D.C. The western side of the watershed consists of low-density residential communities mixed in with agriculture and forested land.

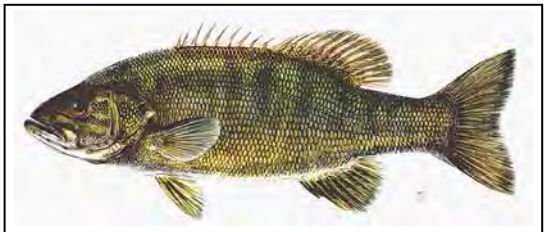
The Cub Run mainstem and its first tributary, Dead Run, begin as a wetland complex on the lightly developed property surrounding Washington-Dulles International Airport. After crossing the Dulles property line into Fairfax County, Cub Run flows for a short distance before increasing its discharge with the addition of Cain Branch, a system that

drains part of Dulles and the residential/commercial area of Chantilly. Cub Run continues south to meet two very different tributaries. Flowing from the east, Flatlick Branch runs through much of the suburban region in and around Chantilly, areas with imperviousness of over 20%. The Elklick Run drainage lies to the west, the 6.5 miles of its mainstem length traveling through lightly developed pasture/agricultural land in Loudoun County, an area with levels of imperviousness averaging under 5%.

Areas of good habitat were common throughout Big Rocky Run in the Cub Run watershed.

Cub Run receives a final input from Big Rocky Run, a system which begins just west of Fair Oaks Mall and flows southwest through the heavily developed suburban areas of Fair Lakes and Centreville. After this confluence, the mainstem runs parallel to, and then crosses under, I-66. For the remainder of its course, Cub Run meanders south through the forested area of Bull Run Regional Park before joining the Bull Run River system on its way to the Occoquan Reservoir.

Largemouth Bass
Micropterus salmoides
Size: to 15 inches or more
Habitat: clear, warm water in ponds, lakes and pools medium/large streams and rivers.
Feeding Group: predator
Tolerance: moderate
This native North American fish has been introduced around the world due to its popularity as a game fish. During spawning, which usually occurs in late spring and early summer, males make and guard large nests. It is not uncommon for largemouth to live past 10 years.



Smallmouth Bass
Micropterus dolomieu
Size: to 20 inches
Habitat: medium/large rivers, gravelly and rocky substrates preferred
Feeding Group: predator
Tolerance: moderate
The Smallmouth Bass is one of the more popular freshwater sport fishes across its range. After spawning in early May, the males will vigorously defend the nests until after the eggs hatch. Larger juveniles and adults primarily feed on crayfishes and fishes but also insects.

Cutlips Minnow
Exoglossum maxillingua
Size: to 6 inches
Habitat: medium/large streams, gravelly and rocky bottoms preferred
Feeding Group: insectivore
Tolerance: intolerant
This minnow is named after the structure of its lower jaw, which is tri-lobed. The center portion is narrow and bony, and is thought that this adaptation might be used for scraping snails and insect larvae from the stream bottom and then crushing them against its upper jaw.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Cain Branch (CUCB01)	Fair	Fair	Poor	Moderate	16.8	51
2 Cub Run (CUCU02)	Good	Good	Fair	Low	8.4	43
3 Flatlick Branch 1 (CUFB01)	Poor	Poor	Poor	High	21.2	39
4 Flatlick Branch 2 (CUFB02)	Poor	Fair	Fair	Low	22.6	49
5 Cub Run 2 (CUCU03)	Good	Poor	Good	Moderate	10.4	46
6 Elklick Run (CUER02)	Fair	Fair	Fair	Very Low	2.2	5
7 Big Rocky Run 1 (CUBR01)	Good	Fair	Excellent	High	27.4	47
8 Big Rocky Run 2 (CUBR02)	Fair	Fair	Fair	Moderate	27.7	44
9 Cub Run 3 (CUCU04)	Poor	Fair	Very Poor	Moderate	12.2	32
Cub Run 4 (CUCU05)	Good	Fair	Fair	Moderate	12.0	31
Bull Run Tributary (BLBT01)	Excellent	Excellent	Fair	High	0.8	5

Cub Run and Bull Run Fish Species List

Common Name	Number of Sites Where Species Occurred (11 Total Sites)	Common Name	Number of Sites Where Species Occurred (11 Total Sites)
Green Sunfish	11	Fallfish	5
Fantail Darter	10	Creek Chubsucker	4
Redbreast Sunfish	10	Cutlips Minnow	4
Bluegill	10	Common Shiner	4
Swallowtail Shiner	9	Smallmouth Bass	4
Bluntnose Minnow	9	Northern Hogsucker	3
Largemouth Bass	8	Comely Shiner	3
Longnose Dace	8	Blacknose Dace	3
Yellow Bullhead	6	River Chub	2
White Sucker	6	Golden Shiner	2
Tessellated Darter	6	Shield Darter	2
Eastern Mosquitofish	6	Rosyside Dace	1
Satinfin Shiner	6	Gizzard Shad	1
Pumpkinseed	5	Eastern Silvery Minnow	1
Spottail Shiner	5	Margined Madtom	1
Creek Chub	5		

CHAPTER 3

Watershed Condition Summary

In combination, the Cub Run and Bull Run watersheds exhibit a wide range of stream quality conditions, a reflection of the large variations in the intensity of land development seen across their respective drainages.

The fish richness in the two watersheds was relatively high compared to other watersheds in the County. Over 30 fish taxa were found throughout the two basins, with samples for the two lowermost sites on the Cub Run mainstem each yielding 22 distinct taxa. The most notable exception to this pattern was Elklick Run, a system with part of its drainage in Loudoun County, which scored in the very lowest category.

Within the Cub Run basin, many of the benthic macroinvertebrate samples collected were ranked as Fair, indicating a certain level of stream degradation systemwide. Conversely, the Bull Run monitoring site was ranked in the highest category, with almost 30% of the community being comprised of intolerant taxa.

Throughout both drainages, RBP values demonstrated an overall trend toward Fair habitat quality, with many sites showing the impact of substantial sediment deposition and the associated substrate embeddedness. An exception of note was Big Rocky Run in Cub Run, which received the highest ranking for overall quality of instream and riparian zone habitat. This high rating may be due to the fact that Big Rocky Run is protected within the Elanor C. Lawrence Park.

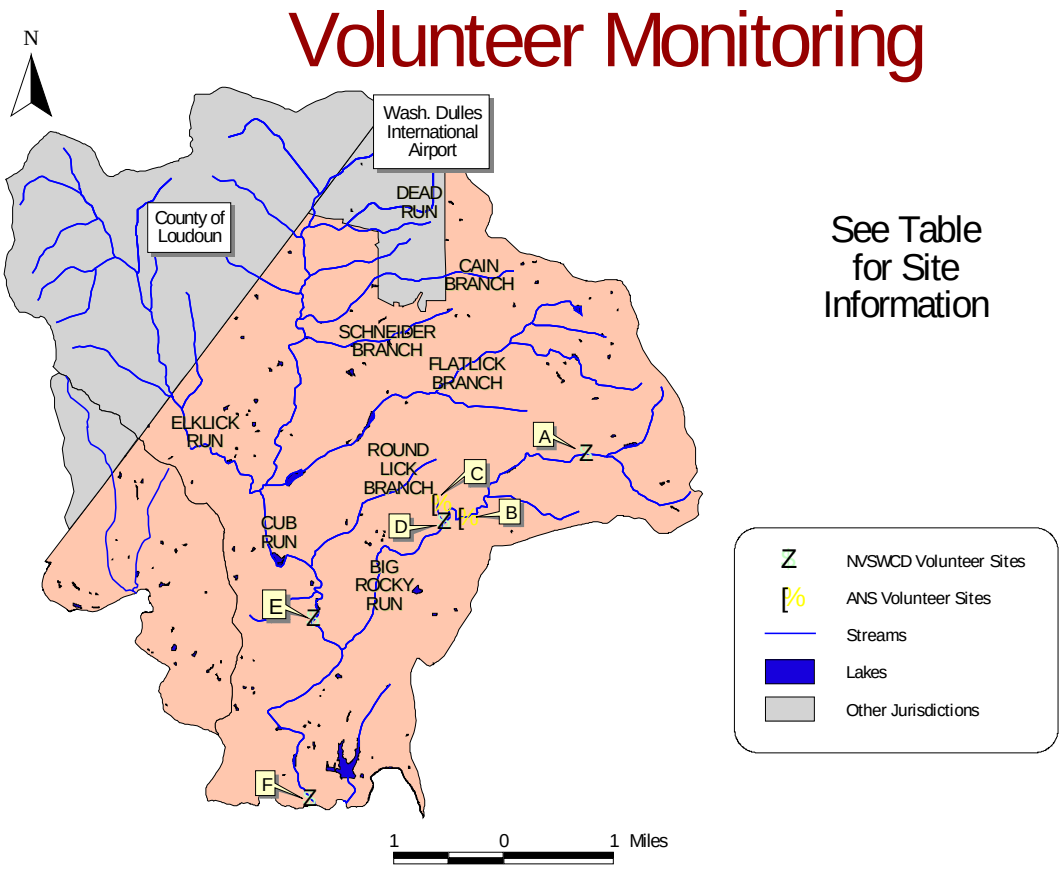
An extremely wide range of imperviousness values (2.2 to 27.7%) exists across the individual subwatersheds of the Cub Run drainage, reflecting both its recent past as farmland and the increasing level of development occurring in its eastern regions. In stark contrast, the Bull Run watershed is almost entirely undeveloped and still exhibits imperviousness values less than one percent. In both cases, the overall site rankings correspond to land use and their biological and habitat components generally decrease along a gradient of increasing development.

Given that the Bull Run basin is uniformly undeveloped in the County, these results serve to further highlight the area's value as a unique resource within Fairfax County. Although some subwatersheds within the Cub Run drainage have been significantly degraded, it also possesses many systems of high quality, including some within areas with high levels of imperviousness that may be just now approaching the threshold for impairment of biological integrity.

CHAPTER 3

Volunteer Data Summary

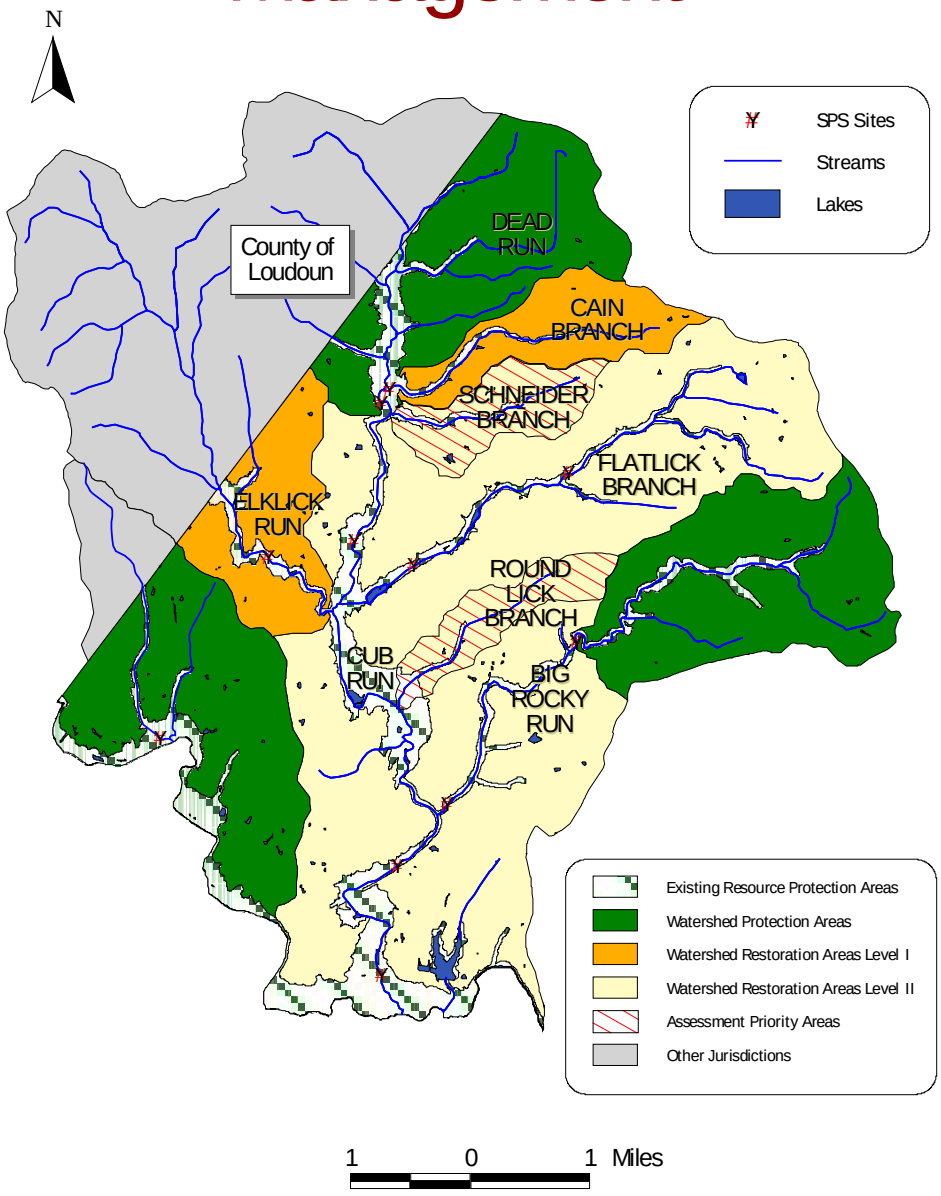
There are currently six active volunteer monitoring stations in the Cub Run Watershed. The Northern Virginia Soil and Water Conservation District (NVSWCD) coordinates four, while the remaining two are operated by the Audubon Naturalist Society (ANS). The NVSWCD sites are recent additions to its countywide program.



Both volunteer efforts indicated the presence of relatively diverse communities within many sections of the mainstem, but they differed somewhat in their assessment of the Big Rocky Run tributary. Both NVSWCD sites on Big Rocky Run showed a high quality benthic community, but each has been sampled only once. The ANS site on Big Rocky Run has consistently shown dominance by tolerant taxa. This variation may be caused by local factors or be time-dependent. Continued sampling should resolve the issue.

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	CR4	1	####	Excellent	Too few samples
B	010	3	####	N/A	Dominated by tolerant forms
C	009	3	####	N/A	Many sensitive taxa present, very diverse
D	CR5	1	####	Good	Too few samples
E	CR1	3	####	Good	All have been good
F	CR6	1	####	Good	Too few samples

Management



Management Category Description

Cub Run and Bull Run watersheds represent a gradient of land use types and associated stream quality, which necessitates a range of management alternatives. Headwaters of Cub Run and Bull Run fall into the Watershed Protection category because of their high biological quality; however, both scored low in the habitat assessment, so a closer look at instream habitat restoration is warranted in these areas.

The upper portion of Big Rocky Run is also classified as Watershed Protection, but further research should focus on identifying the factors limiting the biological community.

Both Elklick Run and Cain Branch were classified in the higher priority Watershed Restoration Level I category. Elklick Run has some degree of biological impairment despite low levels of development, and the area warrants further study. Cain Branch received the same priority classification because it flows into the headwaters of Cub Run, a designated Protection Area. The level of imperviousness in the Cain Branch subwatershed is currently slightly above the generally accepted threshold of biological impairment, but this gives us an opportunity to take active measures now before degradation continues.

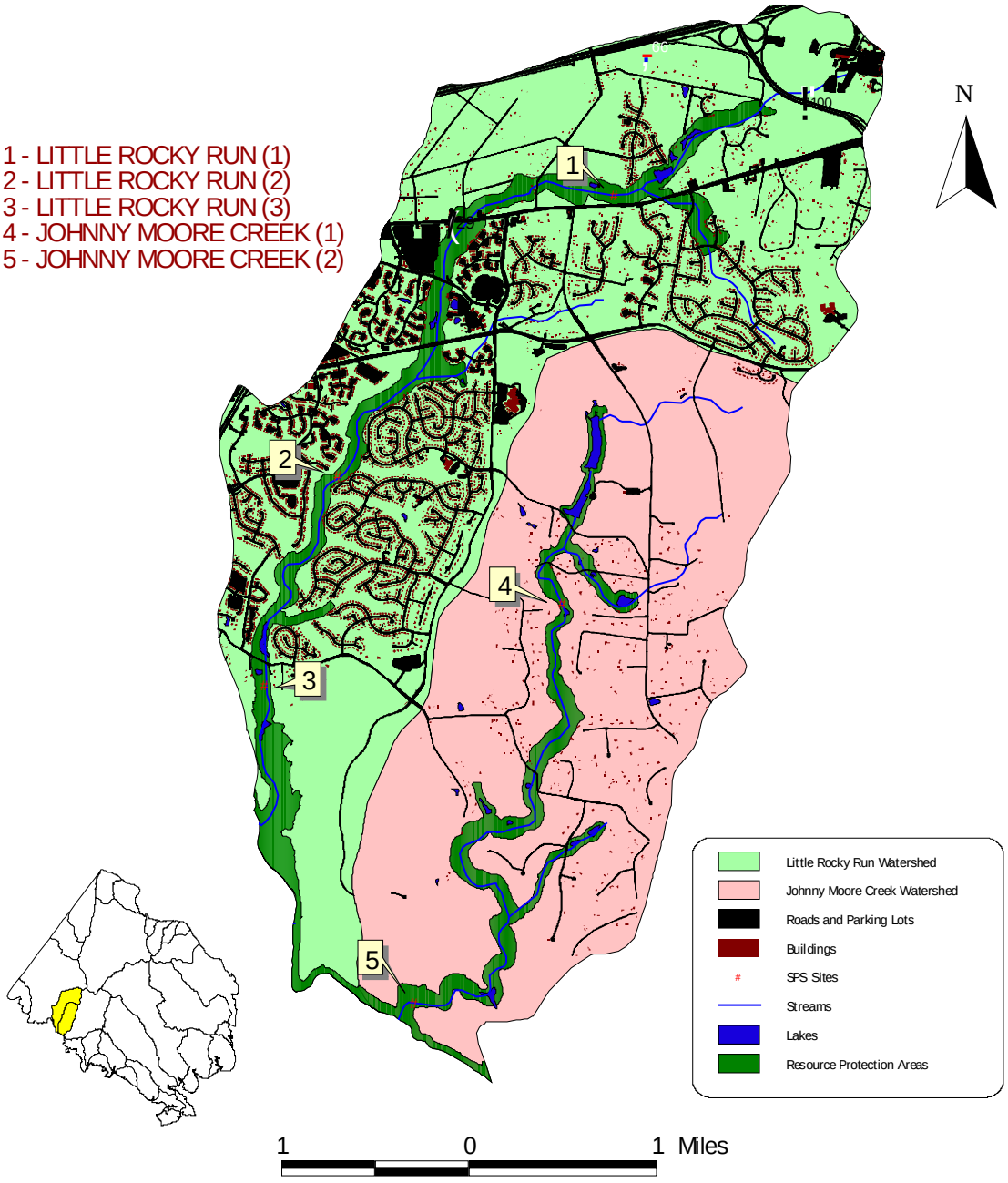
The remainder of the watershed, including the mainstem, are classified as Watershed Restoration Level II Areas. Some of the lower reaches of the mainstem received a Good ranking, raising the priority of the watershed relative to other drainages in the County. Two smaller tributaries, Schnieder Branch and Round Lick Branch, are highlighted as areas for further study due to lack of information about current conditions in these subwatersheds.

Common Stonefly
Family *Perlidae*
Habitat Classification: clingers
Feeding Group: predators
Tolerance: intolerant
Stoneflies require cool, well oxygenated water to survive, which leads them to be very susceptible to human disturbance. Their bodies are flattened to limit exposure to current flow.

CHAPTER 3

LITTLE ROCKY RUN AND JOHNNY MOORE CREEK WATERSHED SUMMARY

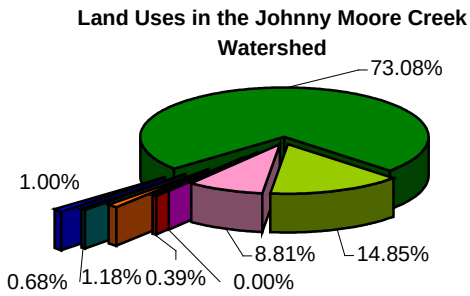
Land Cover

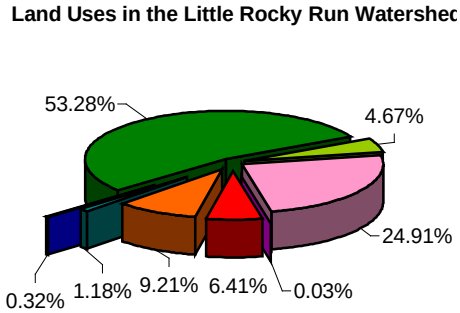

1 - LITTLE ROCKY RUN (1)
2 - LITTLE ROCKY RUN (2)
3 - LITTLE ROCKY RUN (3)
4 - JOHNNY MOORE CREEK (1)
5 - JOHNNY MOORE CREEK (2)
N
1
2
3
4
5
Little Rocky Run Watershed
Johnny Moore Creek Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
1 0 1 Miles

CHAPTER 3

Watershed Description

The two small watersheds that make up this group, Little Rocky Run and Johnny Moore Creek, lie predominately within the Triassic Basin and Piedmont Upland physiographic provinces, respectively. They are bordered on the west by Cub Run and to the east by the Pope's Head Creek drainage. The two systems are very different in terms of level of development. Their combined area contains six regional ponds.





The headwaters of Little Rocky Run begin near the interchange of I-66 and the Fairfax County Parkway (Rte. 7100). These small systems flow through low- to moderate-density residential communities. Once fully formed the mainstem heads south, crossing under Rte. 29, and continuing for nearly three miles through higher density residential areas of southeastern Centreville. After flowing under Compton Road, Little Rocky Run meanders almost a mile through a largely undeveloped area before emptying into the Bull Run River.

Sections of streams in Little Rocky had very stable banks indicative of high quality habitat.

The Johnny Moore watershed is relatively undeveloped with levels of imperviousness below five percent. The system begins at Twin Lakes Golf Course near the intersection of Braddock and Clifton Roads. It runs generally southward through low-density residential areas before flowing into Bull Run.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Little Rocky Run 1 (LRLR01)	Fair	Poor	Good	High	14.6	27
2 Little Rocky Run 2 (LRLR02)	Good	Fair	Good	High	17.7	32
3 Little Rocky Run 3 (LRLR03)	Fair	Poor	Good	Moderate	19.1	33
4 Johnny Moore Creek 1 (JMJM01)	Excellent	Good	Good	High	2.6	6
5 Johnny Moore Creek 2 (JMJM02)	Excellent	Poor	Good	High	2.4	5

Little Rocky Run and Johnny Moore Creek Fish Species List

Common Name	Number of Sites Where Species Occurred (5 Total Sites)	Common Name	Number of Sites Where Species Occurred (5 Total Sites)
Fantail Darter	5	Eastern Mosquitofish	2
Tessellated Darter	5	Northern Hogsucker	2
Green Sunfish	5	Redbreast Sunfish	2
Longnose Dace	5	White Sucker	2
Creek Chub	5	Largemouth Bass	2
Cutlips Minnow	4	Yellow Bullhead	1
Bluegill	4	Satinfin Shiner	1
Swallowtail Shiner	4	Eastern Silvery Minnow	1
Bluntnose Minnow	4	Pumpkinseed	1
Blacknose Dace	4	Warmouth	1
Smallmouth Bass	3	Common Shiner	1
Fallfish	3	River Chub	1
Rosyside dace	3	Golden Shiner	1
Creek Chubsucker	2	Spottail Shiner	1

CHAPTER 3

Watershed Condition Summary

Although the watersheds of Little Rocky Run and Johnny Moore Creek differ from one another in terms of intensity of land use and some aspects of overall biological integrity, their combined area still contains some of the higher quality stream systems found within the Piedmont Upland Region.

Fish taxa richness in the two watersheds was equal, with 21 individual species found in each. Sites in both systems were consistently rated in the upper categories, the region as a whole supporting some of the richest fish communities in the entire County.

With the exception of one site within the Johnny Moore basin, measures of benthic macroinvertebrate community integrity indicated a certain level of impairment across both watersheds, with sites ranging from Fair to Poor. Most communities were dominated by aquatic worms and/or midges, organisms generally considered tolerant of degraded conditions.

Although sediment deposition and bank stability ratings limited overall habitat rankings across the region, instream and riparian zone conditions were generally good throughout both watersheds. Some sample reaches within Little Rocky Run did show evidence of instability, most commonly in the form of active channel widening. Such conditions were less common in Johnny Moore, with areas of degradation often exhibiting early signs of recovery.

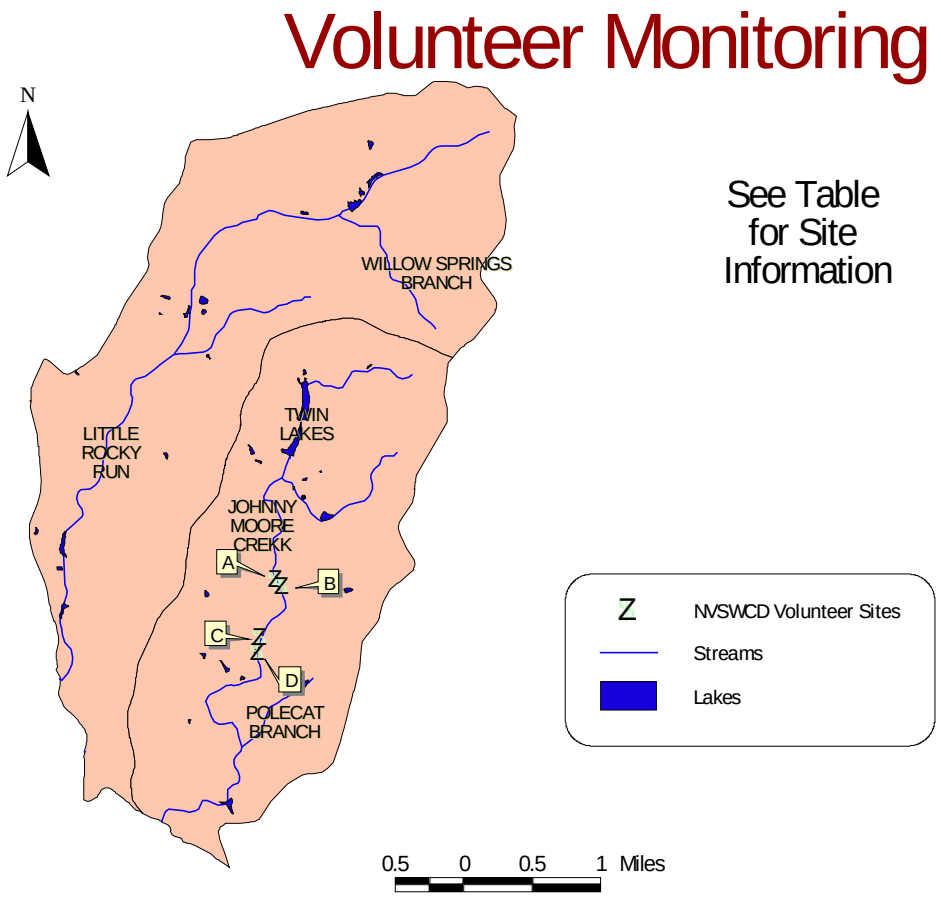
Levels of impervious cover differ dramatically between the two watersheds, with Johnny Moore exhibiting some of the lowest levels seen in the County (< three percent) and several areas of Little Rocky approaching 20%. These differences in land use reinforce the moderate trend in biological and habitat integrity seen across the region.

Despite considerable differences in development intensity, both drainages contain relatively intact aquatic systems. The largely undisturbed nature of the Johnny Moore watershed places it among the most valued and unique resources within Fairfax County. Holding elements of equal significance, Little Rocky Run is currently a semi-degraded system potentially approaching a threshold of biological integrity.

CHAPTER 3

Volunteer Data Summary

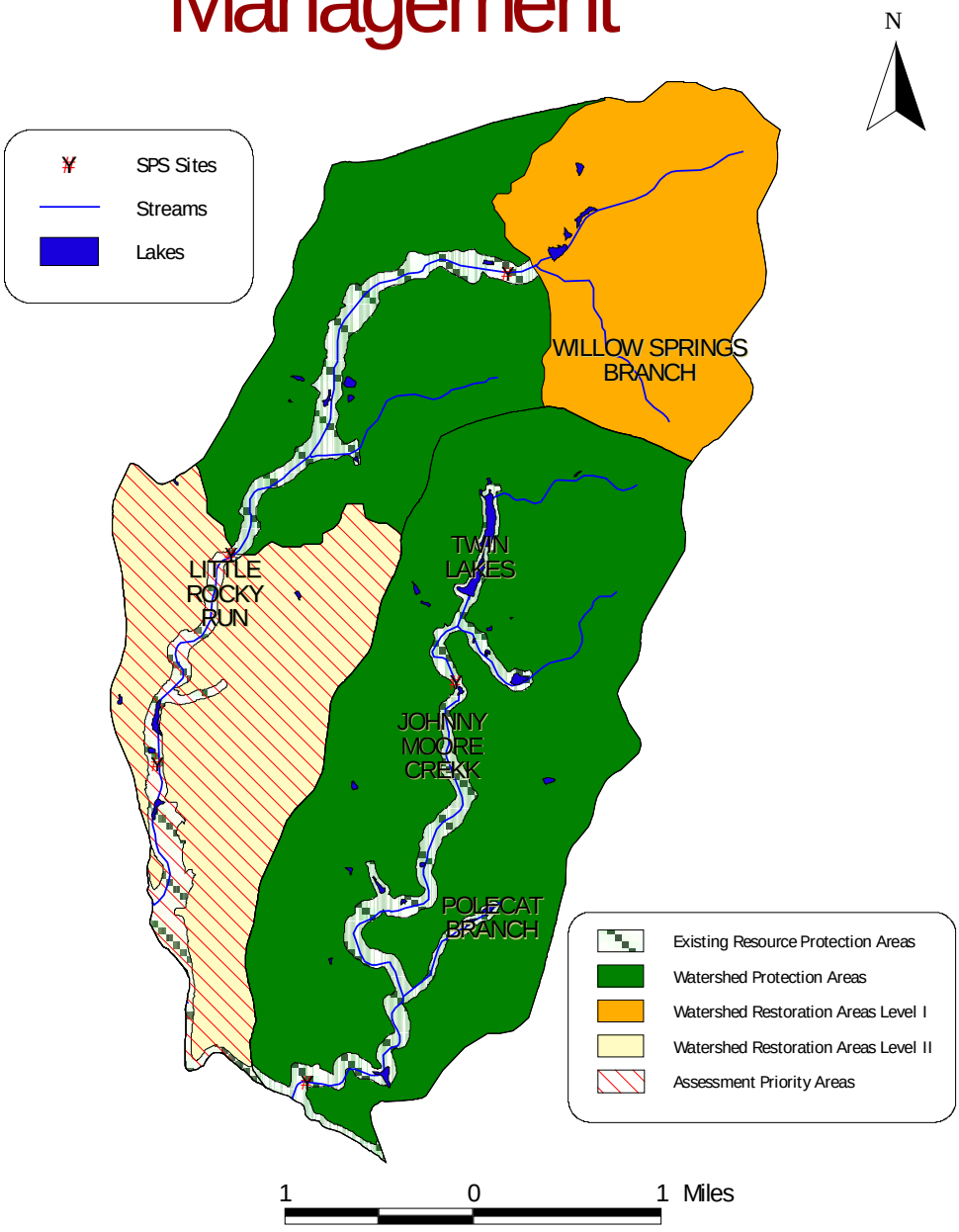
The Northern Virginia Soil and Water Conservation District (NVSWCD) coordinates four volunteer monitoring sites in the Johnny Moore Creek Watershed. While monitoring in the watershed has been ongoing for several years, two of these sites are relatively recent additions. There are currently no volunteer efforts underway in the Little Rocky Run watershed, but given the dramatic change in the condition of the system's mainstem highlighted by SPS sampling, additional volunteer monitoring sites in this area would be an especially useful complement to the existing program.



All of the data collected is well correlated with the SPS findings of a largely healthy benthic community within the Johnny Moore Creek mainstem.

Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	JMC3	1	#####	Good	Too few samples
B	JMC1	11	#####	Excellent	Generally Good - Excellent
C	JMC2	8	#####	Good	Generally Good - Excellent
D	JMC4	1	#####	Good	Too few samples

Management



Management Category Description

Many sections of both watersheds are under the zoning ordinance of the Water Supply Protection Overlay District (WSPOD) to protect the quality of water draining directly into the Occoquan reservoir. The Centerville area is exempt from this ordinance, a fact that explains the abrupt differences in land use and imperviousness between the two watersheds.

CHAPTER 3

All of Johnny Moore and the middle portion of Little Rocky are classified as Watershed Protection Areas. Despite this overall ranking, benthic community integrity at many sites was still rated as Poor, and further research is needed to determine the specific factors influencing this measure of system health.

Because it drains into a designated Protection area, the upper portion of Little Rocky Run is classified as a Watershed Restoration Level I Area. This area deserves close attention due to the projected increase in imperviousness within this watershed.

The lower portion of Little Rocky Run is classified as a Watershed Restoration Level II Area. It is also designated as an Assessment Priority Area, reflecting the uncertainty over the dramatic change in condition seen between monitoring sites along the system's mainstem. Efforts should be made to identify the source(s) most responsible for the obvious degradation.

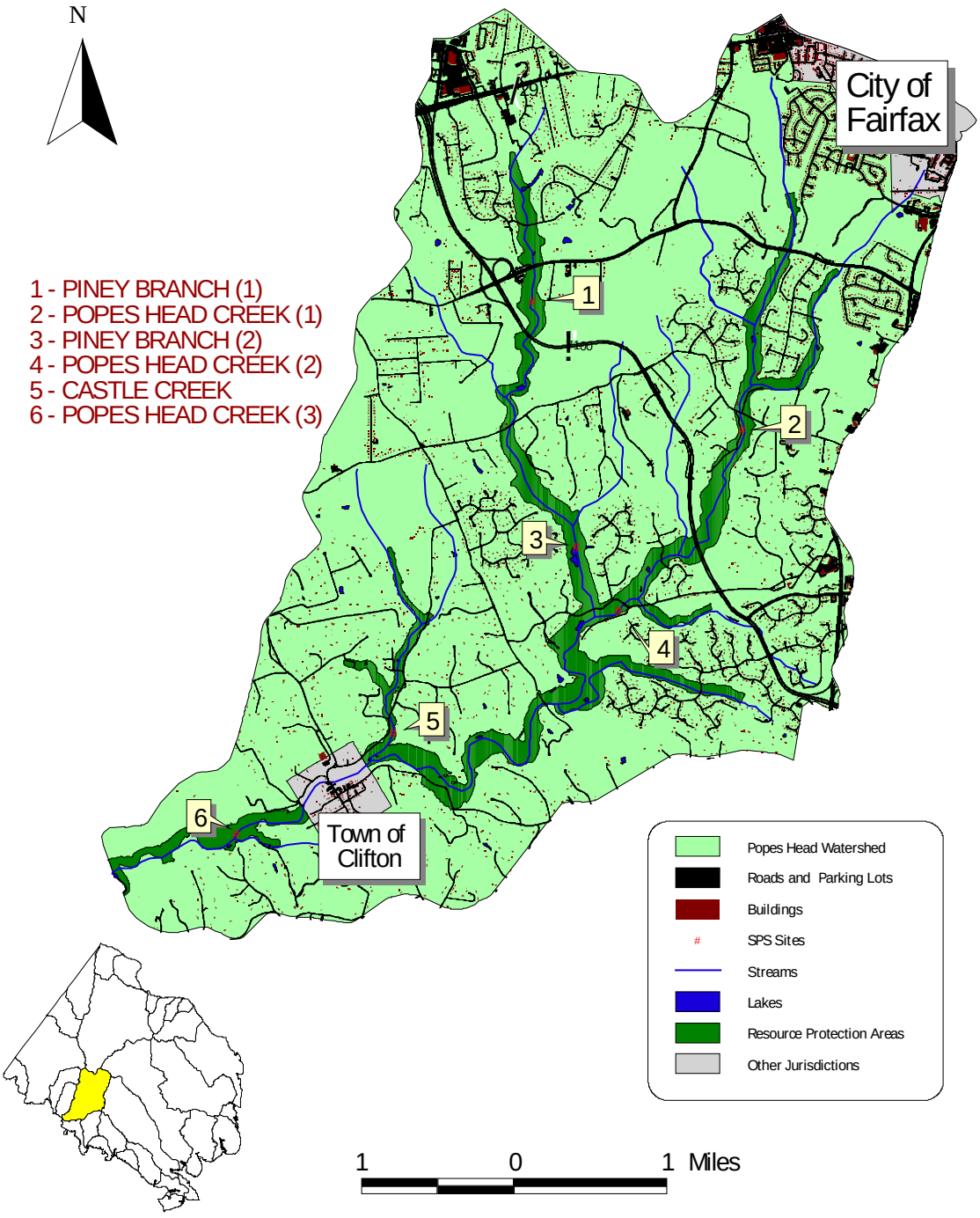
Swallowtail Shiner
Notropis procne
Size: to 2.5 inches
Habitat: in pools of warm, clear streams of moderate to low gradient
Feeding Group: invertivore
Tolerance: intolerant
This minnow feeds on worms, mites, microcrustaceans, aquatic and terrestrial insects, diatoms and algae. Spawning occurs from mid-May to late July by depositing their eggs on the nests of other fish.

Fantail Darter
Etheostoma flabellare
Size: to 3 inches
Habitat: typically in riffles and runs of gravelly or rocky, clear streams
Feeding Group: insectivore
Tolerance: moderate
The fantail darter breeds by depositing eggs in small crevices on the undersides of rocks. The male then aggressively defends the nest until the eggs hatch. While guarding the eggs the male's body secretes antifungal and antibiotic compounds to help protect the eggs.

CHAPTER 3

POPES HEAD WATERSHED SUMMARY

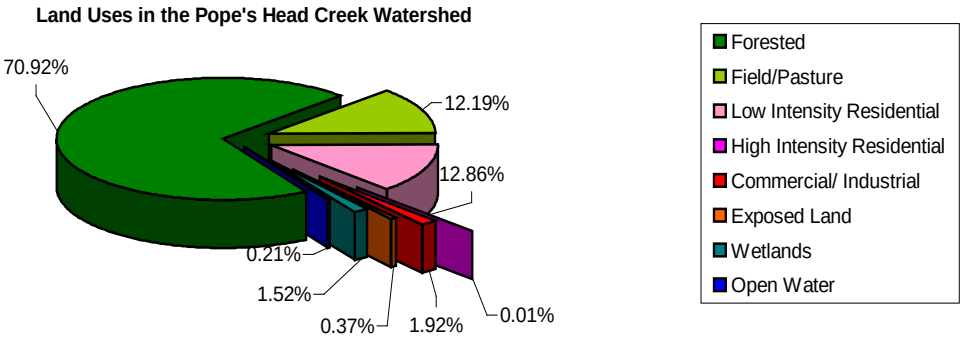
Land Cover


N
1 - PINEY BRANCH (1)
2 - POPES HEAD CREEK (1)
3 - PINEY BRANCH (2)
4 - POPES HEAD CREEK (2)
5 - CASTLE CREEK
6 - POPES HEAD CREEK (3)
City of Fairfax
Town of Clifton
1
2
3
4
5
6
Popes Head Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

CHAPTER 3

Watershed Description

The Pope's Head Creek watershed is located along the southwestern edge of Fairfax County. The watershed lies entirely within the Piedmont Uplands physiographic province and is characterized by rocky substrates and forestland throughout. The entire watershed is under County jurisdiction with the exception of the Town of Clifton and a small portion of Fairfax City. Development within the watershed consists of low-density residential communities, and levels of imperviousness across the drainage are correspondingly low.



Severe stream bank erosion is common throughout much of the Popes Head drainage.

Both Pope's Head Creek and its primary tributary, Piney Branch, begin in highly impervious areas surrounding the City of Fairfax. Each system flows south under Braddock Rd. and the Fairfax County Parkway (Rte. 7100) and then through low-density residential communities. After their confluence, the mainstem meanders toward Clifton, where it receives the input of Castle Creek, a smaller system draining a lightly developed area along the western side of the watershed. A little over a mile below this point, the creek empties into the Bull Run River.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite	Environmental Variables				
	Site Condition Rating	Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
Piney Branch 1 (PHPI01)	Fair	Poor	Fair	High	12.8	14
Popes Head Creek 1 (PHPH01)	Good	Poor	Fair	High	13.1	20
Piney Branch 2 (PHPI02)	Fair	Poor	Poor	High	8.3	9
Popes Head Creek 2 (PHPH02)	Fair	Fair	Poor	Moderate	11.4	14
Castle Creek (PHCC01)	Excellent	Fair	Good	High	3.9	5
Popes Head Creek 3 (PHPH03)	Good	Poor	Fair	Moderate	8.0	10

Popes Head Creek Fish Species List

Common Name	Number of Sites Where Species Occurred (6 Total Sites)
White Sucker	6
Tessellated Darter	6
Green Sunfish	6
Bluegill	6
Swallowtail Shiner	6
Creek Chub	6
Rosyside Dace	5
Fantail Darter	5
Cutlips Minnow	5
Redbreast Sunfish	5
Common Shiner	5
Bluntnose Minnow	5
Blacknose Dace	5
Fallfish	5
Longnose Dace	4
Northern Hogsucker	3
Largemouth Bass	3
Yellow Bullhead	2
Pumpkinseed	1
Smallmouth Bass	1
River Chub	1
Golden Shiner	1
Margined Madtom	1

Fallfish
Semotilus corporalis
Size: to 12 inches
Habitat: clear, sandy- or rocky-bottom streams and rivers of moderate to low gradient
Feeding Group: planktivore (juvenile), generalist predator (adult)
Tolerance: moderate
The fallfish is the largest native minnow east of the Rockies. It is less tolerant of degraded stream conditions than its smaller cousin, the creek chub. Adults have mirrorlike, silver scales. During the breeding season, they build large nest mounds with stones of up to a pound. They may live up to 9 years.

CHAPTER 3

Watershed Condition Summary

While overall site rankings throughout this watershed were generally above average for the County, low scores for some biological measures—even in the presence of better quality habitat—may indicate that the levels of land development in the drainage (currently low to moderate) may be approaching a threshold of ecological integrity.

Fish communities in this watershed appear to be among the richest within Fairfax County. This was true even in the smaller, lower order tributaries which are most susceptible to disturbance. Nineteen distinct taxa were identified at one site on Piney Branch alone, and no site in the entire drainage, regardless of stream order, had less than 14 individual species of fish. These levels were similar to those found under reference conditions.

Measures of benthic macroinvertebrate community integrity were in significant contrast to the fish community rankings. Scores across the eight monitoring sites were generally below average, with the highest rankings falling only in the Fair category. Tolerant midges dominated most samples.

The overall habitat conditions throughout the drainage ranged from Poor to Good, indicating substantial localized disturbance and an overall pattern of moderate degradation. The bank stability and sediment deposition measures were consistently the lowest scoring aspect of the habitat assessment. Many stream reaches throughout the watershed are actively widening.

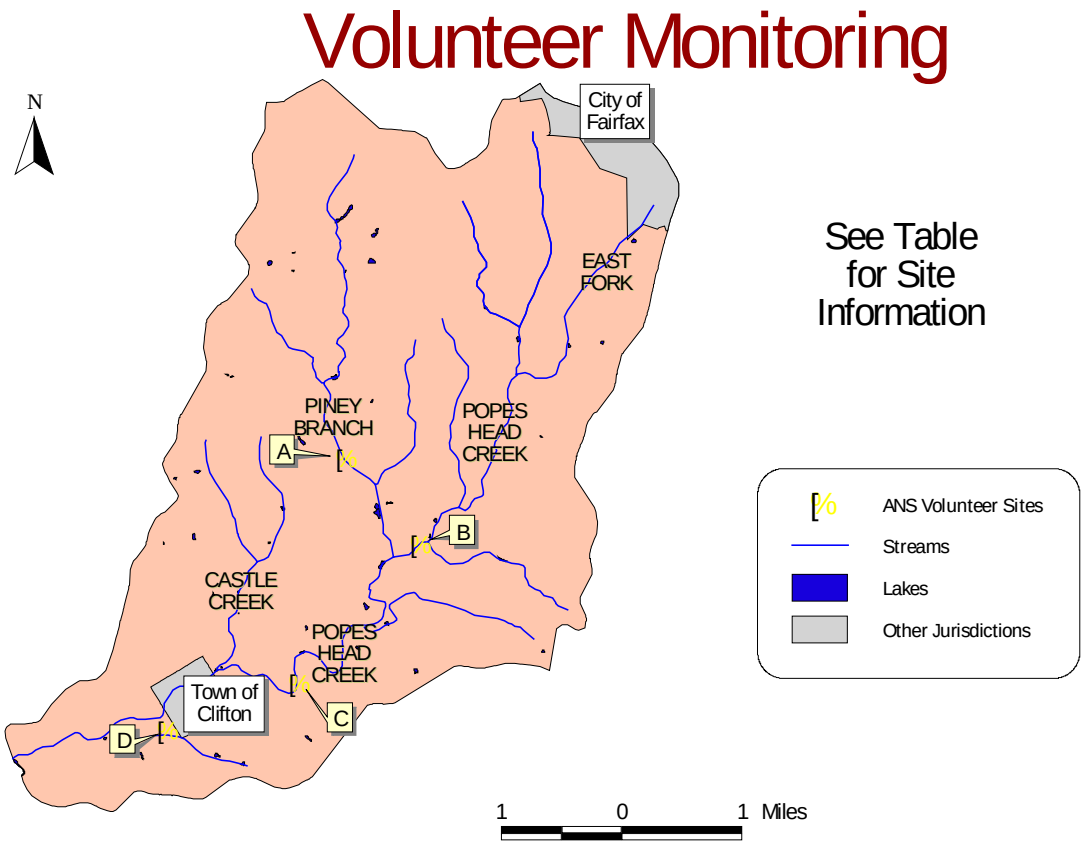
Levels of imperviousness ranged from low to moderate (3.9 to 12.8%). With the exception of the upper regions of the watershed, including the southwestern portion of Fairfax City, the area as a whole contains some of the least developed drainages in the County. However, the ultimate composite ratings did not reflect this overall trend; their respective biological components often contradicted one another. This may reflect either a decline in system integrity that has just recently begun or the presence of other undetected environmental stressors.

Because much of the watershed falls within the Water Supply Protection Overlay District (WSPOD), which requires five acres per residence, the area should be recognized for its significant potential to maintain higher quality aquatic systems. However, while the inconsistencies in the various ranking categories may in fact be a function of localized land use that is approaching some threshold value and is beginning to influence the downstream environment generally, other factors may be involved warranting further investigation.

CHAPTER 3

Volunteer Data Summary

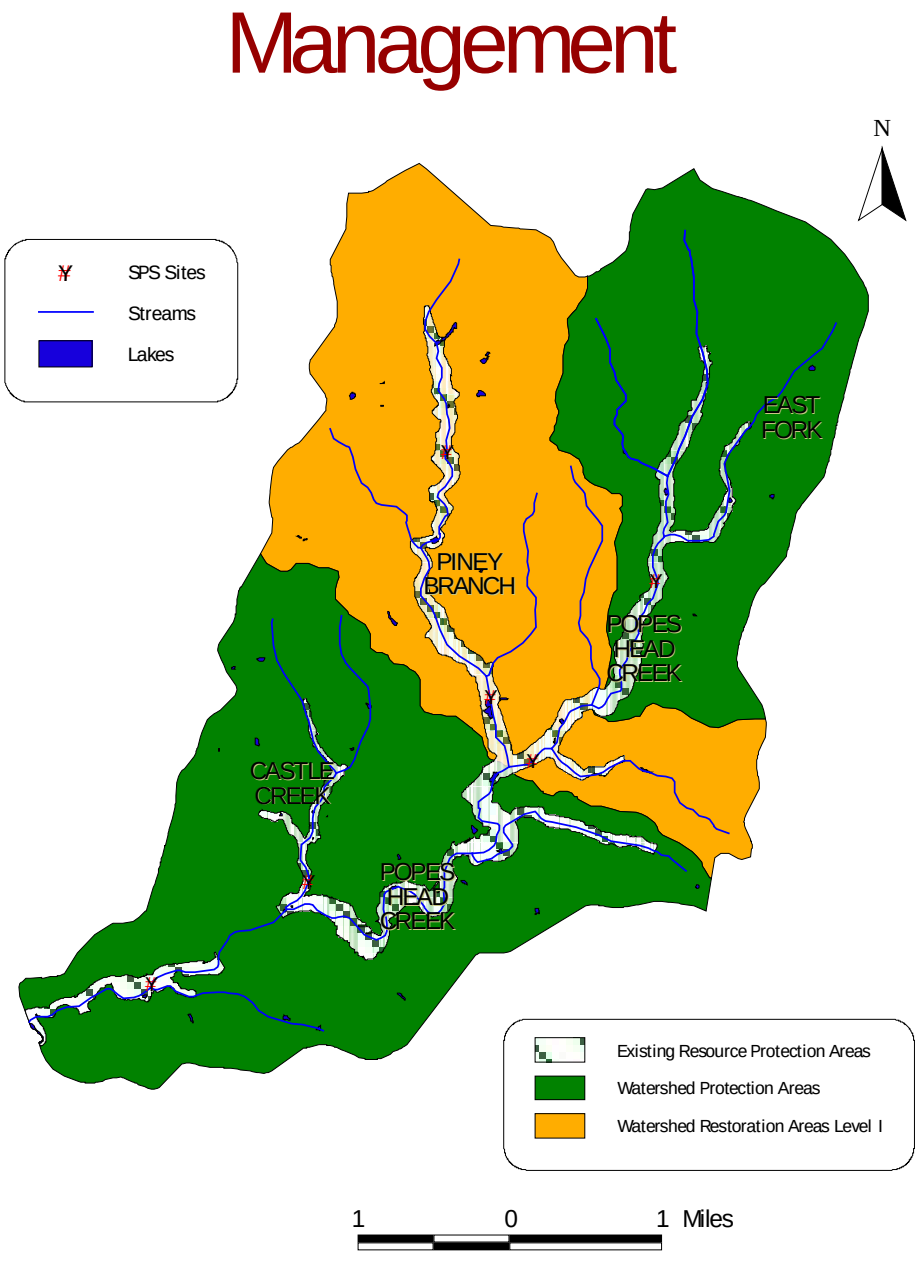
The Audubon Naturalist Society coordinates all four of the active volunteer monitoring stations in the Pope's Head Creek watershed. Two of these are located on the mainstem; one is on Piney Branch, and the other is on a small unnamed tributary of the mainstem, just below the Town of Clifton.



Letter Code	Site Code	# times sampled	Last sampled	WQR (SOS only)	Trends noted
A	017	2	#####	N/A	Several sensitive taxa, but stoneflies absent
B	018	1	#####	N/A	Good species richness, but dominated by tolerant forms
C	014	3	#####	N/A	Dominated by tolerant forms
D	008	8	#####	N/A	Generally high number of sensitive taxa, some abundant

The volunteer data generally supports the findings of the SPS study, similarly highlighting several communities dominated by individuals with high tolerance to many forms of degradation. It is worth noting, however, volunteer efforts on Piney Branch found considerably higher diversity than did the SPS monitoring, and further sampling is

needed to determine which results are most reflective of overall conditions within the tributary.



Management Category Description

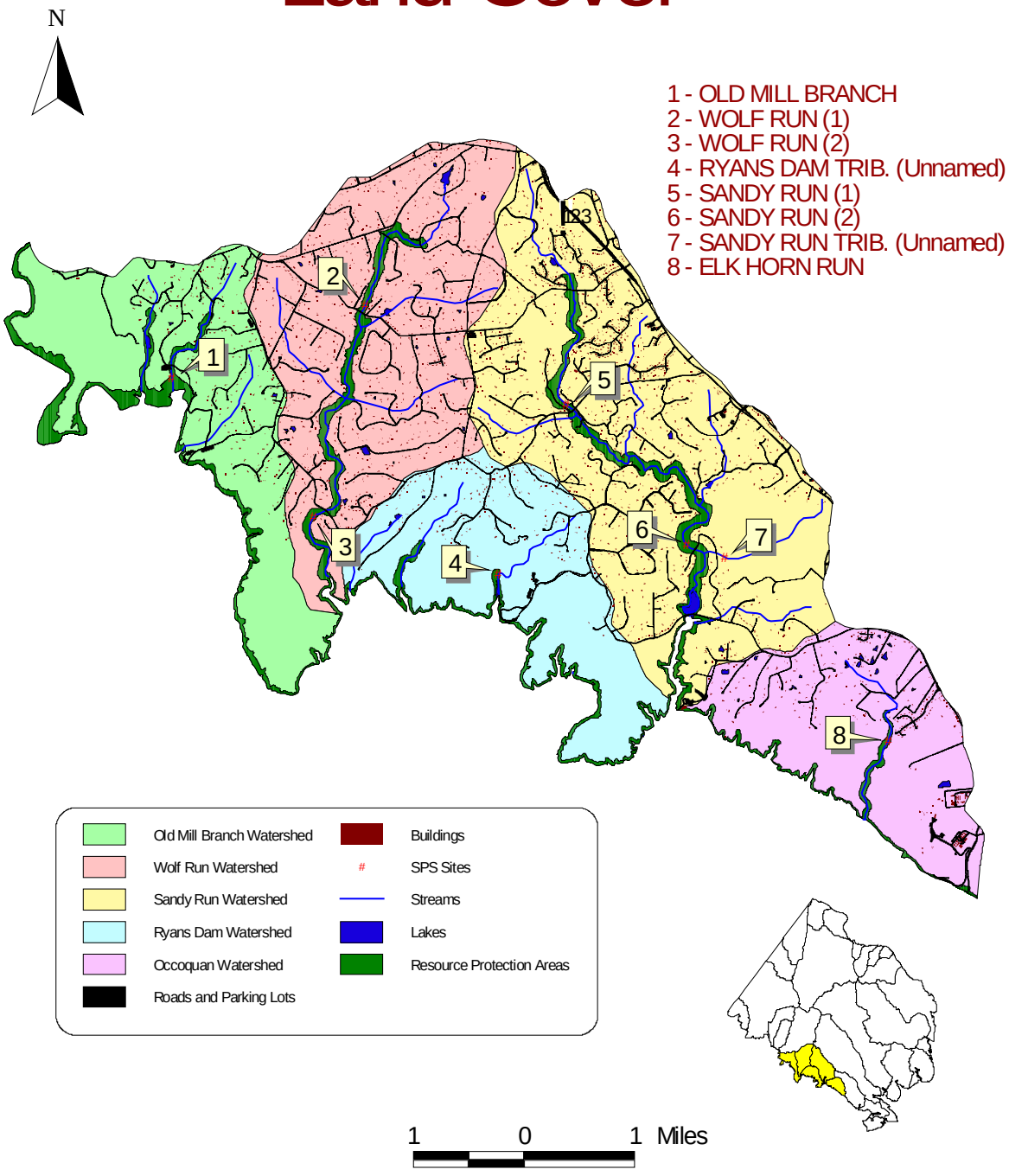
The Pope's Head watershed is of relatively high quality in general, and as such, the majority of the drainage is classified as a Watershed Protection Area. However, some regions are showing signs of approaching a threshold of biological integrity. Degradation, especially in terms of habitat quality, is evident in some localized areas on

both Piney Branch and the mainstem, and each of these areas is designated as Watershed Restoration Level I Areas, warranting a priority assessment focus.

CHAPTER 3

OLD MILL BRANCH, WOLF RUN, RYANS DAM, SANDY RUN AND OCCOQUAN WATERSHED SUMMARY

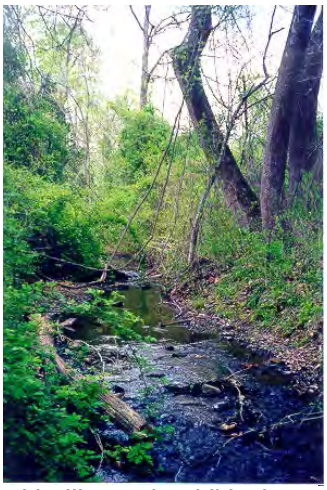
Land Cover


N
1 - OLD MILL BRANCH
2 - WOLF RUN (1)
3 - WOLF RUN (2)
4 - RYANS DAM TRIB. (Unnamed)
5 - SANDY RUN (1)
6 - SANDY RUN (2)
7 - SANDY RUN TRIB. (Unnamed)
8 - ELK HORN RUN
123
1
2
3
4
5
6
7
8
Old Mill Branch Watershed
Wolf Run Watershed
Sandy Run Watershed
Ryans Dam Watershed
Occoquan Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
1 0 1 Miles

CHAPTER 3

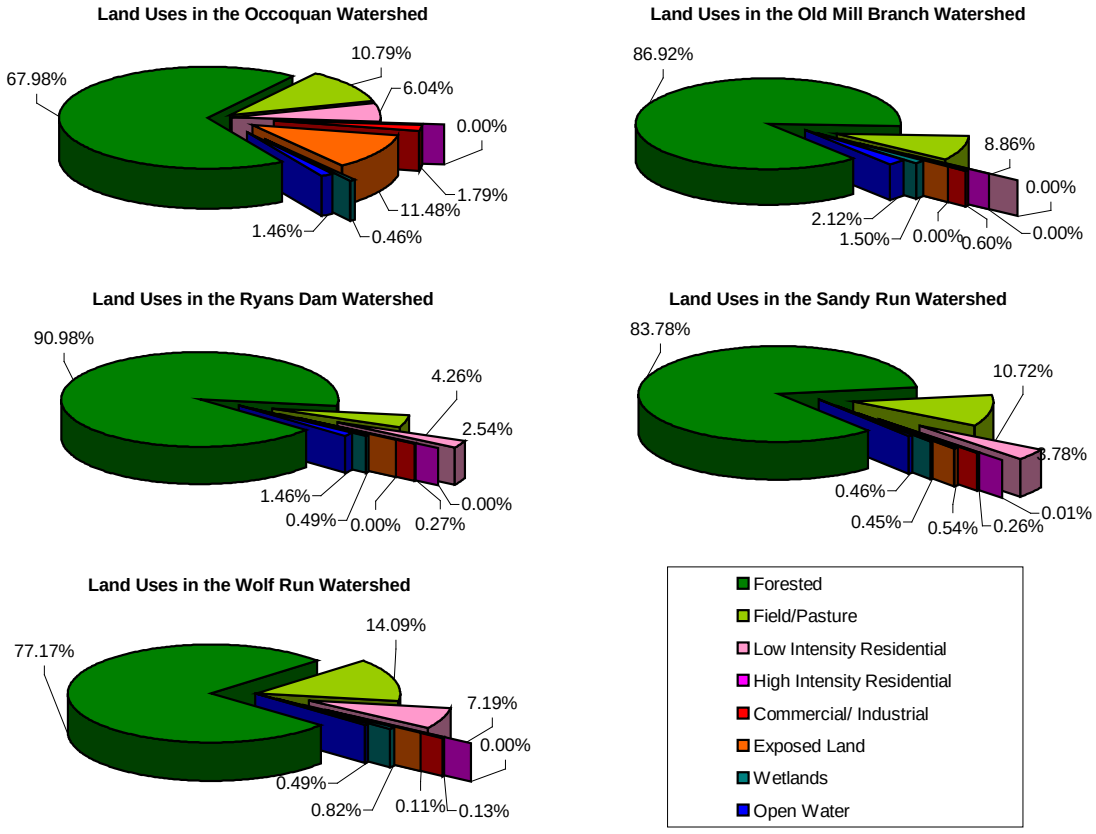
Watershed Description

The Upper Occoquan watersheds, a group of five watersheds in the southwestern corner of Fairfax County, drain an area of approximately 25.4 square miles, or about 6.4 percent of the County's total area. The watersheds are bounded by Mill Branch to the east, the Pope's Head Creek and Pohick Creek watersheds to the north and Prince William County to the south. All five watersheds lie within the Piedmont Uplands physiographic province.



Old Mill Branch exhibited many areas of high stream integrity.

The dominant land use category in these watersheds is forestland. Fountainhead Regional Park runs along the southern edge of this group of watersheds and serves as a forested buffer zone for the Occoquan River and Reservoir. The low degree of development in these watersheds is a direct result of the implementation of the Water Supply Protection Overlay District, a special zoning amendment that required a minimum lot size of five acres for homes in these watersheds. This "downzoning" was intended to protect the water quality in the Occoquan Reservoir.



Sections of Ryans Dam scored for macroinvertebrate integrity.

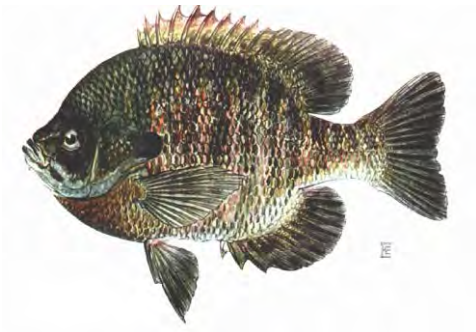
Three of the five watersheds in this group, Old Mill Branch, Ryans Dam and Occoquan, are comprised of many small independent tributaries of the Occoquan River. All of the representative tributaries chosen for monitoring were less than two miles in length. Each watershed has low-density development, less than five percent imperviousness, and parkland bordering the Occoquan River. Approximately 11.5% of the Occoquan watershed area was classified as "exposed land" by the USGS National Land Use coverage maps, based on aerial photography from 1992, and was associated with a quarry operated in this area.

The two other watersheds in this group have larger drainage areas and a single mainstem of over five miles in length. Wolf Run and Sandy Run begin in the same area but one flows southwest and the other flows southeast. Like the other watersheds in this group, both Sandy Run and Wolf Run have levels of imperviousness below five percent.

Spiny Crawler Mayflies
Family *Ephemerellidae*
Habitat Classification: clingers
Feeding Group: collector-gatherers
Tolerance: intolerant
Representatives of this family are some of the more intolerant macroinvertebrates and are indicative of healthy aquatic systems. It lives most of its life in the nymphal stage. The adult stage may only last about 1 day.

Redbreast Sunfish
Lepomis auritis
Size: to 8 inches
Habitat: pools and slow runs of warm streams and rivers
Feeding Group: generalist predator
Tolerance: moderate
The redbreast is another vividly colored sunfish native to our area. Like most sunfish, it will eat almost any animal small enough for it to swallow. This includes insects, crayfish, mollusks and the occasional small fish. Maximum life span is about 8 years.

Pumpkinseed
Lepomis gibbosus
Size: to 12 inches
Habitat: pools and other calm areas of streams and rivers, often over soft bottoms
Feeding Group: invertivore
Tolerance: moderate
The pumpkinseed is a common and beautiful fish native to Virginia. Like most sunfish, it is territorial and aggressive. Special molar-like teeth in its throat allow the pumpkinseed to crack the shells of small snails and clams, which they often eat.



Bluegill
Lepomis macrochirus
Size: to 8 inches
Habitat: ponds, lakes and pools of moderate gradient creeks
Feeding Group: planktivore (juvenile), insectivore (adult)
Tolerance: moderate
This adaptable sunfish is native to the Mississippi River basin, Great Lakes and Gulf coast but has been introduced across the country as well as other continents. It breeds throughout the summer and can tolerate high temperatures. Some live for 6 years or more.

CHAPTER 3

DATA SUMMARY

Stream Name and Site Code	Composite Site Condition Rating	Environmental Variables: Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Old Mill Branch (OMOM01)	Excellent	Excellent	Fair	Low	3.5	5
Wolf Run 1 (WRWR01)	Fair	Excellent	Fair	Very Low	3.3	5
Wolf Run 2 (WRWR02)	Excellent	Excellent	Good	Moderate	3.9	5
Ryans Dam Unnamed Trib. (RDRT01)	Excellent	Excellent	Fair	Moderate	3.3	5
5 Sandy Run 1 (SASA01)	Excellent	Good	Good	High	6.1	6
Sandy Run 2 (SASA03)	Excellent	Good	Good	Moderate	4.4	5
7 Sandy Run Unnamed Trib. (SASA02)	Fair	Good	Fair	Very Low	1.0	8
Elk Horn Run (OCEH01)	Excellent	Excellent	Excellent	Low	3.6	14

Upper Occoquan Fish Species List

Common Name	Number of Sites Where Species Occurred (8 Total Sites)
Blacknose Dace	8
Creek Chub	8
Bluegill	6
Fantail Darter	5
Green Sunfish	5
Tessellated Darter	4
Largemouth Bass	4
Yellow Bullhead	3
White Sucker	3
Rosyside Dace	3
Pumpkinseed	3
Swallowtail Shiner	3
Fallfish	3
Creek Chubsucker	2
Eastern Mosquitofish	2
Northern Hogsucker	2
Margined Madtom	2
American Eel	1
Cutlips Minnow	1
Redbreast Sunfish	1
Golden Shiner	1
Longnose Dace	1

CHAPTER 3

Watershed Condition Summary

All watersheds within this group are protected by zoning restrictions under the Water Supply Protection Overlay District (WSPOD) specifications which were implemented to improve the quality of surface water entering the Occoquan reservoir. The region as a whole exhibits some of the lowest levels of impervious surface seen in the County, and with only a few exceptions, overall site rankings were high.

Fish taxa richness was the most variable biological measure found across the five distinct watersheds. Several factors independent of historic condition may have been responsible for some of the lower values. The site on the unnamed Sandy Run tributary began receiving heavy loads of fine sediment prior to the summer sample, and unlike the High and Moderate diversity ratings at sites along the mainstem environment, the system ranked at the very lowest level (only three taxa). Unknown factors may have also played a role at the upper site on Wolf Run mainstem (only four taxa identified), which exhibited extremely low water levels throughout most of the 1999 fish sampling season.

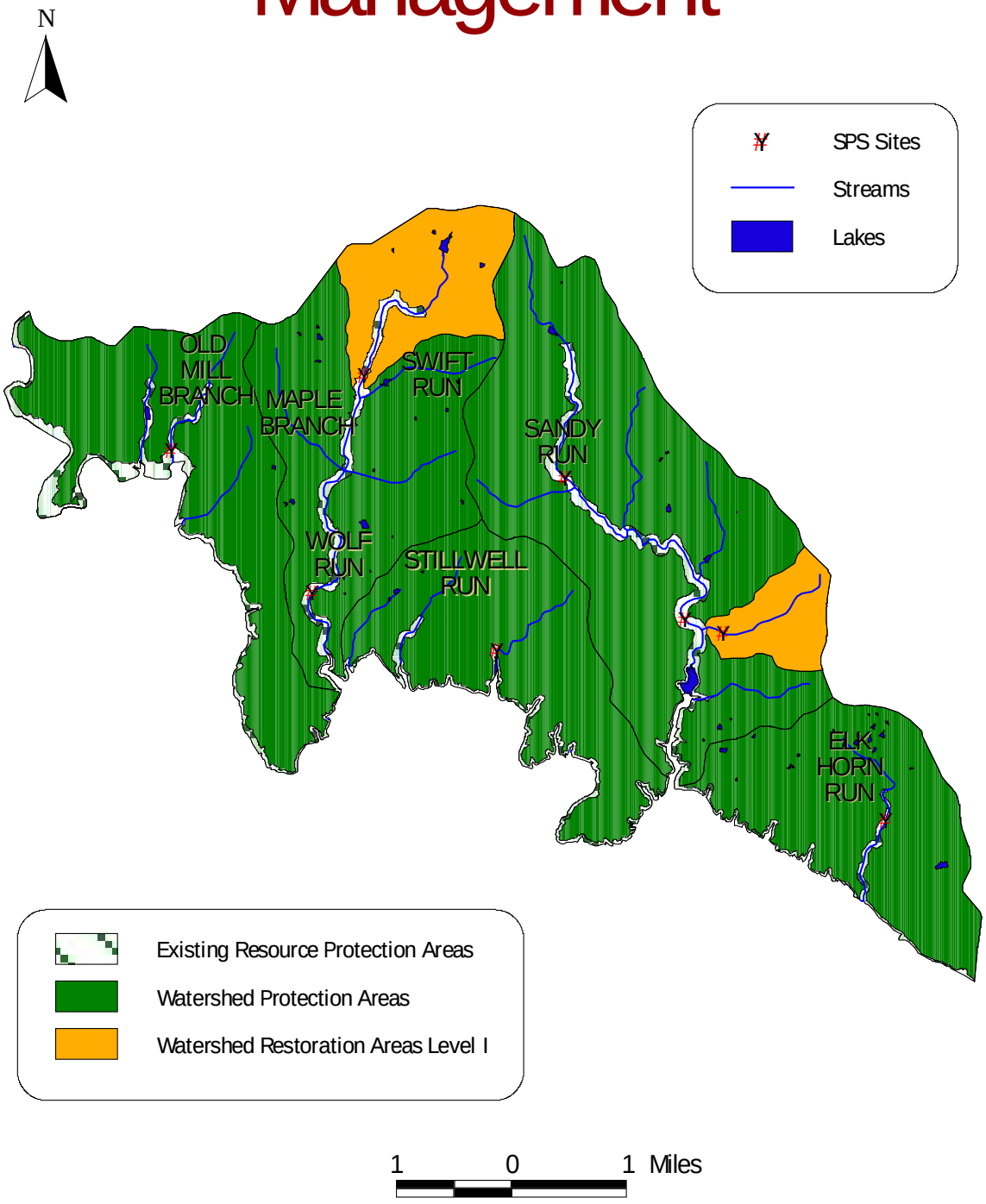
The IBI measures from sites within these five watersheds represent some of the highest scores seen in the County. All sites in the region rated in the highest categories, and five of the eight were ranked as excellent overall, indicating correspondence to the reference level conditions for benthic macroinvertebrate community integrity.

The habitat scores of the group ranged from Fair to Excellent, and although the sediment deposition and bank stability subcategories scores were somewhat low at many sites, these systems are generally more stable relative to the rest of the County's watersheds. One of the highlights in this region was Elk Horn Run, a small stream in the Occoquan watershed that is exhibiting some early signs of reaching a true equilibrium with its new flow regime. An exception to the overall trend was the previously mentioned Sandy Run tributary, which received a rating in the Fair category due largely to the low scores for both sediment levels and the related embeddedness measures.

This group of watersheds collectively has one of the lowest levels of land disturbance in the County, with no watershed exceeding six percent impervious cover. Measures of stream conditions generally corresponded with these values (high biological and habitat ratings versus low imperviousness values), and beyond the two sites experiencing anomalous conditions already noted, rankings throughout the region were Excellent.

Although the many watersheds that make up this region are individually small, their combined area represents one of the largest continuous expanses of undeveloped land in the County. It also holds some of its best, most intact aquatic systems. However, results from monitoring on the Sandy Run tributary serve as a useful reminder of the overall susceptibility of such unique, high quality systems. In this case, the sediment input was directly attributable to inadequate maintenance of control structures at an upstream development site, and though the stream maintained overall biological and habitat integrity prior to this release—IBI score previously ranked among the best of any monitoring site—it is now one of the more degraded systems in the County, and the impacts are being carried to downstream environments.

Management



Management Category Description

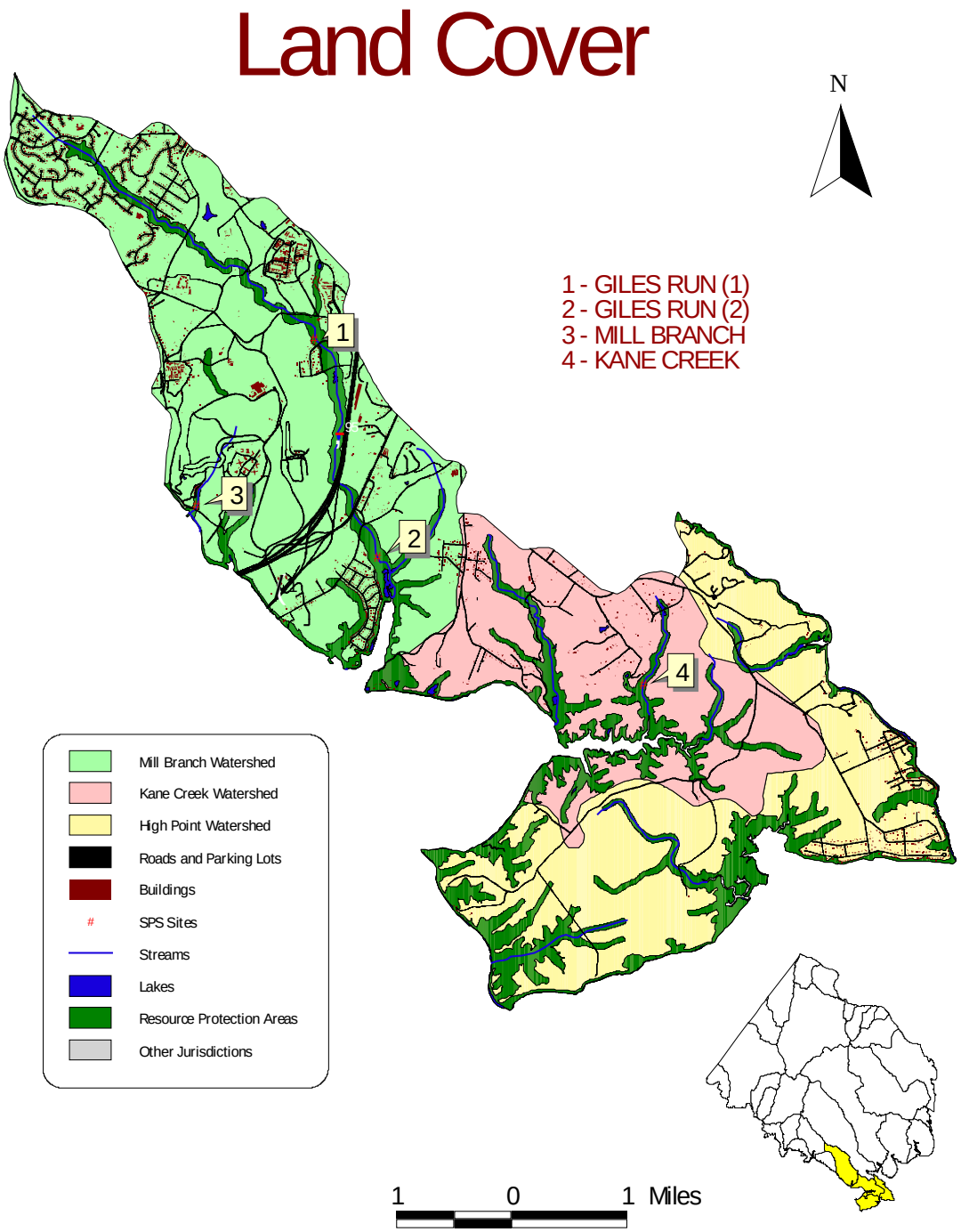
With the exception of upper Wolf Run and the unnamed tributary to Sandy Run, all of the subwatersheds are classified as Watershed Protection Areas. Each of these drainages has already been protected by the WSOPD, and this study highlights the value of the zoning district overlay in preserving stream quality.

The two exceptions mentioned above are classified as high priority Watershed Restoration Level I Areas. Further research is needed in Upper Wolf Run due to low fish and habitat scores; the compounding factors in this area need to be identified, if possible, and then mitigated. Unlike this situation — and most similar cases countywide — the causes of stream degradation within the unnamed tributary of Sandy Run were clear, being directly attributable to exceedingly high levels of sediment entering the system from an upstream development with improperly maintained erosion and sediment controls. This case exemplifies the importance of such measures in the development process. Maintenance of these controls is critical if aquatic environments are to be protected.

Darner Dragonfly Larvae
Family *Aeshnidae*
Habitat Classification: climbers
Feeding Group: predators
Tolerance: intolerant
Relatives of the dragonflies and damselflies are some of the most ancient of the flying insects. Fossils have been found of giant dragonflies with wingspans up to 28 inches that lived long before the dinosaurs. Dragonfly nymphs are some of the most aggressive predators in aquatic systems. They have extendable mouthparts that they can shoot out at high speeds to grasp their prey. Dragonflies' nymphs also have a unique method of locomotion. If they need to move in a hurry, they have the ability to expel water from their posterior and "jet-propel" themselves forward.

CHAPTER 3

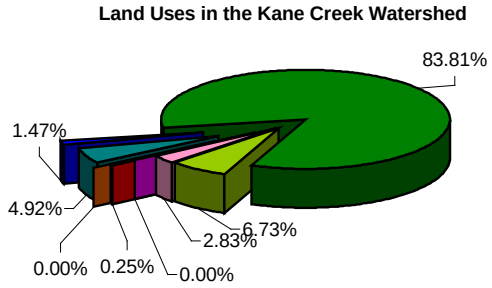
MILL BRANCH, KANE CREEK AND HIGH POINT WATERSHED SUMMARY

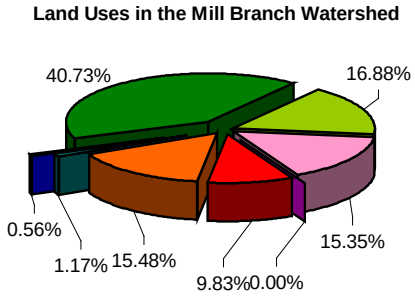

Land Cover
N
1 - GILES RUN (1)
2 - GILES RUN (2)
3 - MILL BRANCH
4 - KANE CREEK
1
2
3
4
Mill Branch Watershed
Kane Creek Watershed
High Point Watershed
Roads and Parking Lots
Buildings
SPS Sites
Streams
Lakes
Resource Protection Areas
Other Jurisdictions
1 0 1 Miles

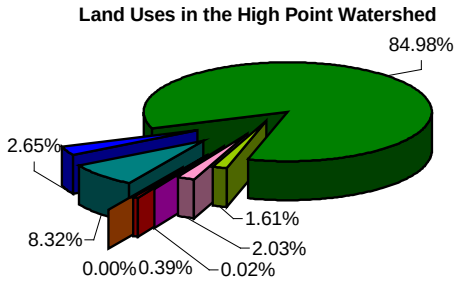
CHAPTER 3

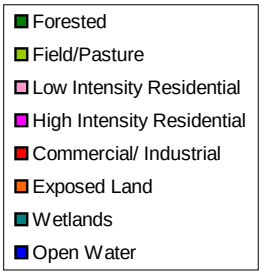
Watershed Description

The three watersheds in this group are located at the southeastern tip of Fairfax County, near the confluence of the Occoquan and Potomac Rivers. With the exception of the northwestern tip of Mill Branch, these watersheds lie within the Coastal Plain physiographic province and are characterized by very low development and associated imperviousness levels. Much of this area, particularly in the High Point watershed, is protected as part of the Mason Neck State Park and the U.S. Mason Neck Wildlife Refuge.









The Mill Branch Watershed consists of two independent systems, Mills Branch and Giles Run, which flow separately into the Occoquan River. Mills Branch is a small stream approximately two miles in length that drains a region containing a sanitary landfill, a sewage treatment plant, and a large parcel of relatively undisturbed land previously controlled by the D.C. Department of Corrections. Giles Run drains the majority of the watershed, with its headwaters beginning in the only residential area in the watershed (10-15% imperviousness). The stream flows southeast, meandering first through the property of the former Lorton Correctional Facility, and then crossing under the major highways I-95 and Rte. 1, before emptying into the Occoquan River.

Giles Run in the Mills Branch watershed.

CHAPTER 3

The monitoring location on Kane Creek was used as the reference or standard to which all other Coastal Plain streams were compared.

Kane Creek Watershed includes a number of small independent streams. SPS monitoring was conducted on the drainage's largest tributary, which begins near Gunston Hall, George Mason's historic estate, and flows south for roughly two miles before entering Belmont Bay along the Potomac River. There is very little development within the watershed, and the area as a whole exhibits levels of imperviousness below five percent.

The High Point watershed is actually a wetland-dominated region with many small, marshy tributaries that flow independently into the Potomac River. A few small developments exist along the eastern edge of the watershed, but the majority of the area is well protected by the Mason Neck National Wildlife Refuge.

White Perch
Morone americana
Size: to 10 inches
Habitat: tidal fresh or brackish waters
Feeding Group: generalist predator
Tolerance: moderate
The white perch is an anadromous fish migrating to freshwater from salt water to spawn. It spawns in the spring over sand or gravel. It is especially common in the tidal Potomac River seasonally.

Tessellated Darter
Etheostoma olmstedi
Size: to 2.5 inches
Habitat: typically in pools and slow runs, sandy, gravelly or rocky substrates of clear streams
Feeding Group: insectivore
Tolerance: moderate
This fish usually 2 to 3 years. During spawning, subordinate males may defend nests that are first fertilized by a dominant male. These Darters may lay eggs 2 – 8 times a season.

Golden Shiner
Notemigonus chrysoleucas
Size: to 7 inches
Habitat: Slow waters in ponds, lakes, swamps, and pools in medium/large streams.
Feeding Group: planktivore
Tolerance: tolerant
The adult golden shiner has a characteristic deep body profile. It is a hardy minnow, able to survive in turbid conditions. It also has one of the highest thermal tolerances among our native fish, enduring temperatures up to 110 F. Individuals may live as long as 9 years.

CHAPTER 3

DATA SUMMARY

	Composite	Environmental Variables				
Stream Name and Site Code	Site Condition Rating	Index of Biotic Integrity	Habitat Score	Fish Taxa Richness	Current Percent Impervious Surfaces	Projected Percent Impervious Surfaces
1 Giles Run 1 (MBGR01)	Good	Fair	Fair	Moderate	11.4	33
2 Giles Run 2 (MBGR02)	Excellent	Fair	Good	Moderate	10.5	30
3 Mill Branch (MBMB01)	Fair	Fair	Poor	Moderate	8.0	10
4 Kane Creek (KCKC01)	Excellent	Excellent	Good	High	2.2	10

Mill Branch and Kane Creek Fish Species List

Common Name	Number of Sites Where Species Occurred (4 Total Sites)
American Eel	4
Bluegill	4
Creek Chubsucker	3
Blacknose Dace	3
White Sucker	2
Rosyside Dace	2
Tessellated Darter	2
Eastern Mosquitofish	2
Pumpkinseed	2
Spottail Shiner	2
Swallowtail Shiner	2
Creek Chub	2
Eastern Mudminnow	2
Brown Bullhead	2
Banded Killifish	1
Mummichog	1
Least Brook Lamprey	1
Largemouth Bass	1
White Perch	1
Golden Shiner	1
Bluntnose Minnow	1

CHAPTER 3

Watershed Condition Summary

The Mill Branch and Kane Creek watersheds stand out as the highest quality Coastal Plain basins within Fairfax County. High Point, the remaining drainage in this group, is a largely undeveloped region containing extensive areas of wetland communities that is already protected as a component of the National Wildlife Refuge System (the watershed was excluded from monitoring in this program).

Measures of fish community richness were in the moderate and high categories for sites in Mill Branch and Kane Creek, respectively. A total of 21 different fish taxa were collected in sampling across both areas.

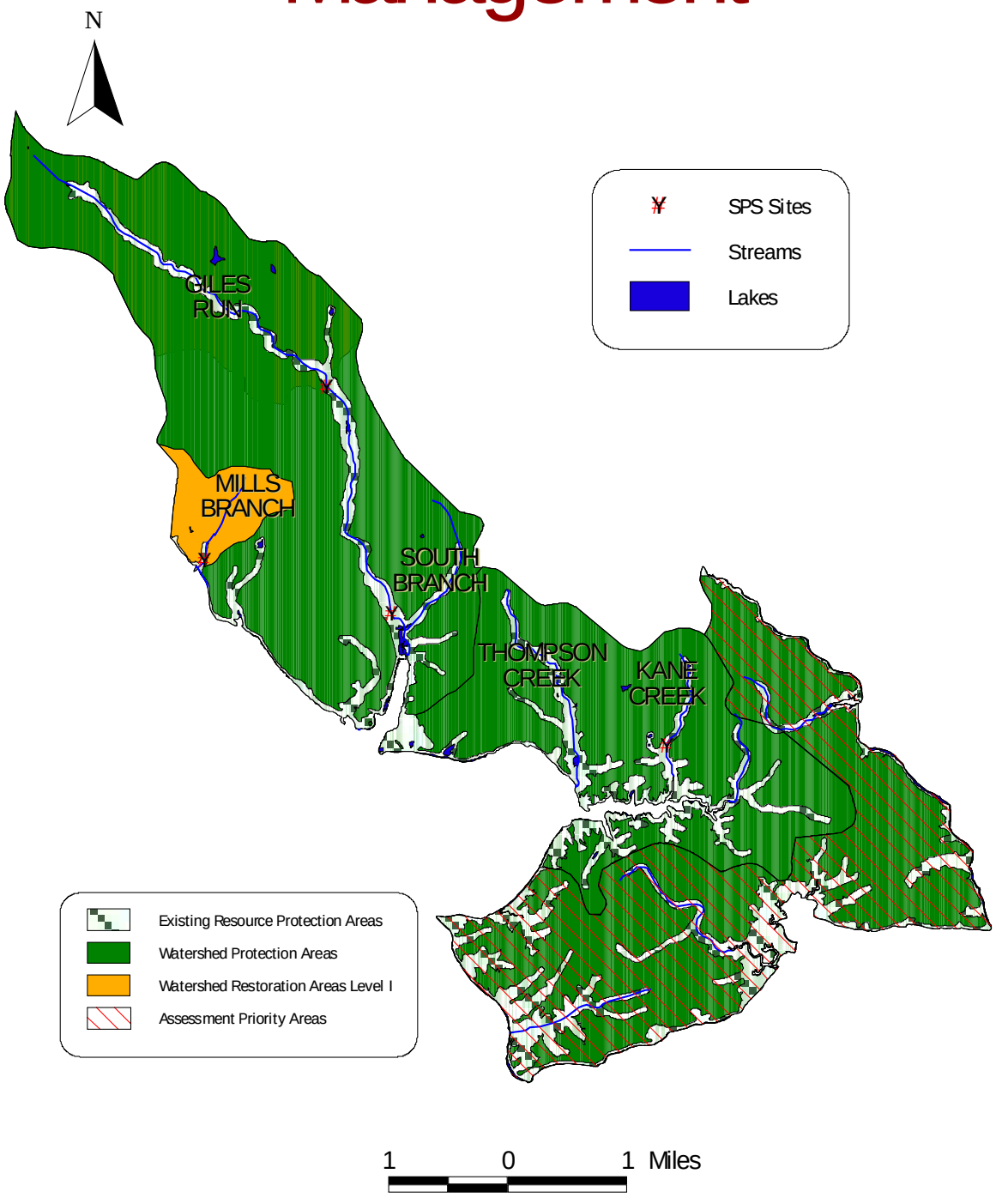
Kane Creek represents the highest level of biological integrity to be found within any Coastal Plain system in the County, and the measures of its benthic community were used as the reference to which all other sites within the physiographic province were compared. Each site in the Mill Branch watershed was rated as fair based on this standard, with the two sites on Giles Run actually scoring higher for the individual IBI component of taxa richness. The lowermost site on this system produced the most diverse sample in the entire Coastal Plain group (22 distinct taxa).

Habitat conditions at monitoring sites ranged from poor to good. The Mills Branch subwatershed received the lowest rating, a situation that may be influenced both currently and historically by characteristics of the upstream basin, an environment that includes an inactive landfill and a sewage treatment facility. Overall quality of instream and riparian habitat was higher in the Giles Run tributary, especially in the lower reaches where the stream is contained within a wide, marshy, undeveloped floodplain. Kane Creek exhibited fairly stable conditions and was similarly ranked in the Good category. Sediment deposition was consistently the lowest scoring component of the rating of each site.

While existing zoning regulations specify minimum lot sizes of one-acre and two-acres for many sections of the Mill Branch and Kane Creek watersheds, respectively, levels of imperviousness are low throughout the entire region. With the exception of the Mills Branch site below the landfill and treatment plant, composite rankings were consistently high.

The combined area of the three watersheds contains some of the highest quality systems found not only in the Coastal Plain province, but in the County as a whole. Kane Creek is partially contained within either Mason Neck State Park or Mason Neck Wildlife Refuge, and its usefulness as a reference of minimally impacted invertebrate communities makes it even more valuable. This is equally true of the protected areas within the High Point drainage, an area that may hold its own potential as a source of small stream reference conditions within the Coastal Plain.

Management


N
SPS Sites
Streams
Lakes
GILES RUN
MILLS BRANCH
SOUTH BRANCH
THOMPSON CREEK
KANE CREEK
Existing Resource Protection Areas
Watershed Protection Areas
Watershed Restoration Areas Level I
Assessment Priority Areas
1 0 1 Miles

CHAPTER 3

Management Category Description

Kane Creek, High Point and Giles Run are all classified as Watershed Protection Areas. Most of the High Point watershed is already protected by parkland, and further study is needed to assess the usefulness of the region as a source of potential reference streams. Kane Creek represents the best available regional conditions and was used as a source of reference characteristics for all Coastal Plain sites; as such, the watershed deserves the highest level of protection. Many portions of the Giles Run subwatershed are just now being opened up for development — the area was previously held by the D.C. Department of Corrections — and extensive stream monitoring should coincide with any subsequent alterations to the land. If widespread development is to occur on this property, care will be needed in zoning, site planning, and construction to protect the existing stream conditions.

Mill Branch was ranked lower than the other subwatersheds in the area due to modifications from the inactive landfill and Sewage Treatment Plant, which altered the stream channel and, potentially, its water quality. The primary strategy for this area would be to coordinate with landfill and sewage treatment plant personnel to improve conditions in this area.

These watersheds have no volunteer sites and are sensitive areas that warrant further attention, especially with the projected development of the former Lorton Correctional Facility property.

Flat Headed Mayflies
Family *Heptageniidae*
Habitat Classification: clinger
Feeding Group: scraper, collector gatherer
Tolerance: moderate – intolerant
The low profile of the Flat Headed Mayfly allows them to move freely along the bottom of fast moving streams and not be swept away. They are indicator organisms of higher quality stream conditions.

CHAPTER 3

OTHER MONITORING

Fairfax County Health Department
1999 Stream Water Quality Report

Even though the SPS Study did not conduct any monitoring for Fecal Coliform, it is still an important issue pertaining to Fairfax County streams. Fecal Coliform are bacteria found in the intestinal tracts of warm-blooded animals and are useful indicators of fecal contamination within aquatic systems. While they may not be harmful in themselves, the presence of fecal coliform may indicate possible fecal contamination. The Fairfax County Health Department annually conducts a Stream Water Quality Report on 24 watersheds within Fairfax County (Figure 3), the major component of the program being an assessment of fecal coliform content in streams.

Standards set by the Virginia Department of Environmental Quality – Water (DEQW) specify that all surface waters, excluding shell-fish waters, "shall not exceed a geometric mean of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a 30 day period, or a fecal coliform (f.c.) bacteria level of 1,000 per 100 ml at any time." According to the Health Department's 1999 Stream Water Quality Report, samples collected within the County failed to meet both of these criteria, with no site averaging under the 200 f.c. limit in the past five years, and over 41% of the 1999 samples exceeding the 1000 f.c. maximum level (Table 7). The highest counts were seen within Long Branch in the Four Mile Run watershed, with samples averaging 1605 f.c.

Table 7: Fecal Coliform levels by watershed. Watersheds not included are Belle Haven, High Point, Horsepen Creek, Kane Creek, Occoquan and Ryans Dam.

Watershed	Percentage of Samples Below 200 f.c. per 100 ml	Percentage of Samples Above 1000 f.c per 100 ml	Watershed	Percentage of Samples Below 200 f.c. per 100 ml	Percentage of Samples Above 1000 f.c per 100 ml
Sugarland	14.6	26.2	Dogue Creek	4.7	57.1
Nichol	0	33.3	Accotink Creek	5.9	55.4
Pond Branch	9.6	37.1	Pohick Creek	11.5	49
Difficult Run	6.1	53.4	Mill Branch	30.2	36.5
Bullneck Run	23.8	38.1	Sandy Run	19	45.2
Scotts Run	14.3	42.9	Wolf Run	12.8	33.3
Dead Run	4.7	57.1	Old Mill Branch	16.7	44.4
Turkey Run	28.6	23.8	Popes Head Creek	12.5	33.9
Pimmit Run	9.5	44	Johnny Moore Creek	15.8	26.3
Four Mile Run	5	65	Little Rocky Run	7.9	42.1
Cameron Run	14.8	46.7	Cub Run	13.1	29.2
Little Hunting Creek	17.1	41.5	Bull Run	9.1	36.4

Samples not in the following two categories have values between 200 and 1000 f.c.

Rainfall and water temperature are suggested as responsible for the increase or decrease of fecal coliform in stream water. Of these two factors, temperature has the more direct influence, with warmer water during the summer providing optimal conditions for bacterial growth. This relationship is seen in the data from the 1999 report, with higher counts occurring during the summer period.

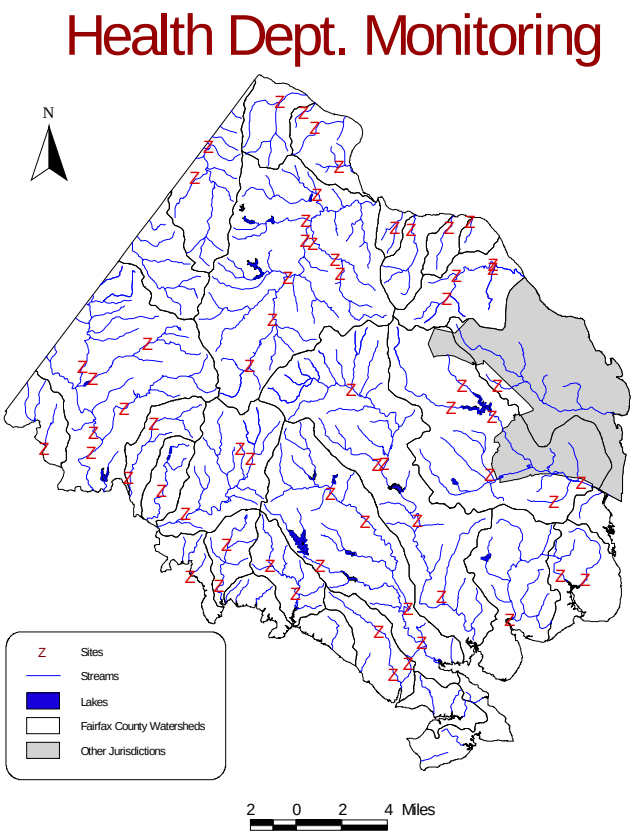


Figure 3: Fairfax County Health Department monitoring sites.

In addition to water temperature, the report also looked at several other parameters including dissolved oxygen, nitrate-nitrogen ($N\text{-}NO_3^-$), pH, total phosphorous, and heavy metals. With the exception of a few measurements of pH and $N\text{-}NO_3^-$ at a handful of sites, values for most of these parameters were within normal ranges.

"Therefore, the use of streams for contact recreational purposes, such as swimming, wading, etc, which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided." (Fairfax County Health Department, 2000).

A copy of the 1999 Stream Water Quality Report can be obtained by calling 703-246-2341 or found on-line at the following address on the World Wide Web:

http://www.co.fairfax.va.us/service/hd/strannualrpt.htm