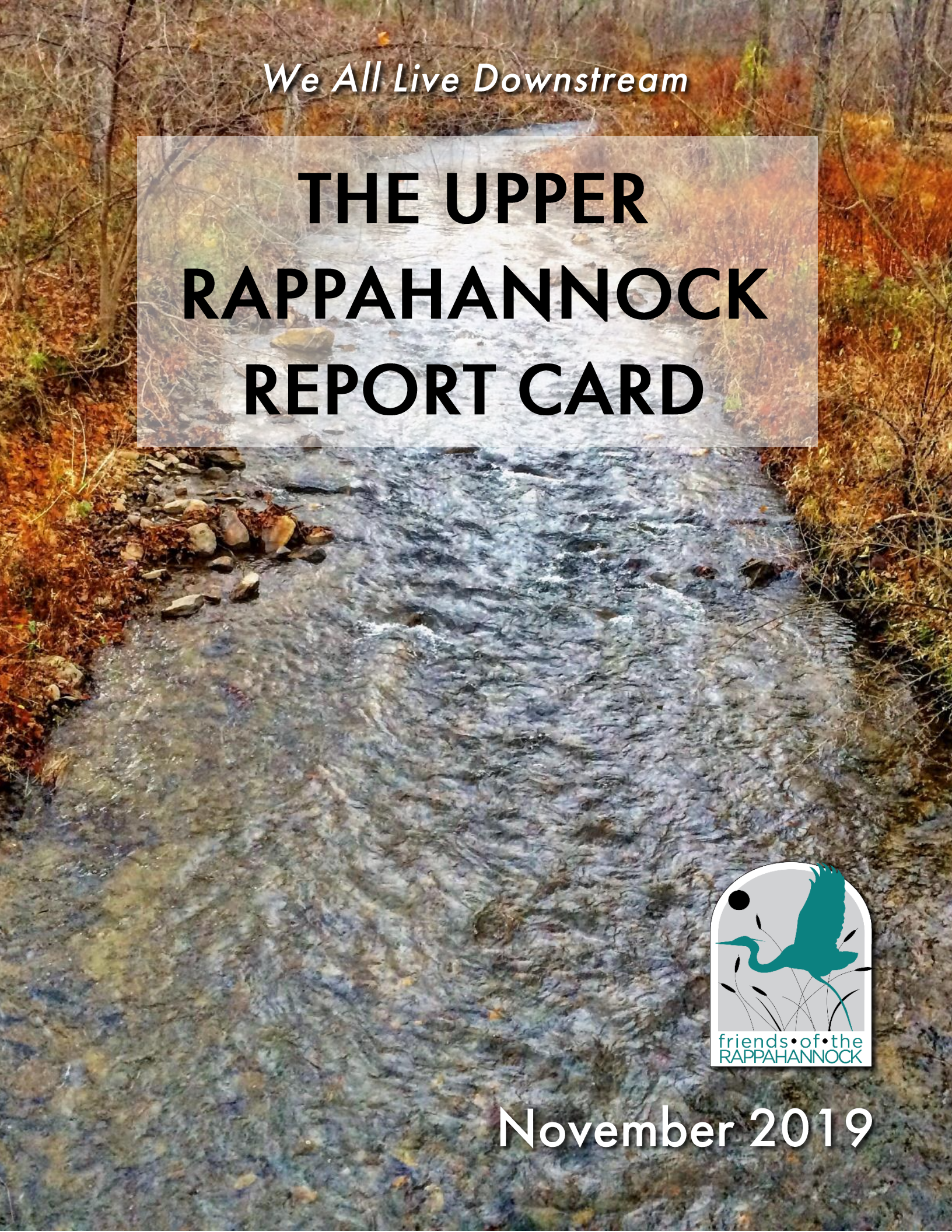

We All Live Downstream

THE UPPER RAPPAHANNOCK REPORT CARD

friends•of•the RAPPAHANNOCK

November 2019

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Acknowledgments

Friends of the Rappahannock would like to thank the PATH Foundation and the Northern Piedmont Community Foundation for providing the grant funding for the Upper Rappahannock Report Card. Special thank you to all Friends of the Rappahannock staff, interns, and volunteers who were involved in the planning, production and outreach in support of the document, including Matthew Decatur and Leslie Raterman.

This report prepared by:

Adam Lynch
Restoration Coordinator
Friends of the Rappahannock

Dear Reader

The communities of the upper Rappahannock watershed are blessed with a valuable resource. Crystal clear water emerges continuously from the springs of the Blue Ridge Mountains in Shenandoah National Park, purified by earth's natural groundwater system, like a free Brita filter under our feet. As the water trickles downhill, it forms streams and rivers that provide drinking water, irrigate farms, and nourish aquatic ecosystems across the Piedmont and beyond.

Before long, this golden resource loses some of its shine. As the streams leave the protection of the Park, they lose their forest cover and gather runoff laced with bacteria, which soon taints the waters where we swim and fish. Sediment eroded from unsecured banks smothers creek-bottom habitat and gradually fills in the deep, cool pools where native brook trout take refuge in the hot summer months. Carelessly discarded litter builds up unabated, leaching chemicals and microplastics into our waterways and tarnishing our scenic trails and parks. The result is a sicker and less beautiful Rappahannock River.

The Upper Rappahannock Report Card takes many lessons from Shenandoah National Park because it is an example of what our rivers *could be*. The spongy forest floor filters runoff, absorbing and digesting pollutants and bacteria while refilling aquifers with clean water for the wells and springs downhill. Massive sycamore and tulip poplar trees anchor riverbanks and in soil that would otherwise silt in the nooks and crannies of the natural cobble bottom. Deciduous native plants shade the water, keeping it cool, while feeding the aquatic food chain with a seasonal bounty of leaf litter. Best of all, these forests will continue to deliver clean water and healthy ecosystems because they are forever preserved.

Rebuilding the Rappahannock River so it can reach its clean water potential requires setting ambitious goals to make our rivers as swimmable, fishable and drinkable as they are in our great national park. This document sets many milestones for land use, conservation, public engagement, and restoration that will not be reached for decades. But if our local communities can work together to make a "C" stream into a "B" stream in our lifetime, perhaps the next generation can take it from there.

Sincerely,

Friends of the Rappahannock
www.riverfriends.org/rappreportcard

How to Use this Document

The River Report Card is intended to produce a set of baseline data indicators that will help Friends of the Rappahannock and other stakeholders monitor trends in water quality and watershed conditions in the Rappahannock River Watershed. The results of this document will equip community leaders, policymakers and administrators with the information they need to take targeted stewardship action on a local level.

Understanding the Grade

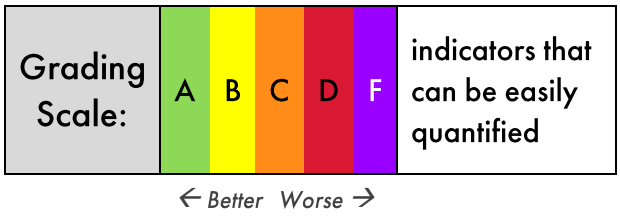
The grades found in this Report Card are unique to the Rappahannock River watershed. The grades incorporate current water quality conditions and surrounding land uses, while also addressing challenges such as lack of community engagement or protective regulations, all of which are tailored to fit the tributaries of the Rappahannock River watershed. *The grades found in this document area not useful as a tool to compare the Rappahannock with other rivers.* Instead, this study focuses on how the Rappahannock River watershed is performing within its specific context and geography.

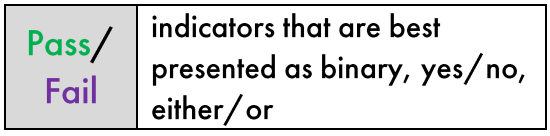
The Report Card Model

Twelve tributaries of the Rappahannock River within Culpeper County, Fauquier County and Rappahannock County were selected to create a representative sample of streams in the Upper Rappahannock watershed. Each tributary was assessed on a total of 16 quantitative indicators of stream condition, which were grouped into the following categories:

- **Human Health** – four indicators that relate to the health and safety of community members who interact with the river
- **Land Use** – four indicators that assess the current land cover, land cover protections, and the use of best-management-practices (BMPs) to treat pollutants from nonpoint source runoff in the watersheds of the sample streams
- **Stream Ecology** – four indicators that evaluate the ecological health of the stream environments, including a land cover assessment of all lands within 300 feet of perennial waterbodies
- **Community Engagement** – four indicators that gauge the current state of watershed education, stewardship action, and relationship between local communities and their streams

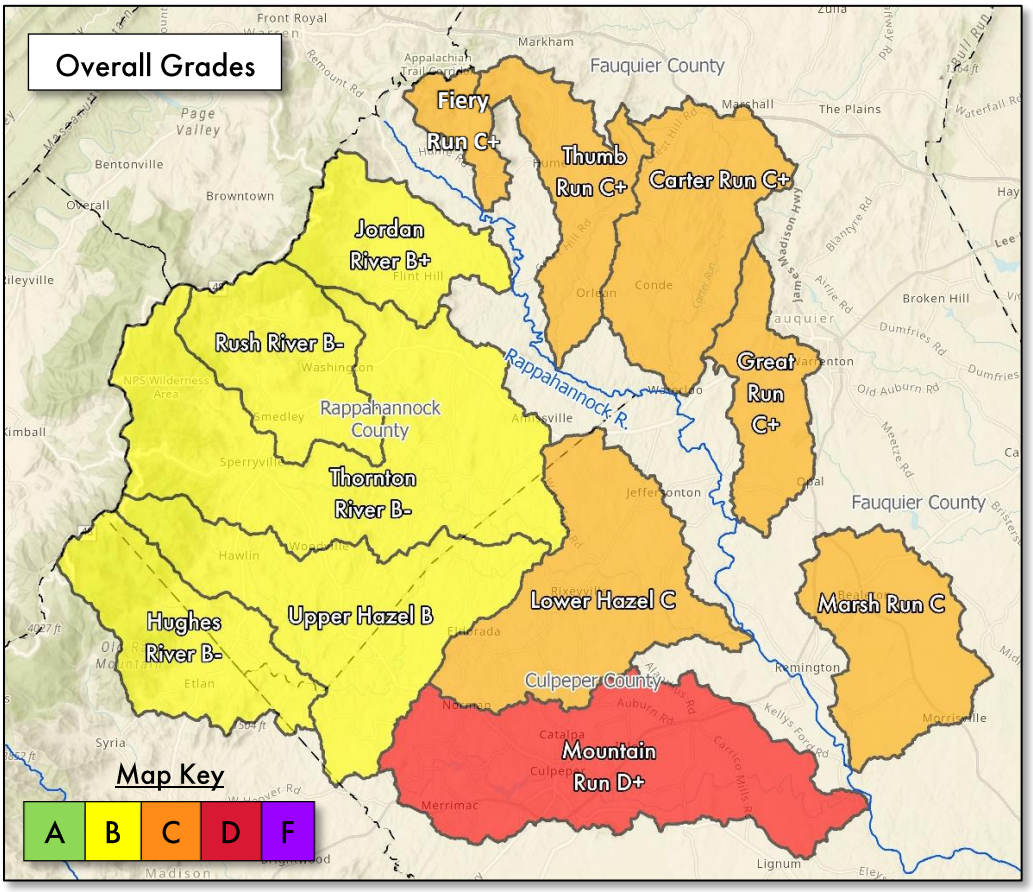
Each indicator was graded on one of the following scales:





For more information about individual grading scales. Methodology, and data sources, please see Appendix 1 of this document.

Overall Report Card Grades by Tributary



Grades Breakdown

	Carter Run	Fiery Run	Great Run	Hazel River (Upper)	Hazel River (Lower)	Hughes River	Jordan River	Marsh Run	Mountain Run	Rush River	Thornton River	Thumb Run
Human Health	B+	B	B	B+	B+	A-	A-	B	D	C+	A-	B
Land Use	C+	C	C	B	D+	B+	A-	D+	D+	B+	C	C
Stream Ecology	B	B-	C	C+	C	C	B	C	D+	C	C	C+
Community Engagement	F	C	C	B+	F	C	B+	D+	A	A	A-	C
Overall Grade By Tributary:	C+	C+	C+	B	C	B-	B+	C	D+	B-	B-	C+

B	Human Health
C+	Land Use
C+	Stream Ecology
C+	Community Engagement

C+

Upper Rappahannock Overall Grade, 2019

Culpeper County Stream Results

Upper Hazel River Report Card

B

Subject	Grade	Comments
Human Health	B+	• 30.5% of stream-miles have unsafe bacteria count • No Fish consumption advisories
Land Use	B	• 22.7% of open spaces under protection • 13.0% of farmland treated by year, average 2007-2018
Stream Ecology	C+	• 10.8% of stream-miles have degraded aquatic life • 70.8% of land within 300 feet of perennial streams are forested
Community Engagement	B+	• Public access via Hazel River Trail and Broad Hollow Trail • 71.4% of road crossings marked

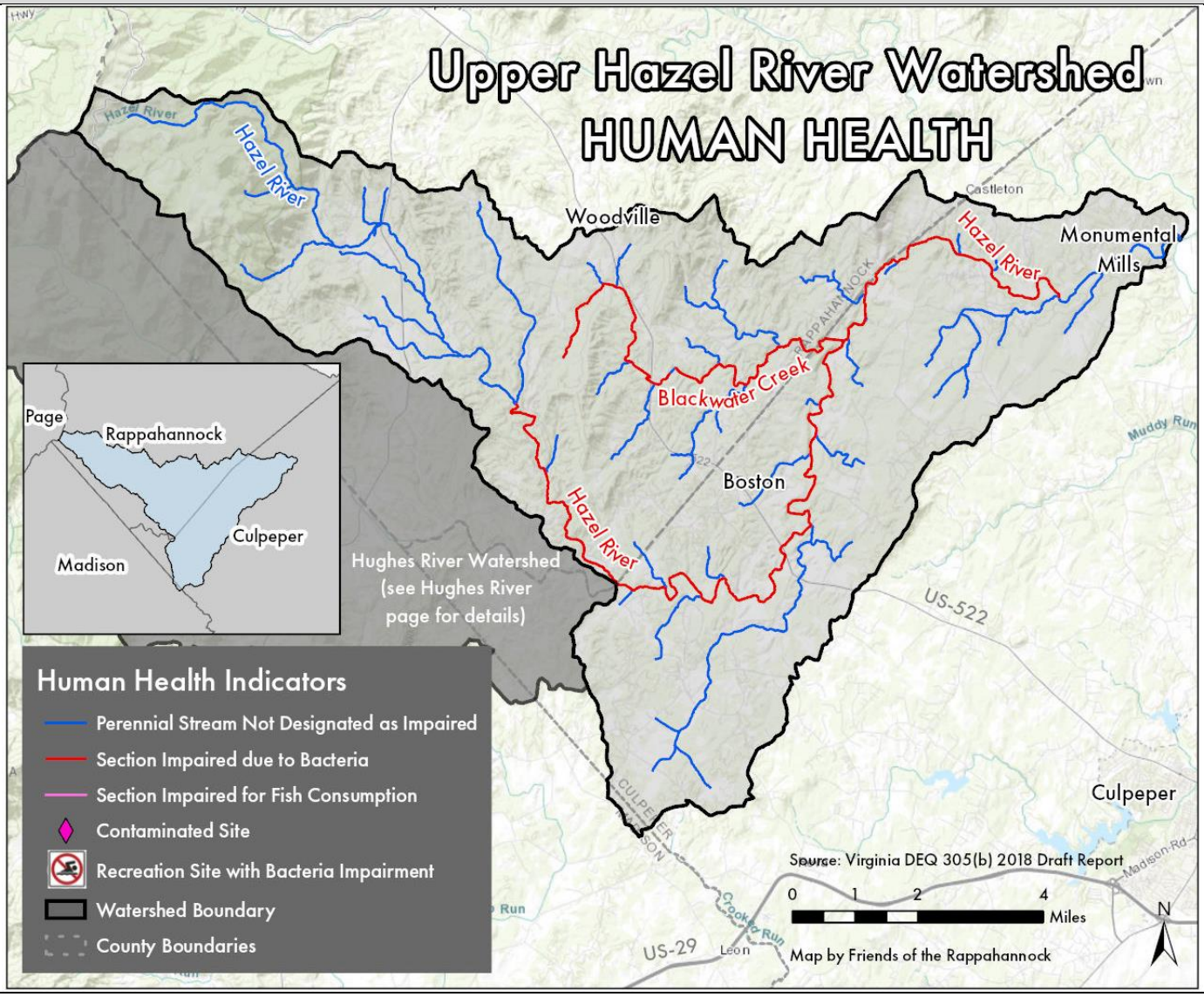
*Using state cost shares

Upper Hazel River

HUMAN HEALTH: B+

Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
C	A	Pass	Pass
30.5% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No impairment at recreation sites

For more information on indicators and grading scales, see Appendix 1

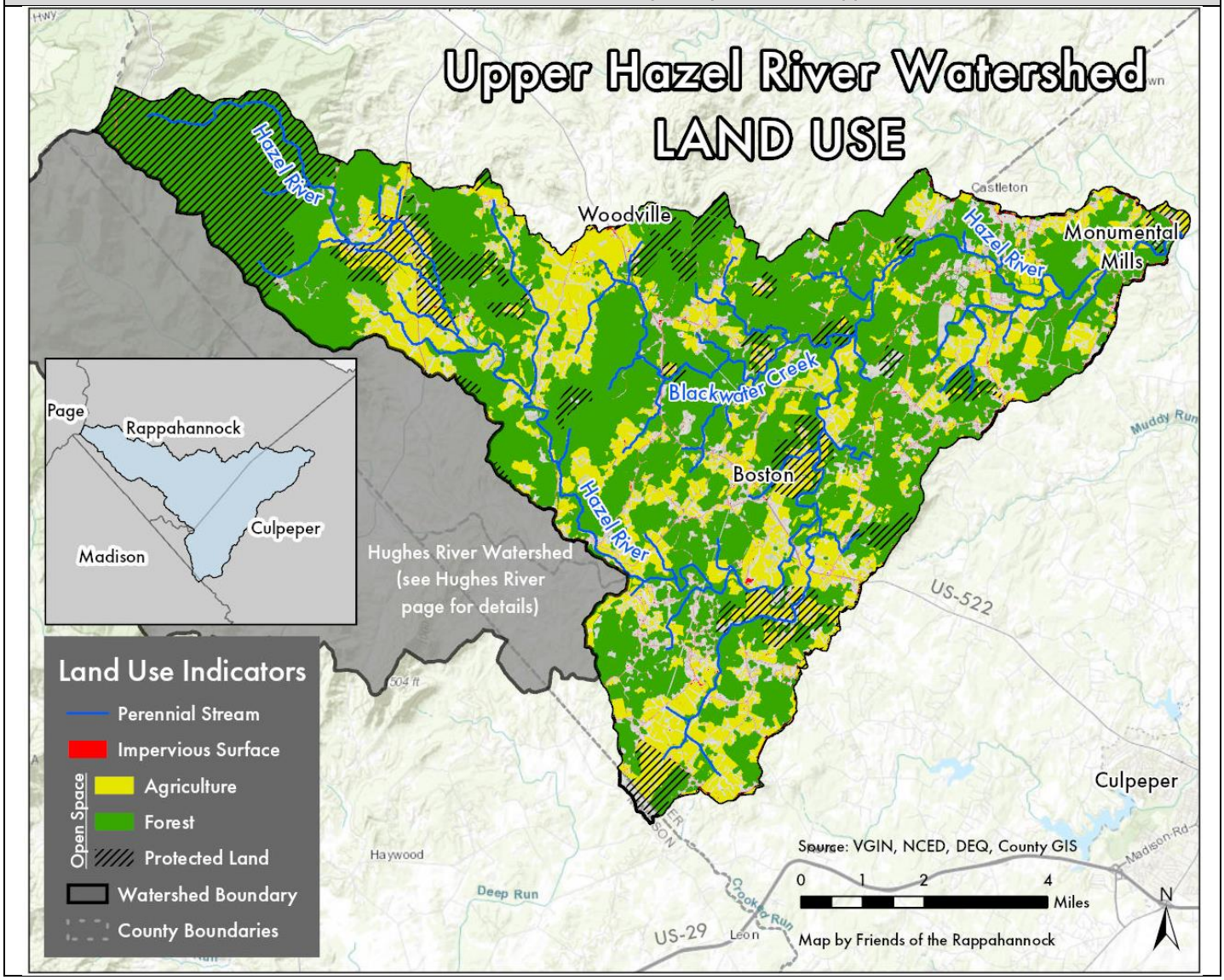


Upper Hazel River

LAND USE: B

A	B	C	B
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
50.9 to 1 forest to impervious surface ratio	22.7% of open spaces under protection	13.0% of farmland treated by year, average 2007-2018	0.8 residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

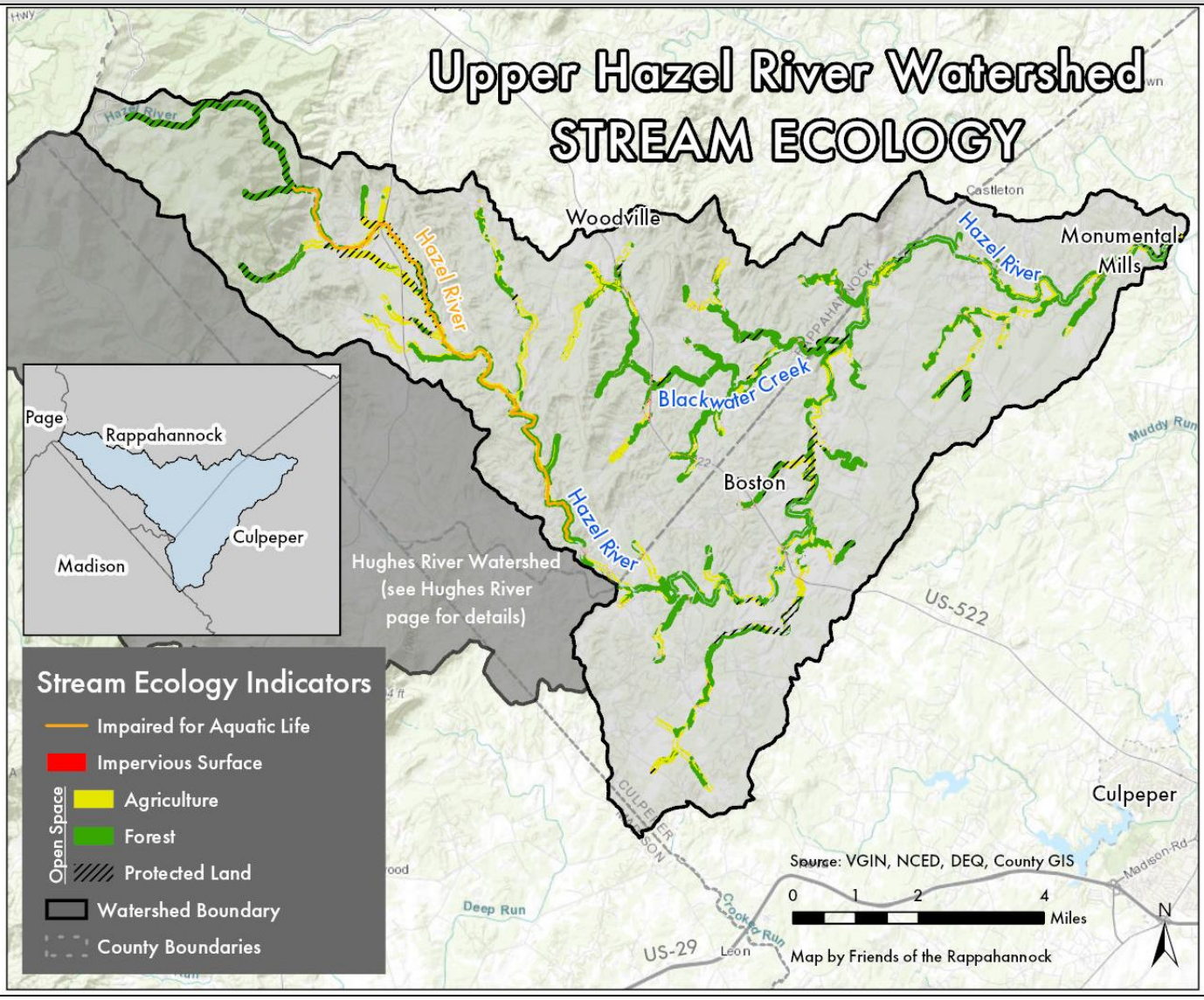


Upper Hazel River

STREAM ECOLOGY: C+

B	A	C	D
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
10.8% of stream-miles listed as impaired for aquatic life	1.1% of land within 300 feet of perennial streams are impervious	70.8% of land within 300 feet of perennial streams are forested	24.7% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

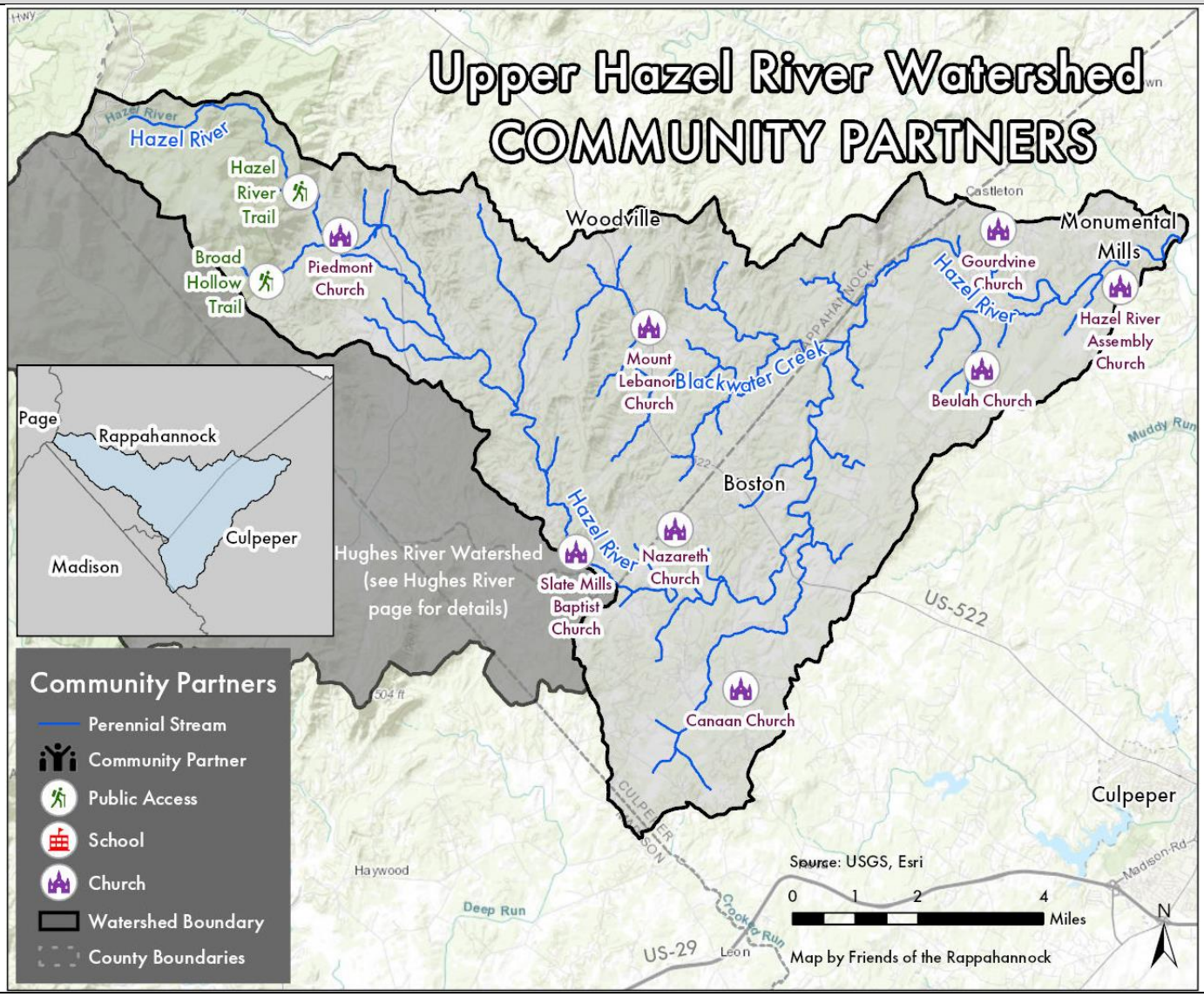


Upper Hazel River

COMMUNITY ENGAGEMENT: B+

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
B	N/A	N/A	A
Public access without interpretive signage (Hazel River Trail, Broad Hollow Trail)	No public schools in watershed	No data on river cleanups	71.4% (5 of 7) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Lower Hazel River Report Card

C

Subject	Grade	Comments
Human Health	B+	• 24% of stream-miles have unsafe bacteria count • No Fish consumption advisories
Land Use	D+	• 22.7 to 1 forest-impervious ratio • 9.2% of open spaces under protection
Stream Ecology	C	• 0% of stream-miles have degraded aquatic life • 69.2% of land within 300 feet of perennial streams are forested
Community Engagement	F	• 14.3% of road crossings marked • No public access to streams via park or trail

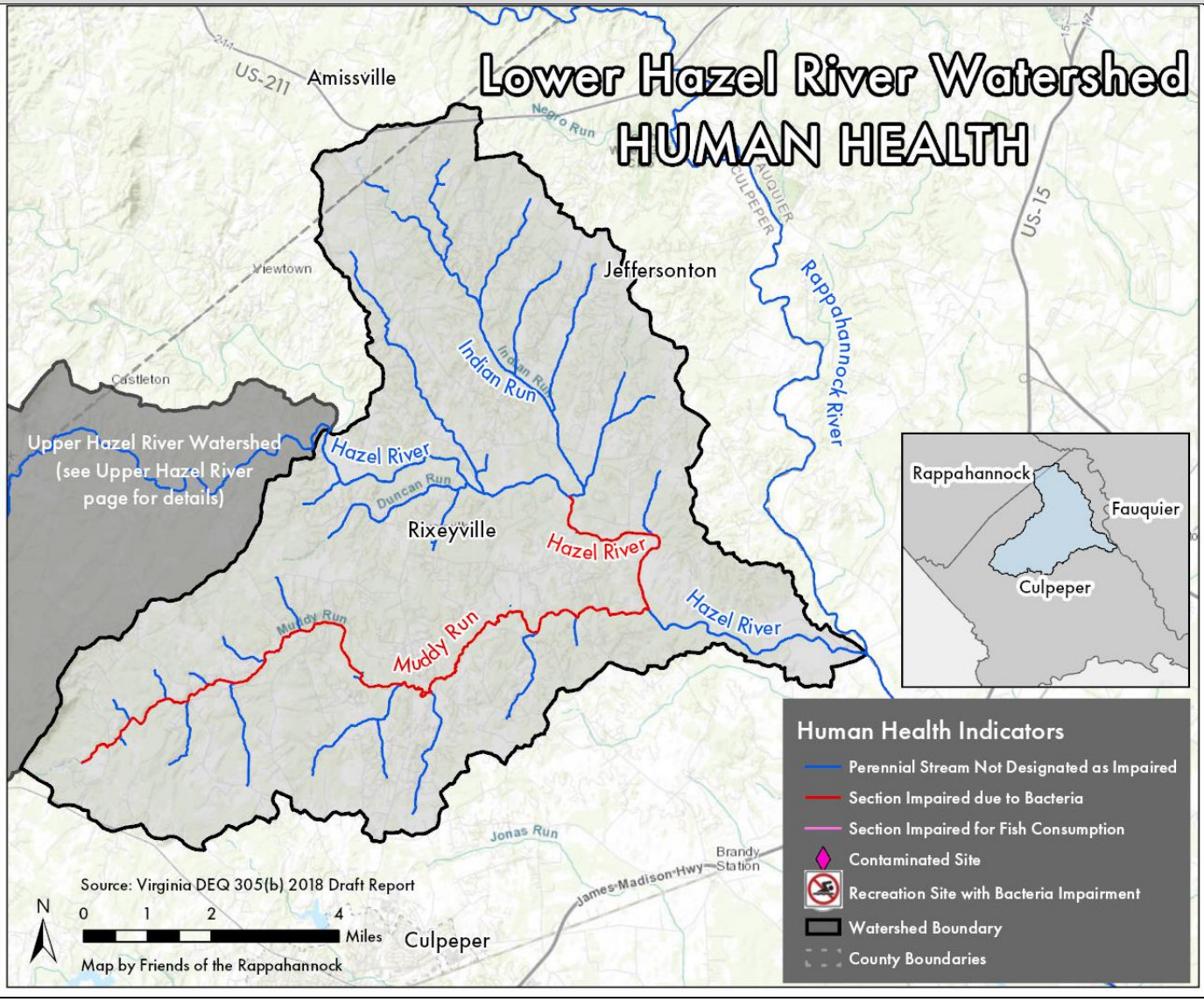
*Using state cost shares

Lower Hazel River

HUMAN HEALTH: B+

Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
C	A	Pass	Pass
24.0% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No impairment at recreation sites

For more information on indicators and grading scales, see Appendix 1

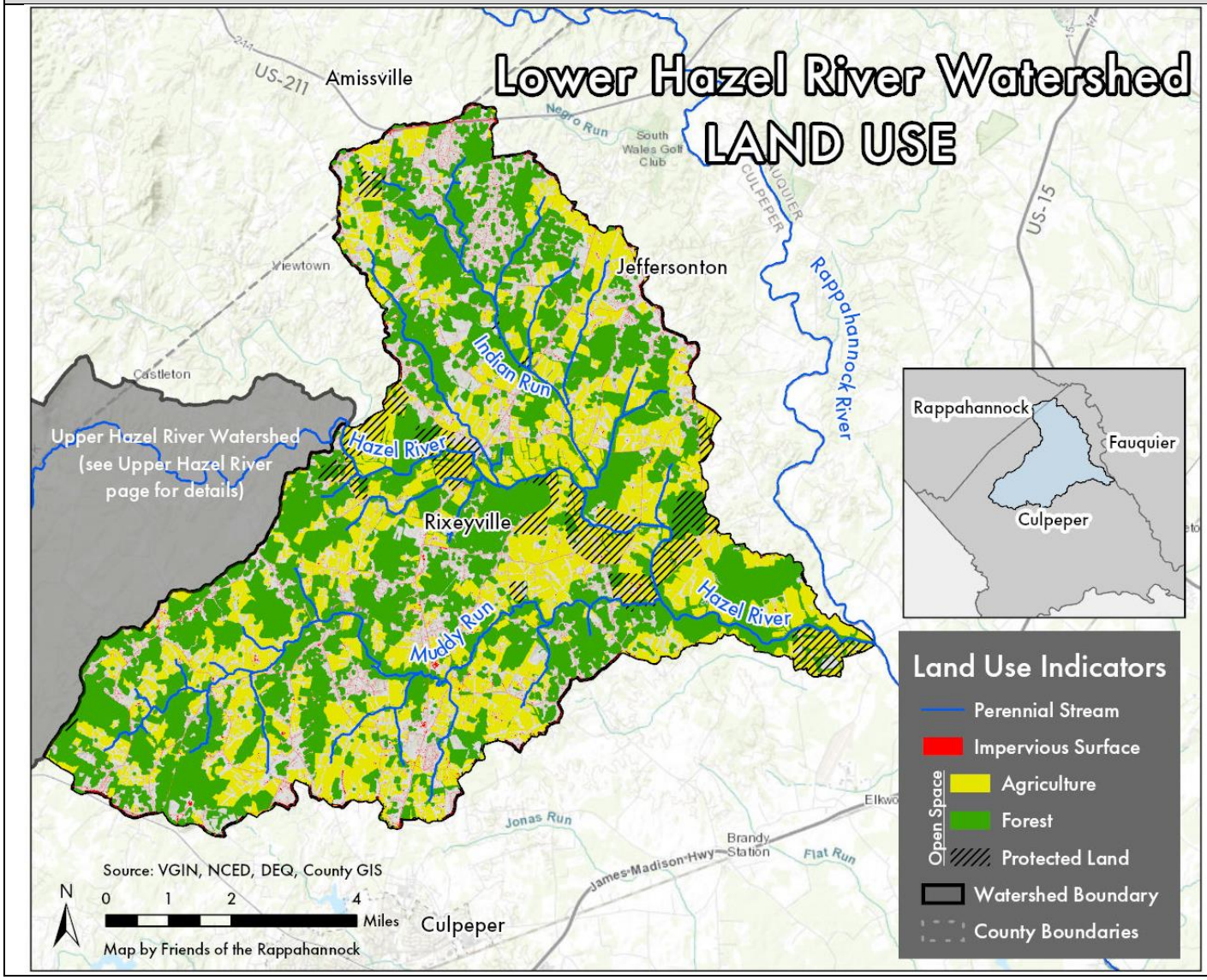


Lower Hazel River

LAND USE: D+

A	F	C	F
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
22.7 to 1 forest to impervious surface ratio	9.2% of open spaces under protection	14.2% of farmland treated by year, average 2007-2018	No residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

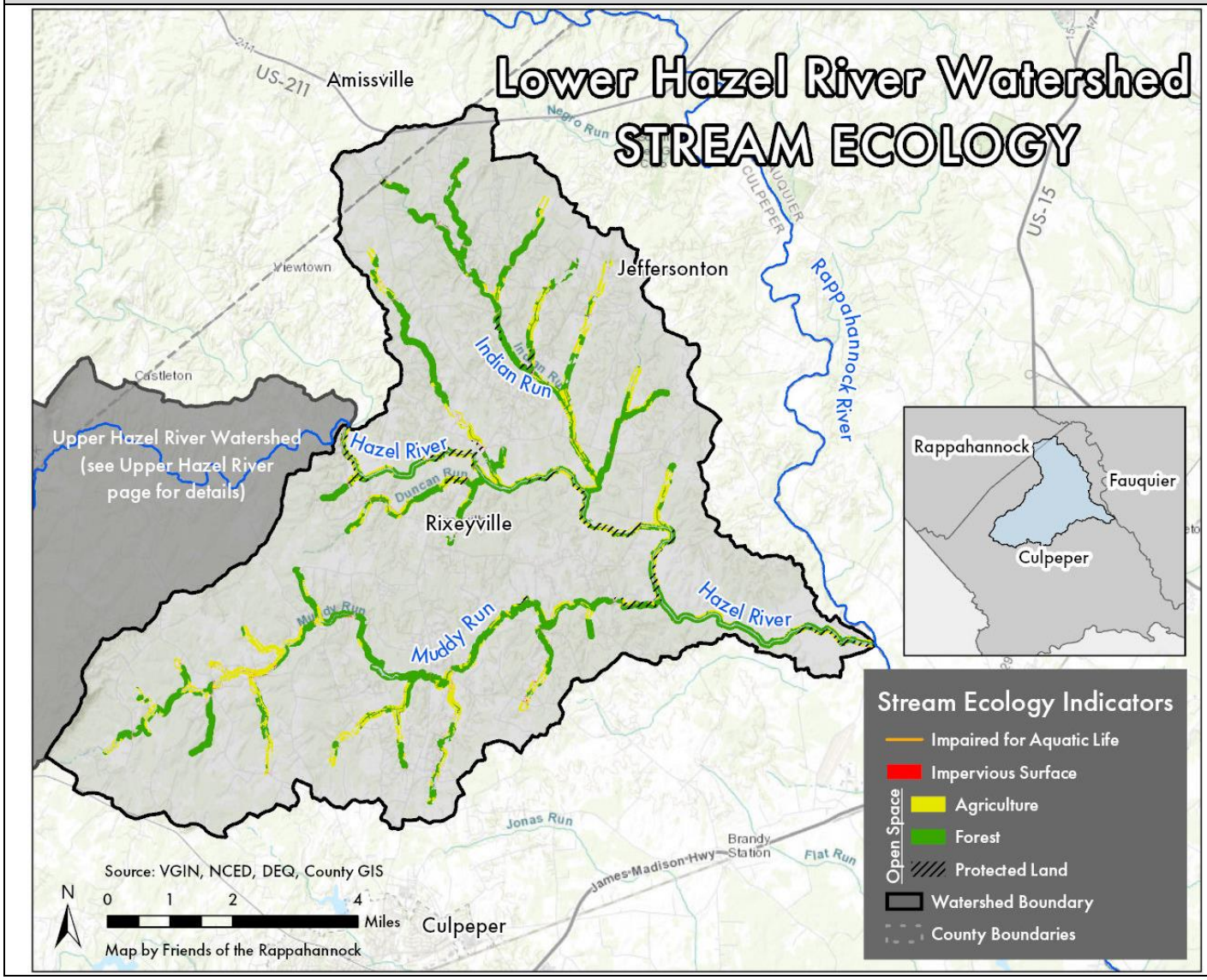


Lower Hazel River

STREAM ECOLOGY: C

A	A	D	F
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
0% of stream-miles listed as impaired for aquatic life	0.9% of land within 300 feet of perennial streams are impervious	69.2% of land within 300 feet of perennial streams are forested	11.9% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

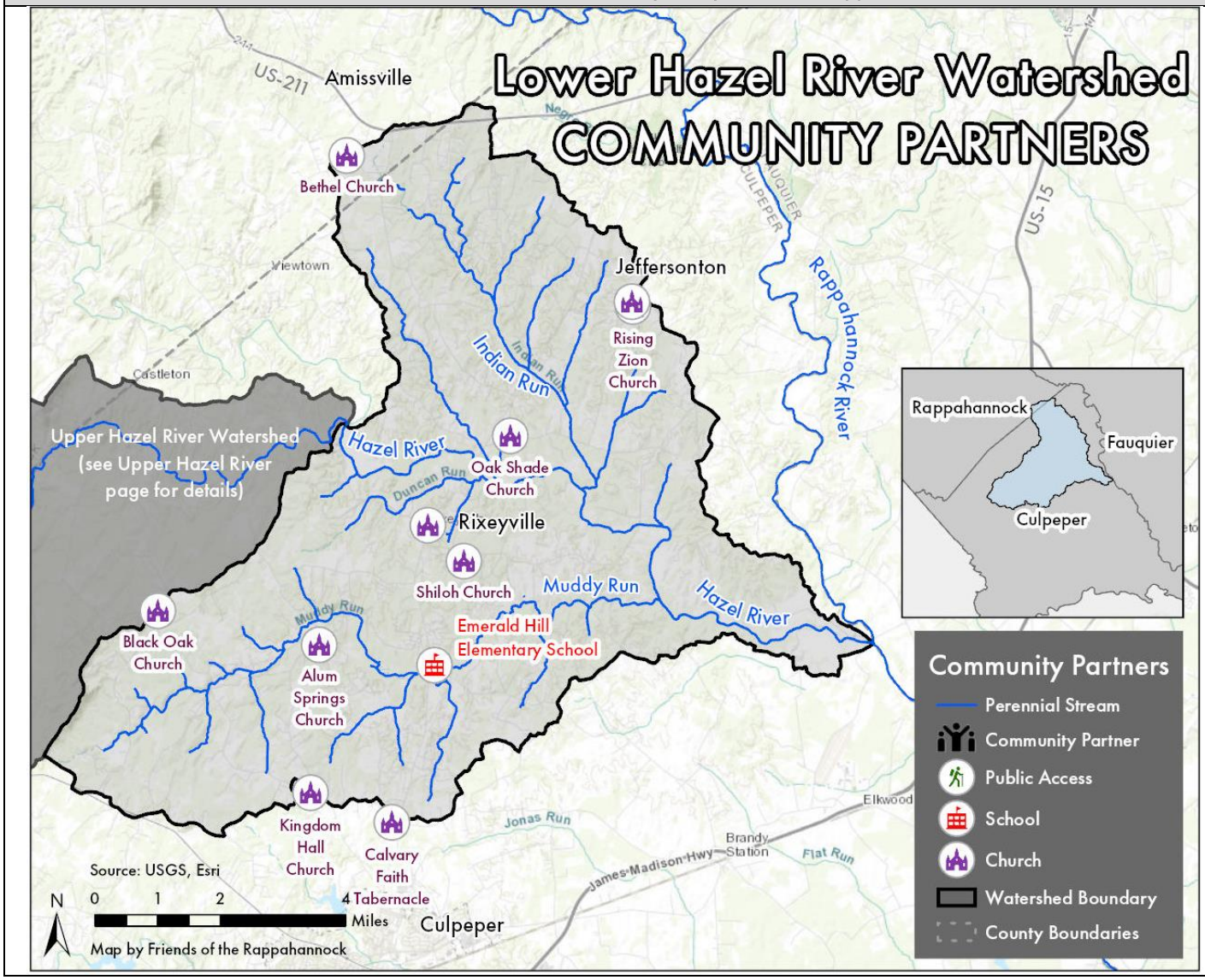


Lower Hazel River

COMMUNITY ENGAGEMENT: F

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
F	N/A	N/A	F
No public access	No data on watershed education	No data on river cleanups	14.3% (2 of 14) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Hughes River Report Card

B-

Subject	Grade	Comments
Human Health	A-	• 18.4% of stream-miles have unsafe bacteria count • No fish tissue impairment
Land Use	B+	• 54.4% of open spaces protected under private easement or government ownership • 12.0% of farmland treated with BMP annually *
Stream Ecology	C	• 11.1% of stream-miles have degraded aquatic life • 68.7% of land within 300 feet of perennial streams are forested
Community Engagement	C	• Watershed contains a public trail providing access to a named stream, with no interpretive signage • 25% of road crossings marked with stream name

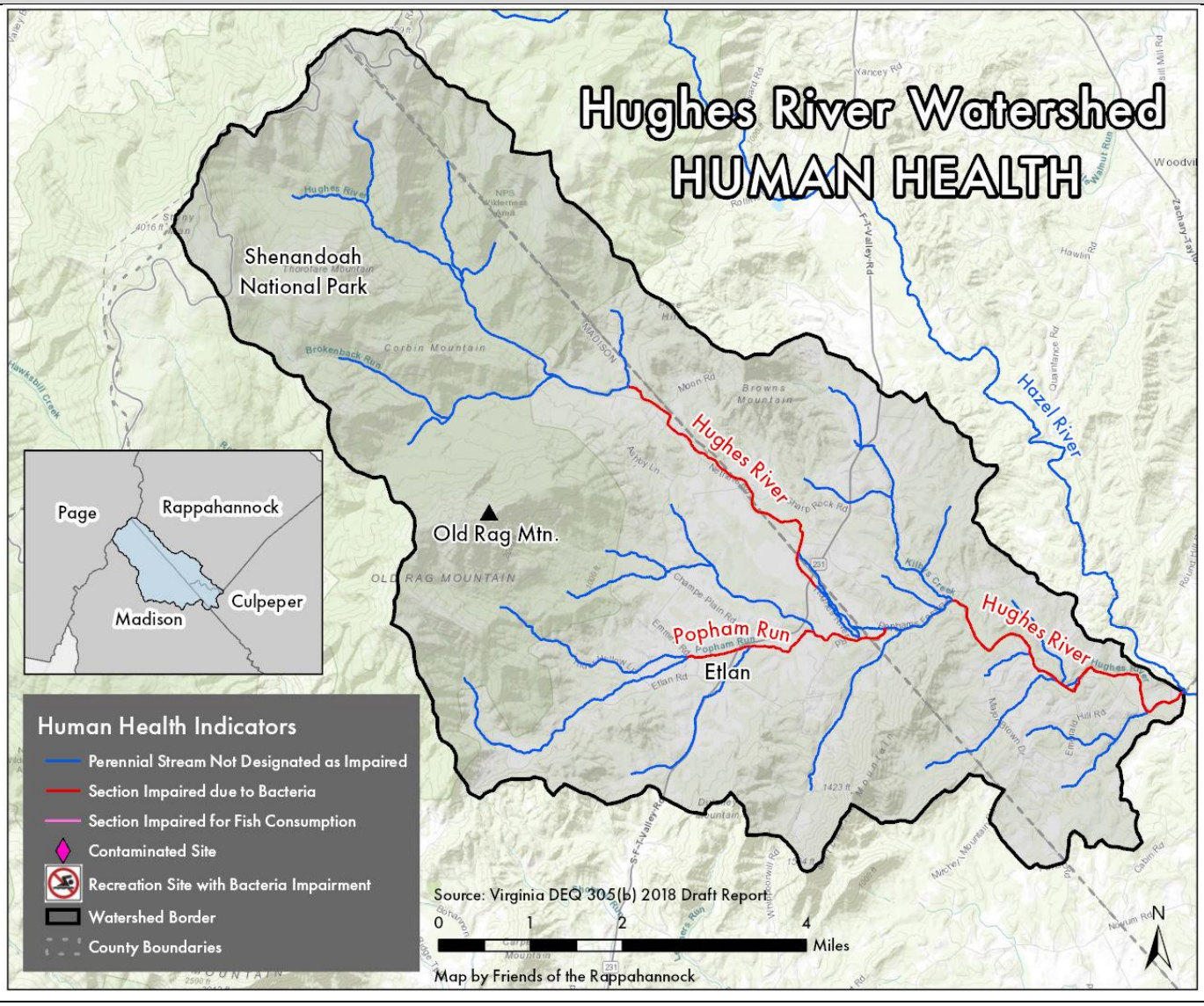
*Of BMP-eligible farmland, using state cost shares

Hughes River

HUMAN HEALTH: A-

B	A	Pass	Pass
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
18.4% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No impairment

For more information on indicators and grading scales, see Appendix 1

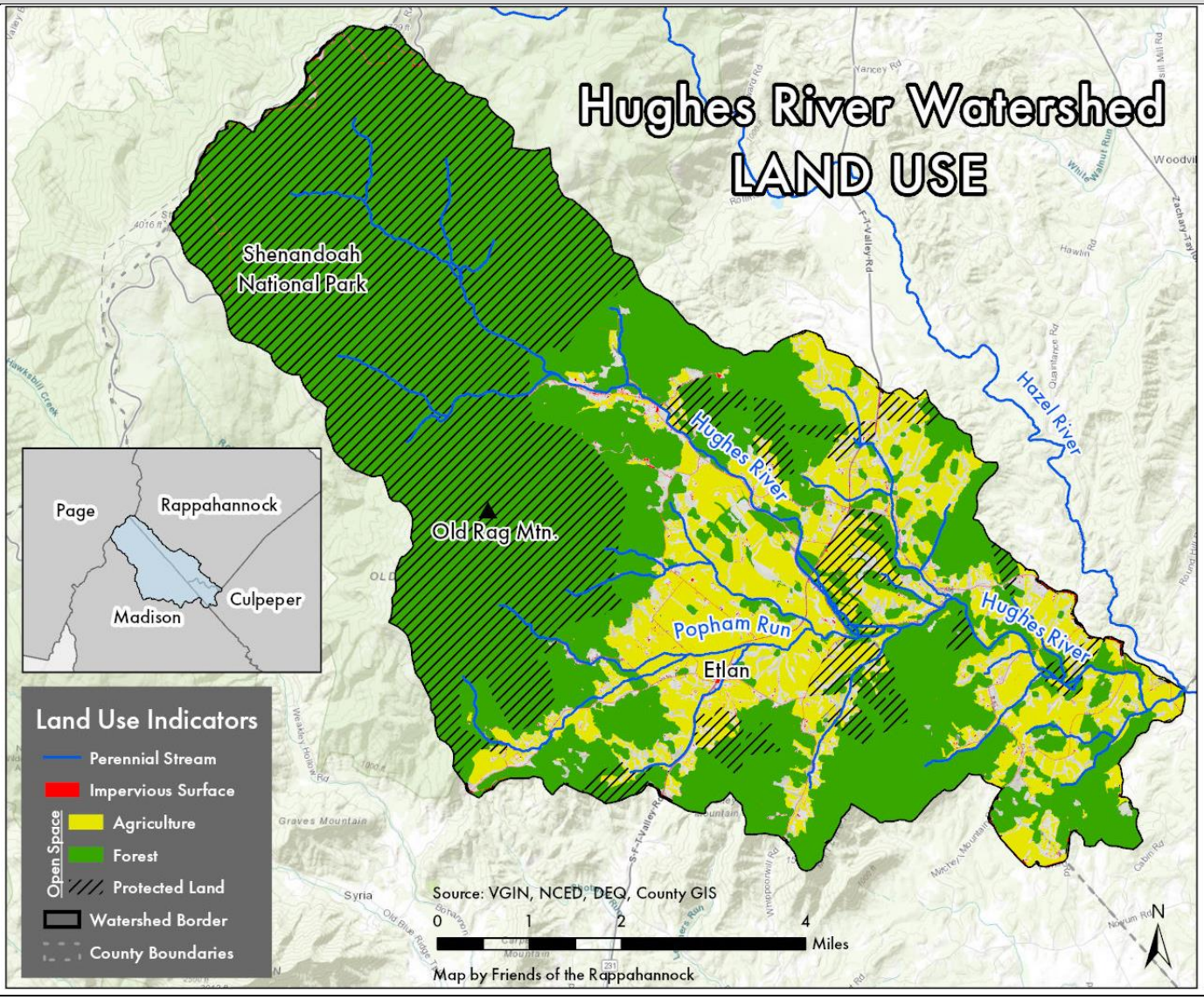


Hughes River

LAND USE: B+

A	A	C	A
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
91.6 to 1 forest to impervious surface ratio	54.4% of open spaces under protection	12.0% of farmland treated by year, average 2007-2018	4.0 BMPs per 10,000 population installed (2015-2018)

For more information on indicators and grading scales, see Appendix 1

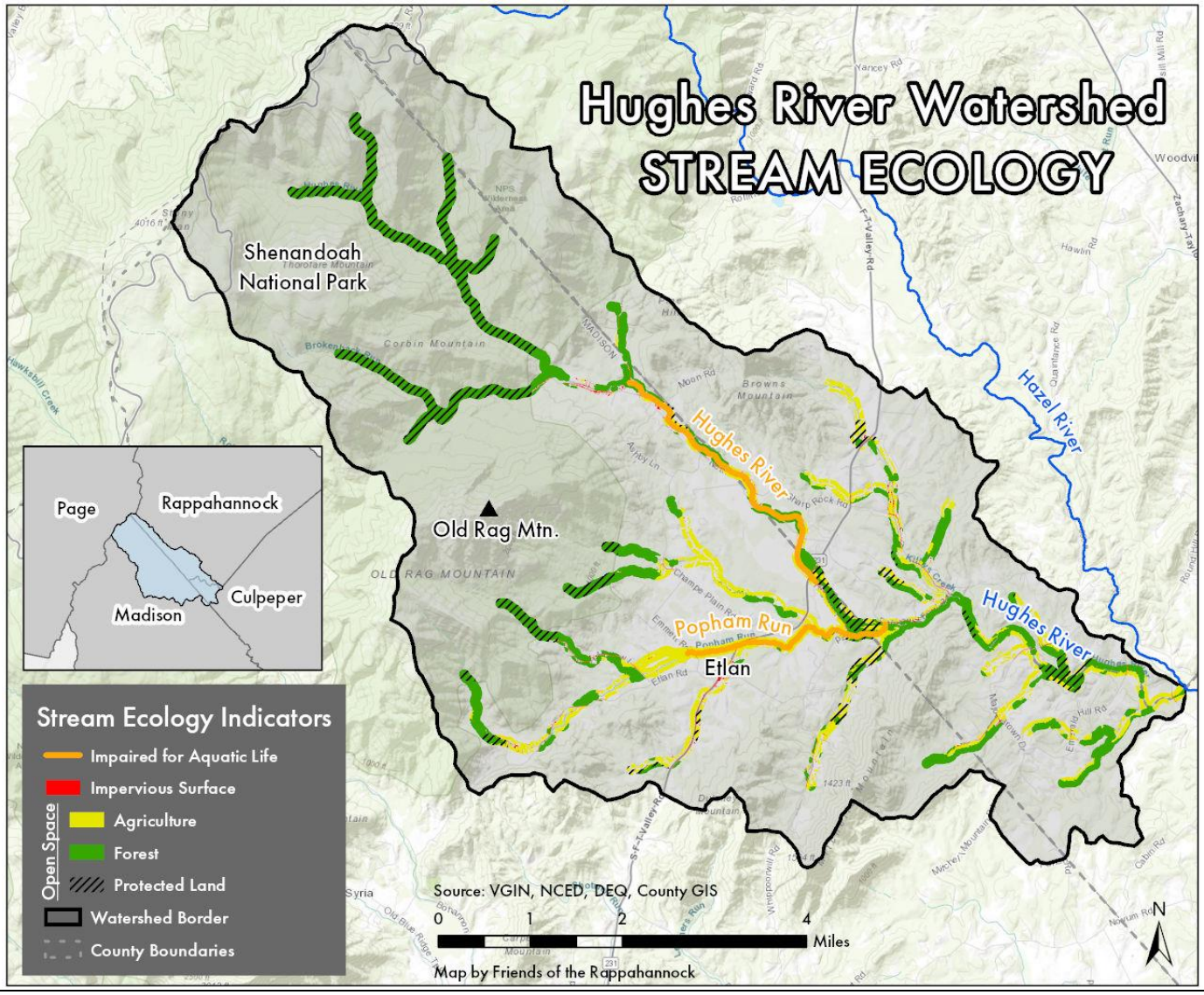


Hughes River

STREAM ECOLOGY: C

B	B	D	D
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
11.1% of stream-miles listed as impaired for aquatic life	2.2% of land within 300 feet of perennial streams are impervious	68.7% of land within 300 feet of perennial streams are forested	38.5% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

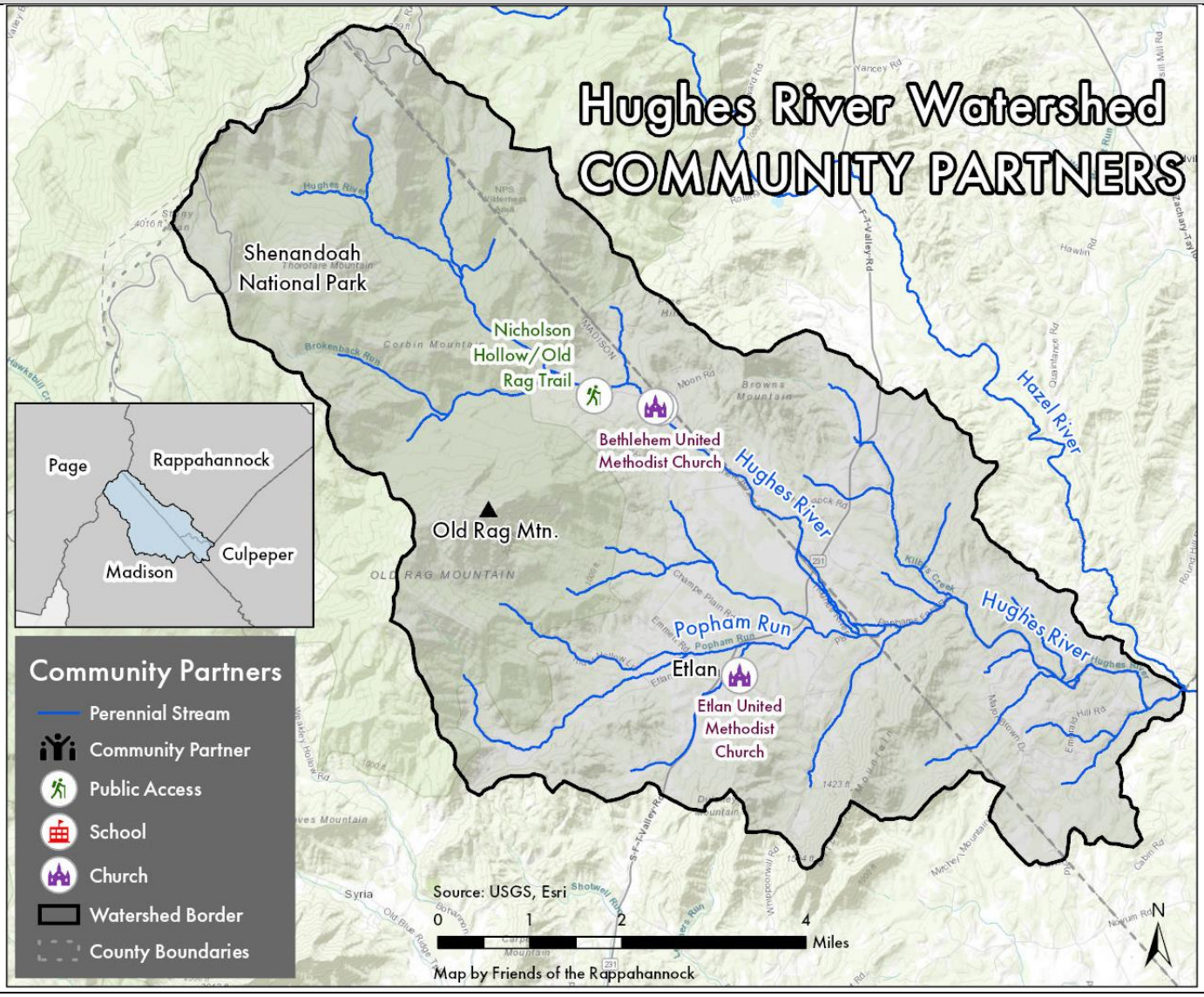


Hughes River

COMMUNITY ENGAGEMENT: C

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
B	N/A	N/A	D
Public access, but without interpretive signage (Old Rag Tr.)	No public schools in watershed	No data on river cleanups	25% (1 of 4) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Mountain Run Report Card

D+

Subject	Grade	Comments
Human Health	D	• 31.9% of stream-miles have unsafe bacteria levels including at Yowell Meadow Park • 26.1% of stream-miles have elevated levels of contaminated fish tissue
Land Use	D+	• 4.4% of open spaces under protection • 25.9% of farmland treated using BMP per year, average 2007-2018*
Stream Ecology	D+	• 25.4% of stream-miles have degraded aquatic life • 57.8% of land within 300 feet of perennial streams are forested
Community Engagement	A	• Multiple public access points with interpretive signage • 50% of stream crossings have been marked

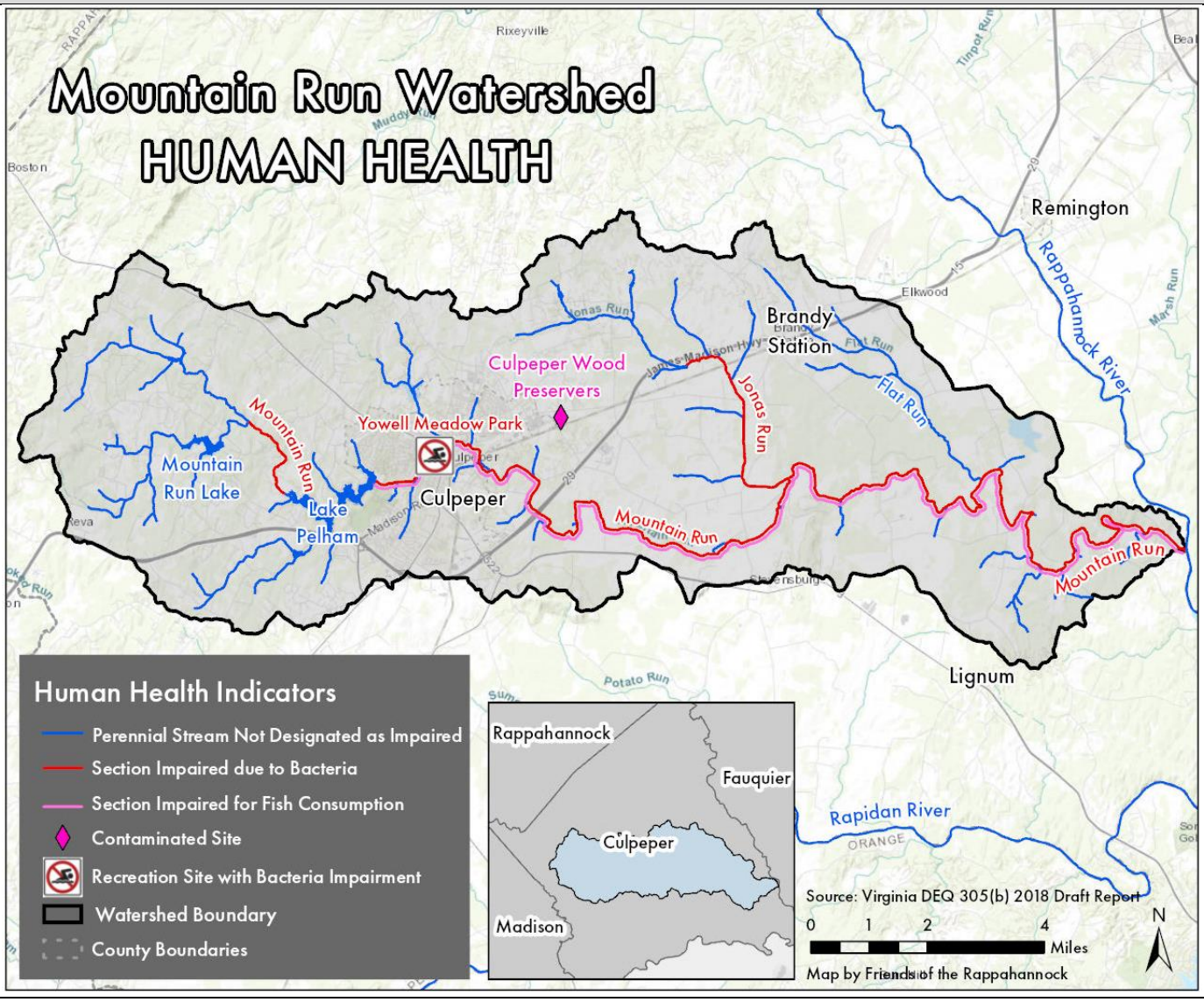
*Of BMP eligible farmland, using state cost shares

Mountain Run

HUMAN HEALTH: D

Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
C	C	Fail	Fail
31.9% of stream-miles listed as impaired for recreation due to bacteria	26.1% of stream-miles listed as impaired for contaminated fish tissue	1 Superfund site	Recreation impairment at Yowell Park

For more information on indicators and grading scales, see Appendix 1

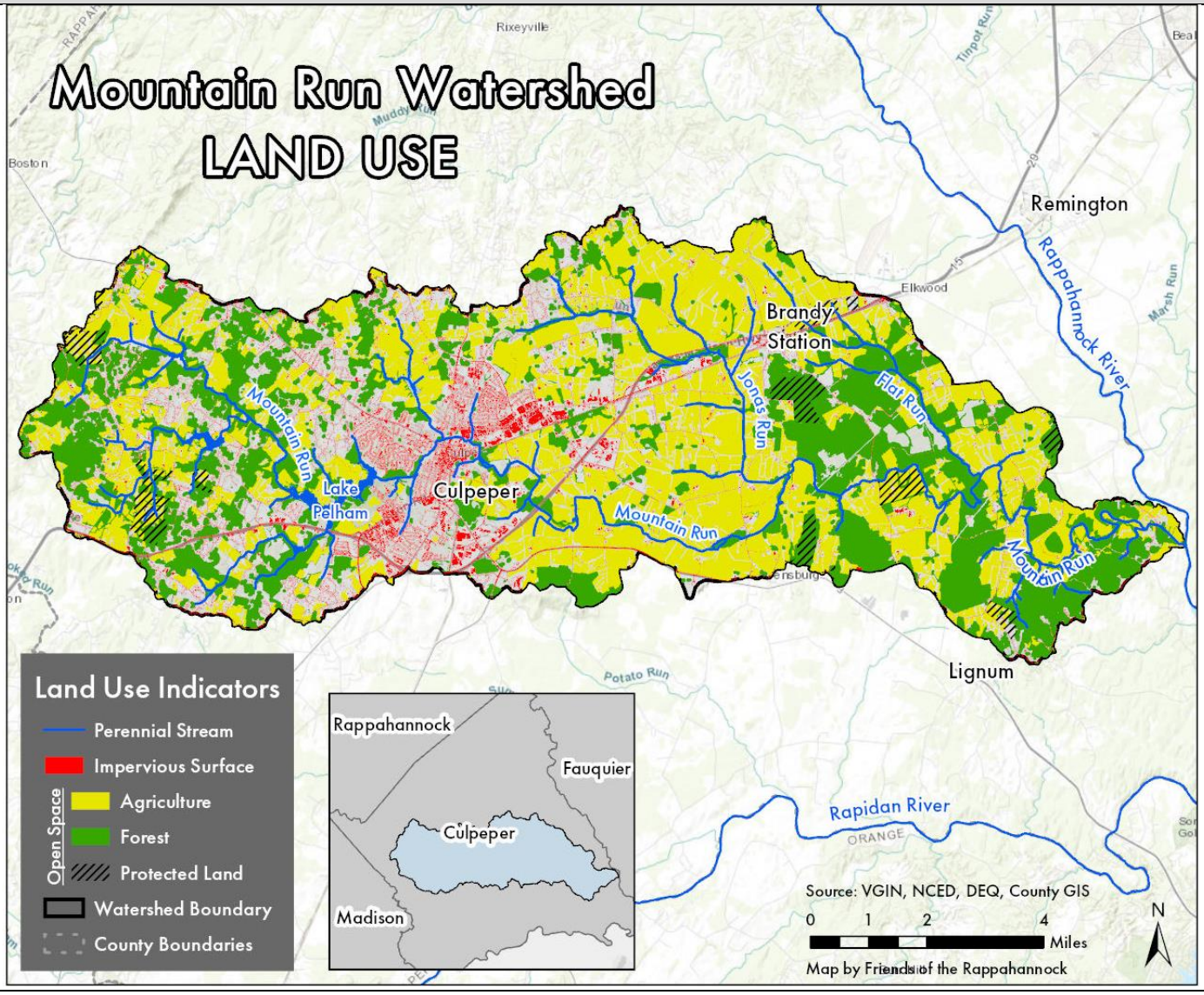


Mountain Run

LAND USE: D+

C	F	B	D
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
8.2 to 1 forest to impervious surface ratio	4.4% of open spaces under protection	25.9% of farmland treated by year, average 2007-2018	0.3 residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

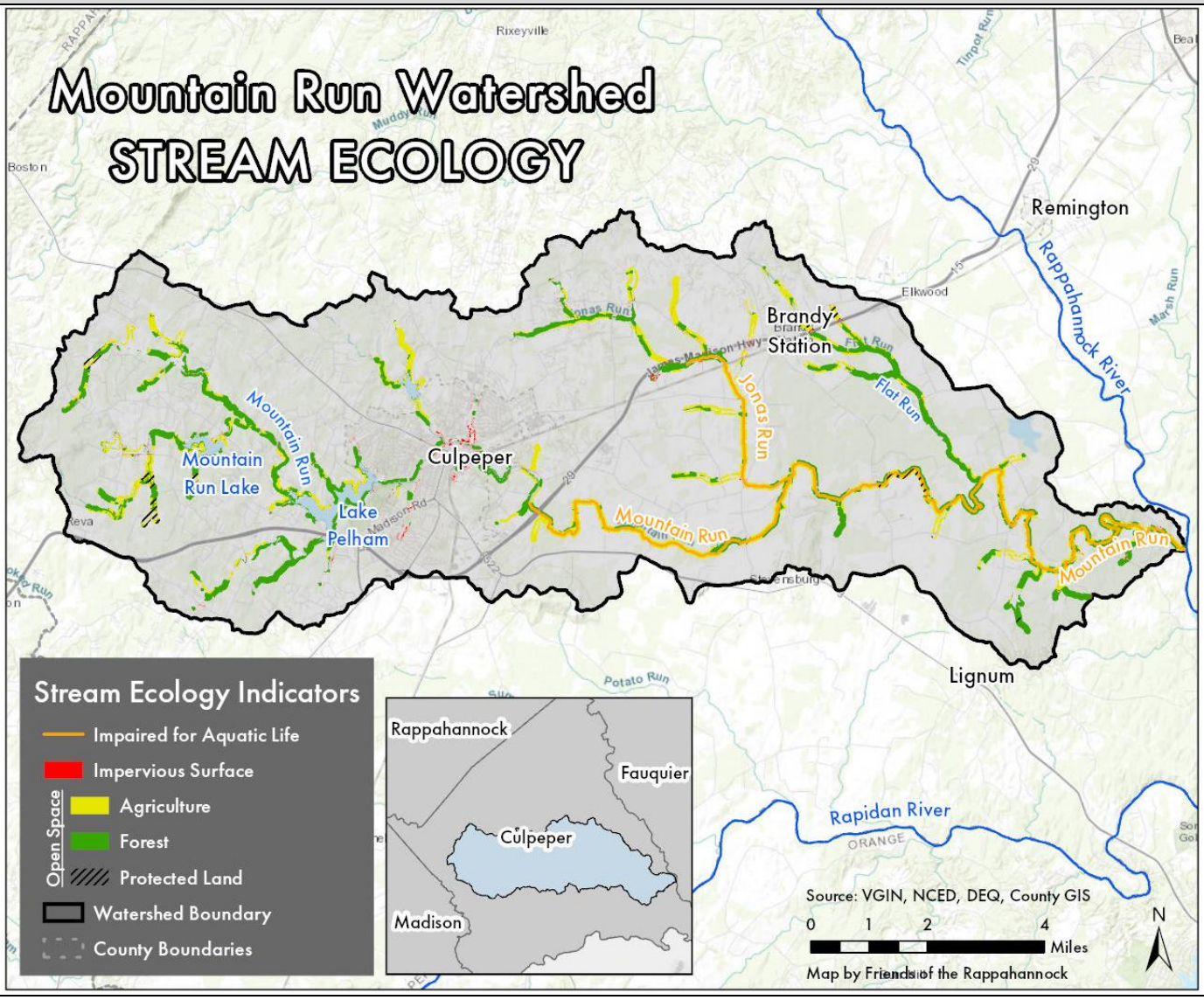


Mountain Run

STREAM ECOLOGY: D+

C	B	F	F
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
25.4% of stream-miles listed as impaired for aquatic life	2.1% of land within 300 feet of perennial streams are impervious	57.8% of land within 300 feet of perennial streams are forested	4.4% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

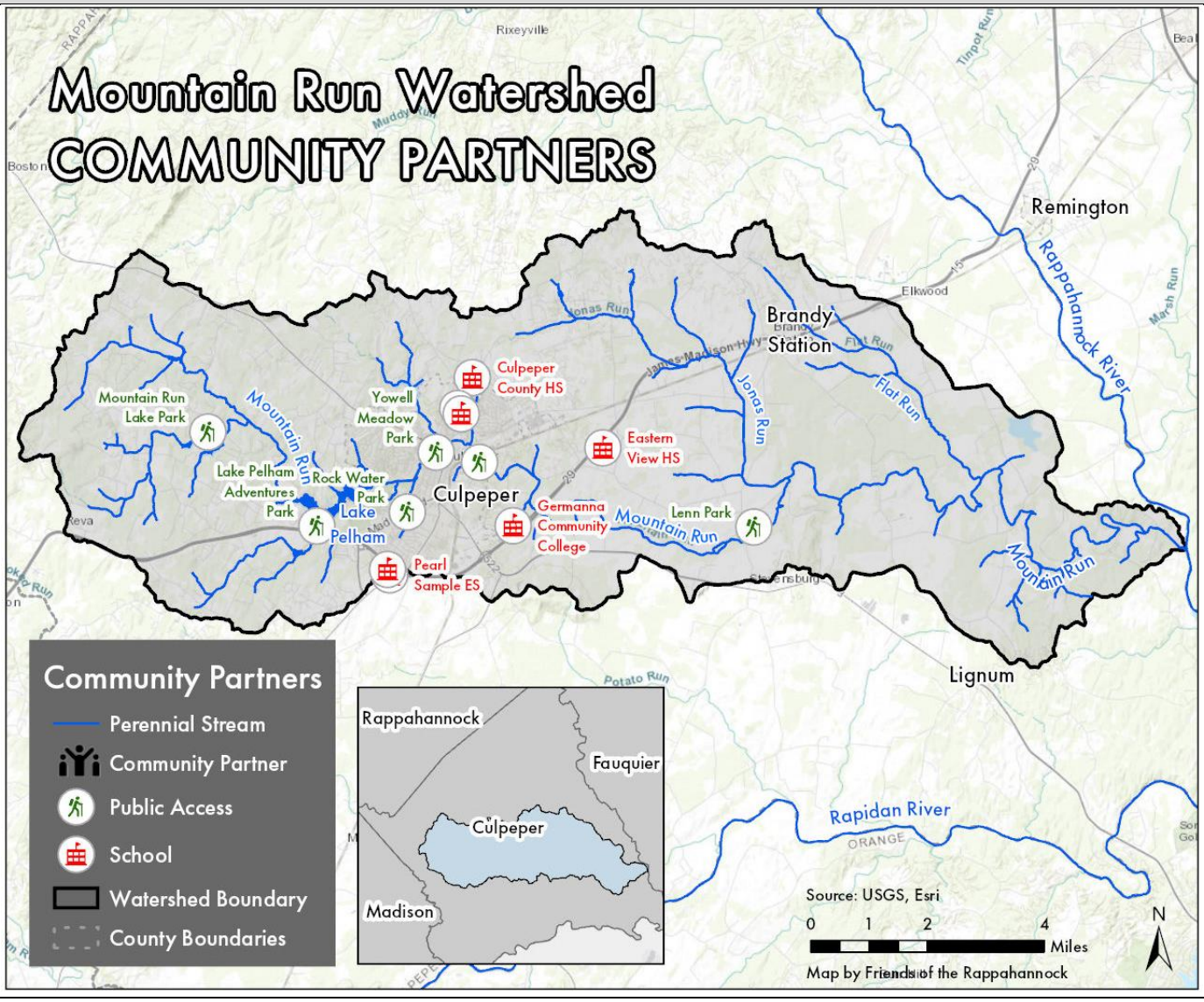


Mountain Run

COMMUNITY ENGAGEMENT: A

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
A	N/A	N/A	A
Public access with interpretive signage via 6 public parks	No data on watershed education	No data on river cleanups	50% (8 of 16) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Fauquier County Stream Results

Carter Run Report Card

C+

Subject	Grade	Comments
Human Health	B+	• 30.7% of stream-miles have unsafe bacteria count • No fish contamination impairment
Land Use	C+	• 30.8% of open spaces under protection • No residential BMPs installed (2015-2018)*
Stream Ecology	B	• 80.3% of land within 300 feet of perennial streams are forested • 22.3% of open spaces within 300 feet of perennial streams are under protection
Community Engagement	F	• 0% of road crossings marked • No public access to streams via park or trail

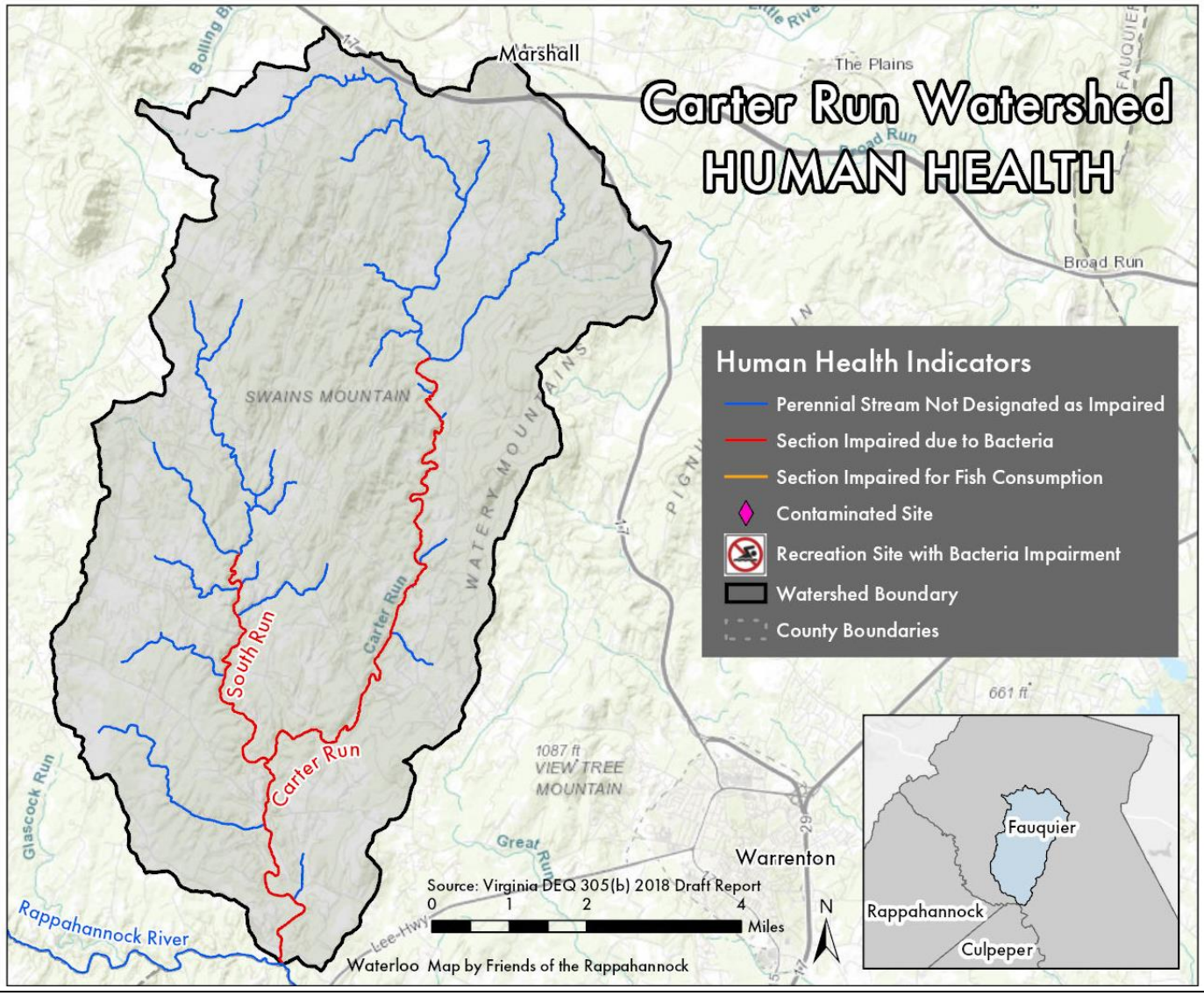
*Using state cost shares

Carter Run

HUMAN HEALTH: B+

Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
C	A	Pass	Pass
30.7% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No impairment

For more information on indicators and grading scales, see Appendix 1

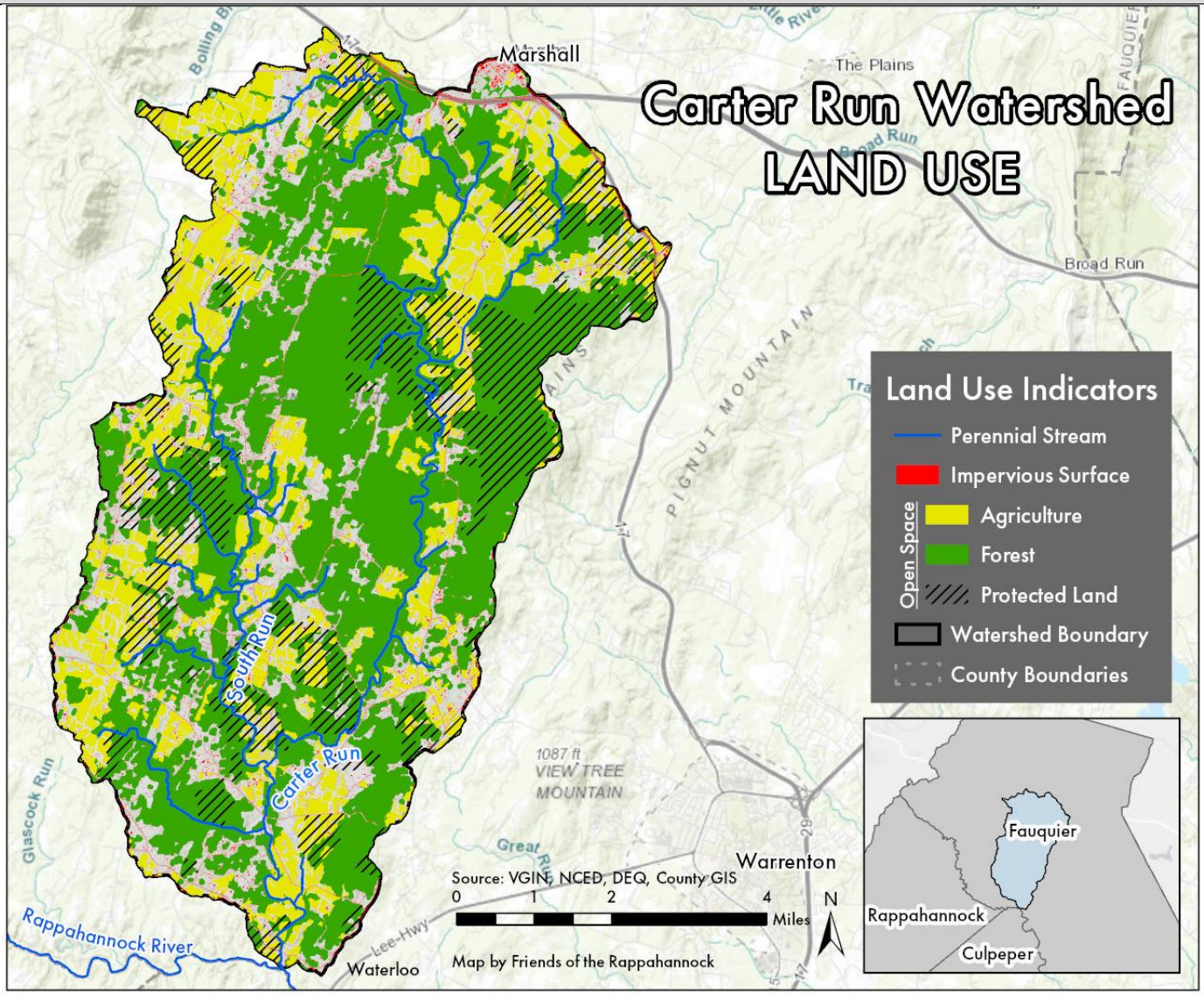


Carter Run

LAND USE: C+

A	A	C	F
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
30.4 to 1 forest to impervious surface ratio	30.8% of open spaces under protection	13.8% of farmland treated by year, average 2007-2018	0 residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

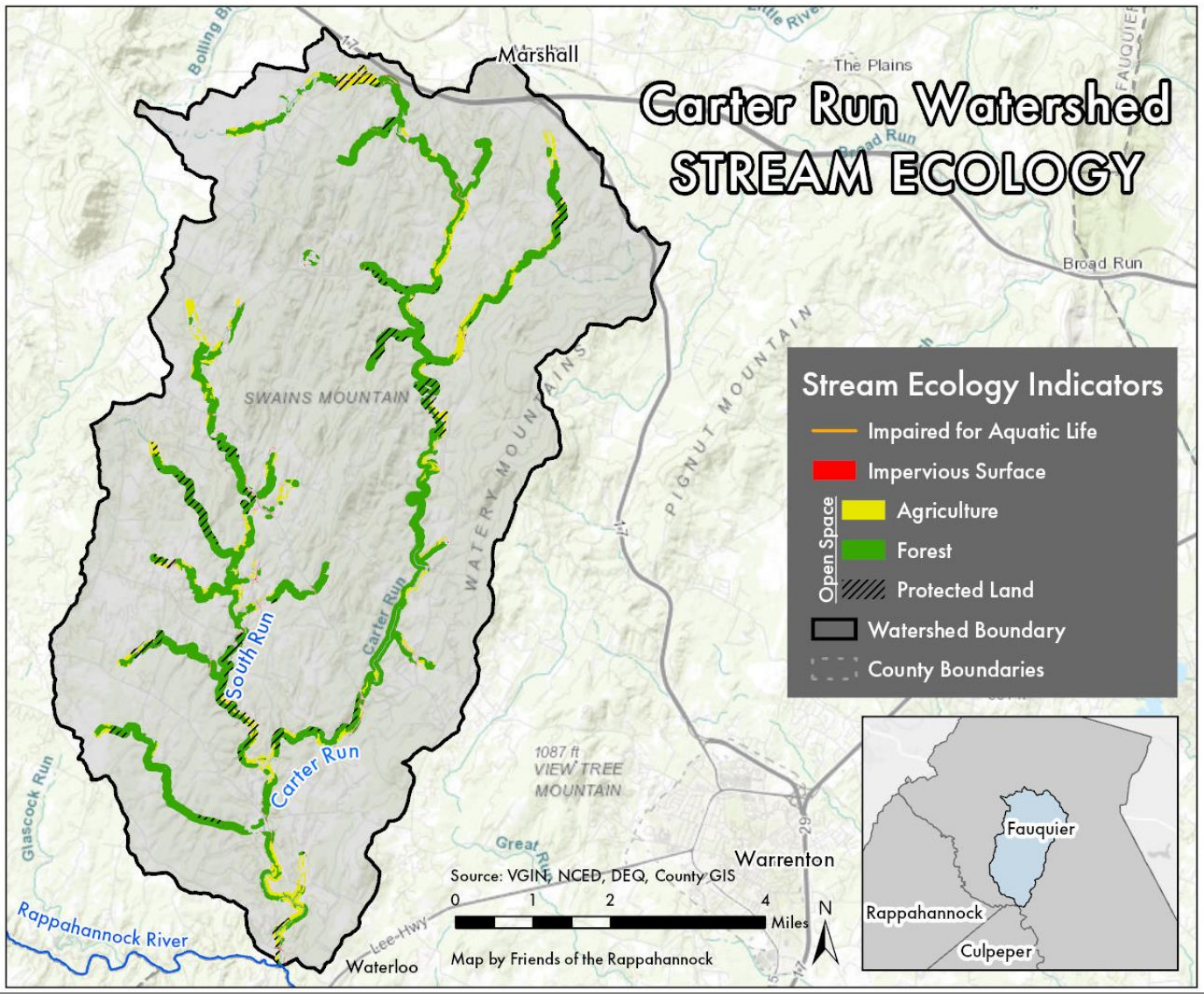


Carter Run

STREAM ECOLOGY: B

A	A	B	D
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
0% of stream-miles listed as impaired for aquatic life	0.9% of land within 300 feet of perennial streams are impervious	80.3% of land within 300 feet of perennial streams are forested	22.3% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

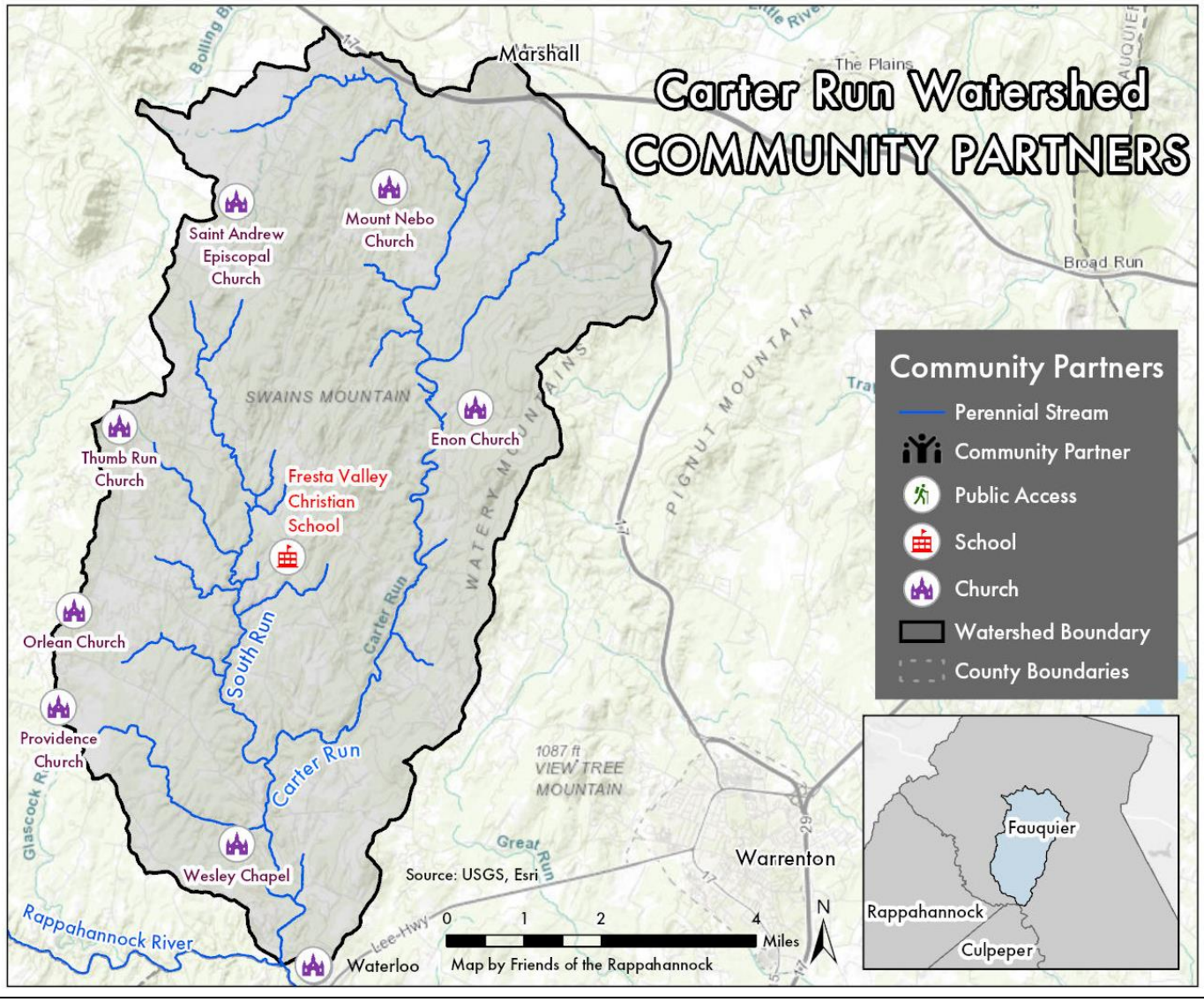


COMMUNITY ENGAGEMENT: F

Carter Run

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
F	N/A	N/A	F
No public access points	No public schools in watershed	No data on river cleanups	0% (0 of 7) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Great Run Report Card

C+

Subject	Grade	Comments
Human Health	B	• 63.3% of stream-miles have unsafe bacteria count • No fish contamination impairment
Land Use	C	• 45.4% of open spaces protected under private easement or government ownership • No residential BMPs installed (2015-2018)*
Stream Ecology	C	• 29.3% of stream-miles have degraded aquatic life • 1.3% of land within 300 foot buffers around perennial streams is impervious surface
Community Engagement	C	• 50% of road crossings marked with stream name • No public access to streams via park or trail

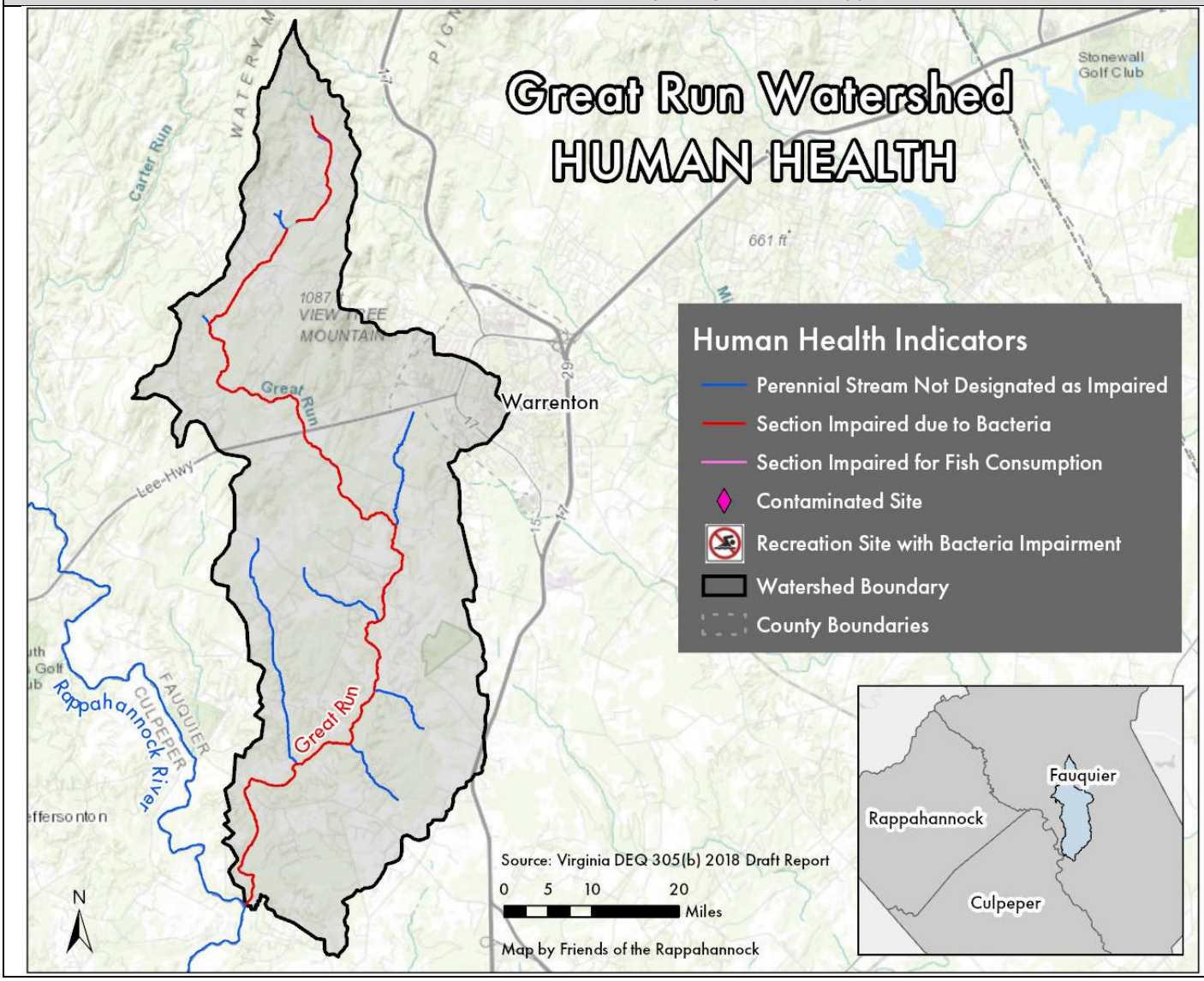
*Using state cost shares

Great Run

HUMAN HEALTH: B

F	A	Pass	Pass
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
63.3% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No recreation impairment at public access sites

For more information on indicators and grading scales, see Appendix 1

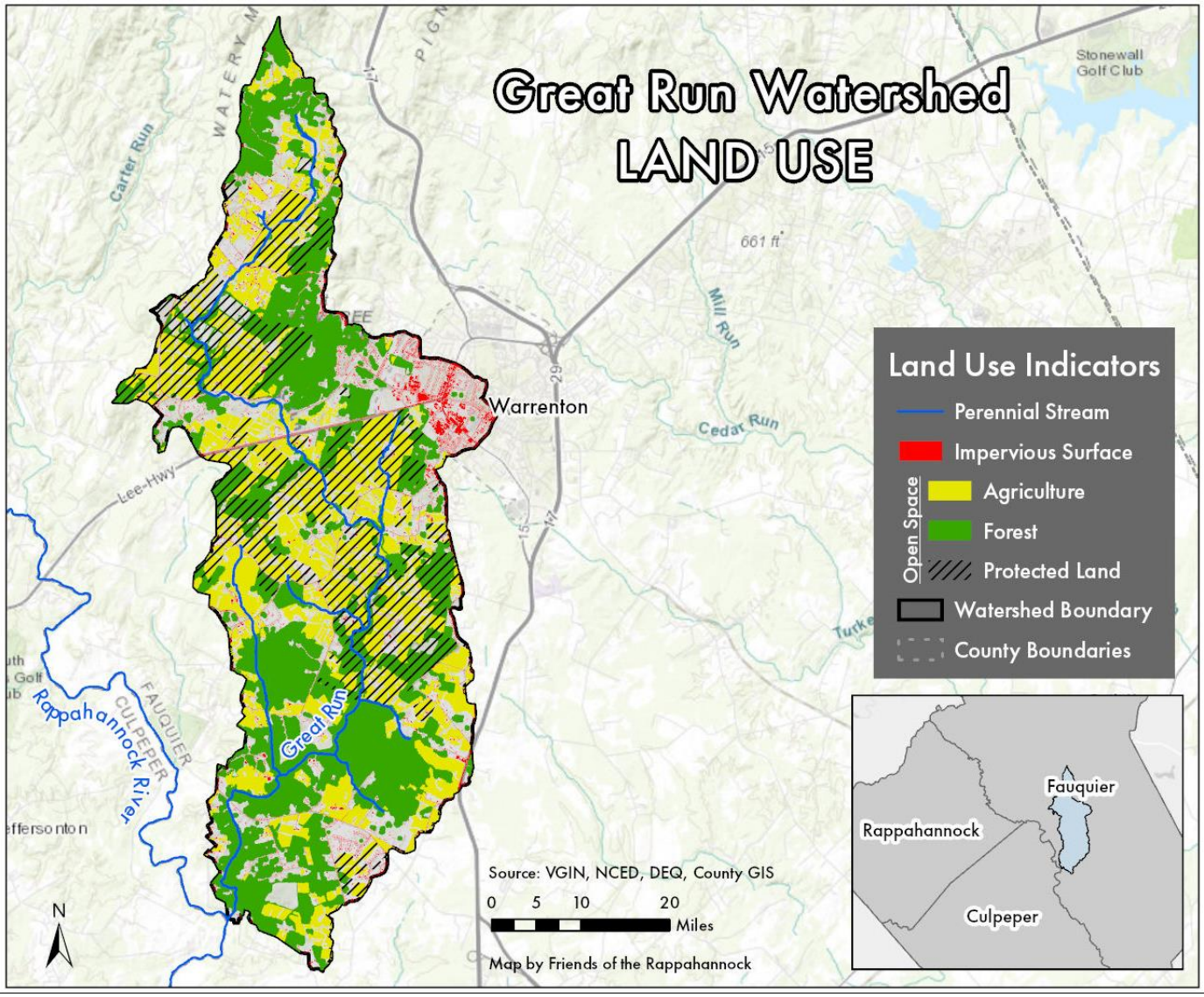


Great Run

LAND USE: C

B	A	D	F
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
14.7 to 1 forest to impervious surface ratio	45.4% of open spaces under protection	9.7% of farmland treated by year, average 2007-2018	No residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

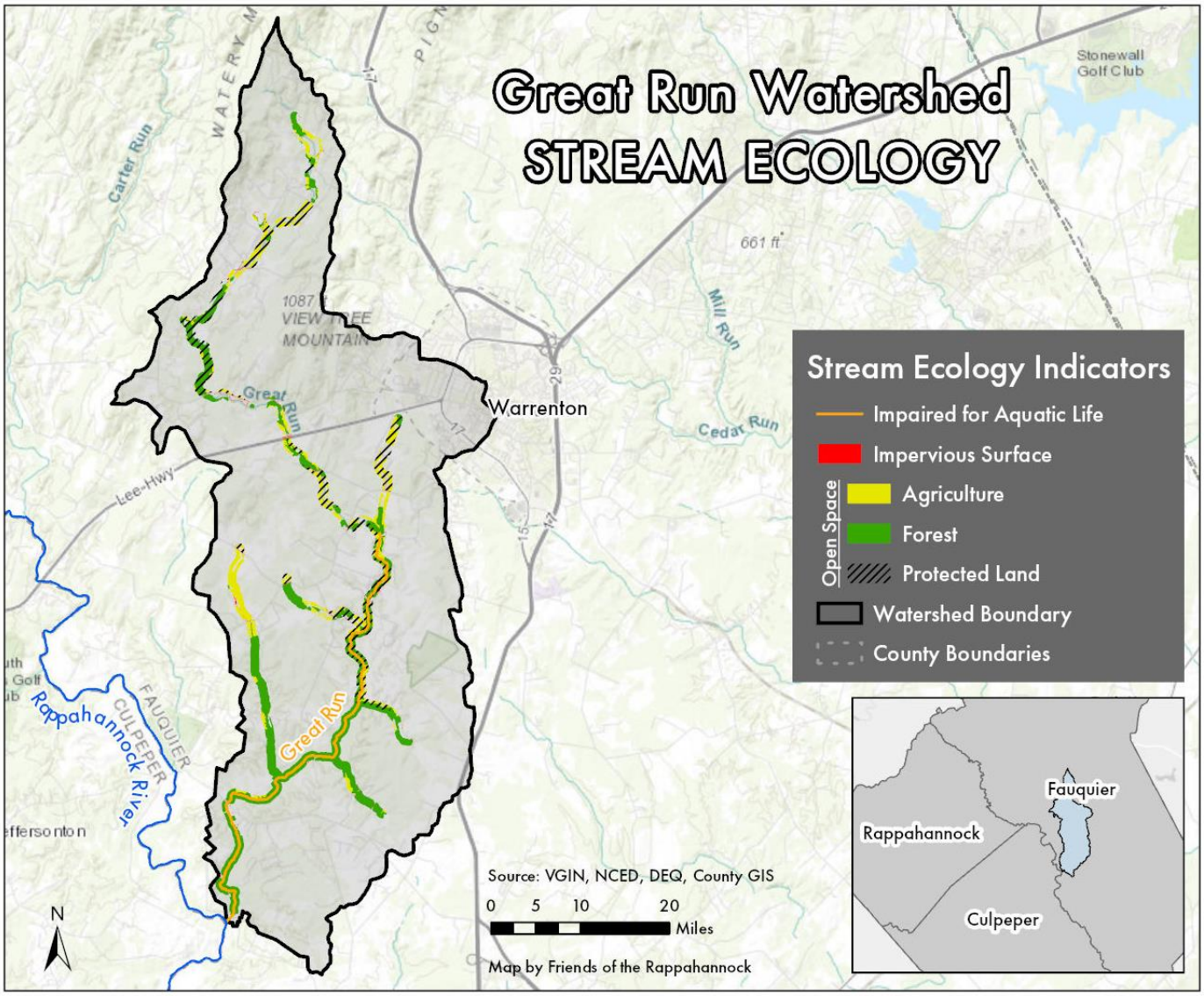


Great Run

STREAM ECOLOGY: C

Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
C	A	D	C
29.3% of stream-miles listed as impaired for aquatic life	1.3% of land within 300 feet of perennial streams are impervious	66.9% of land within 300 feet of perennial streams are forested	46.5% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

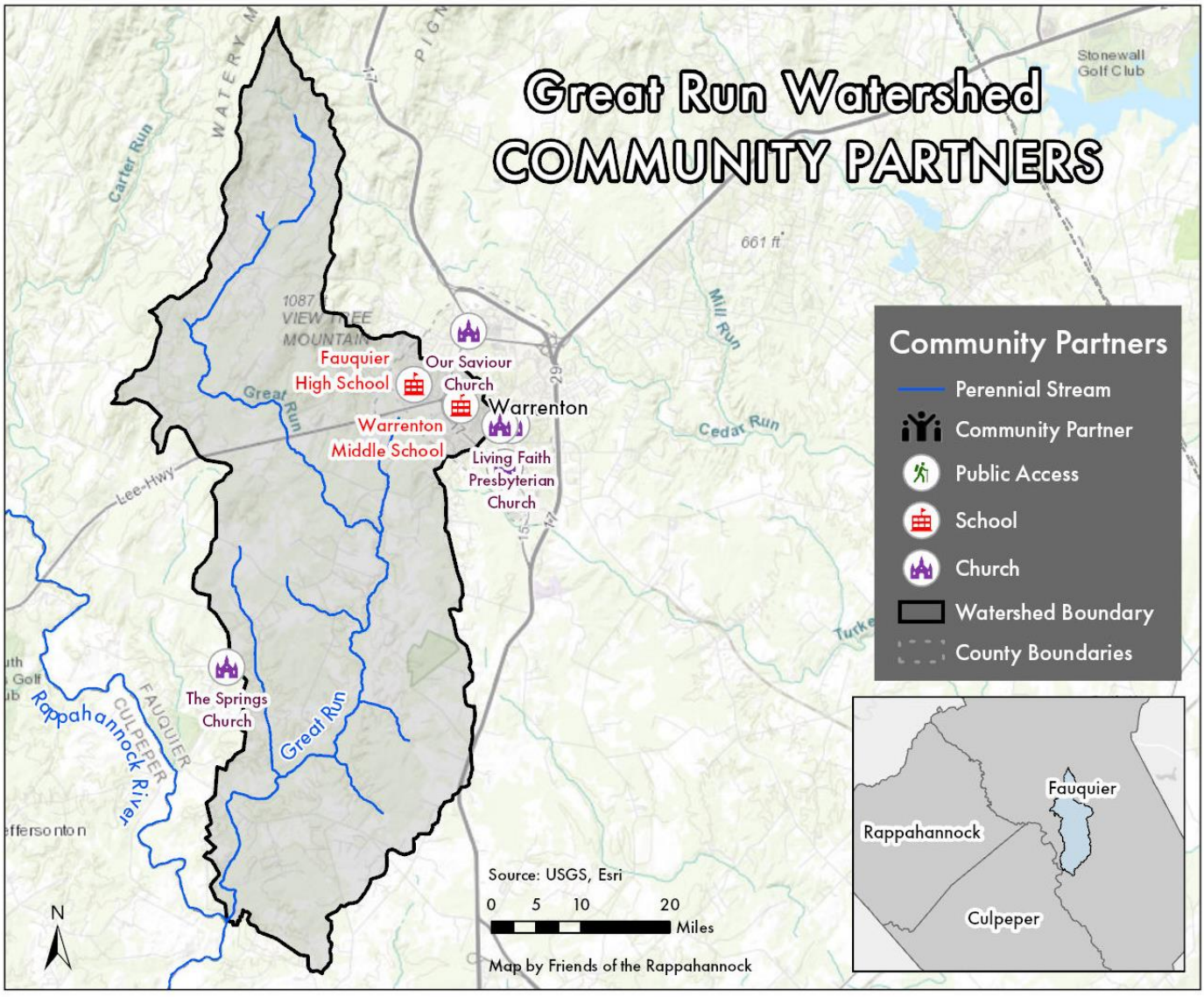


COMMUNITY ENGAGEMENT: C

Great Run

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
F	N/A	N/A	A
No public access to streams via park or trail	No data on watershed education	No data on river cleanups	50% (2 of 4) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Fiery Run Report Card

C+

Subject	Grade	Comments
Human Health	B	• 74.8% of stream-miles have unsafe bacteria count • No fish contamination impairment
Land Use	C	• 35.3% of farmland treated with BMP annually* • 12.9% of open spaces protected under private easement or government ownership
Stream Ecology	B-	• No streams have degraded aquatic life • 80.6% of riparian areas are forested
Community Engagement	C	• Private access to stream via Marriott Ranch • No schools or lined road crossings

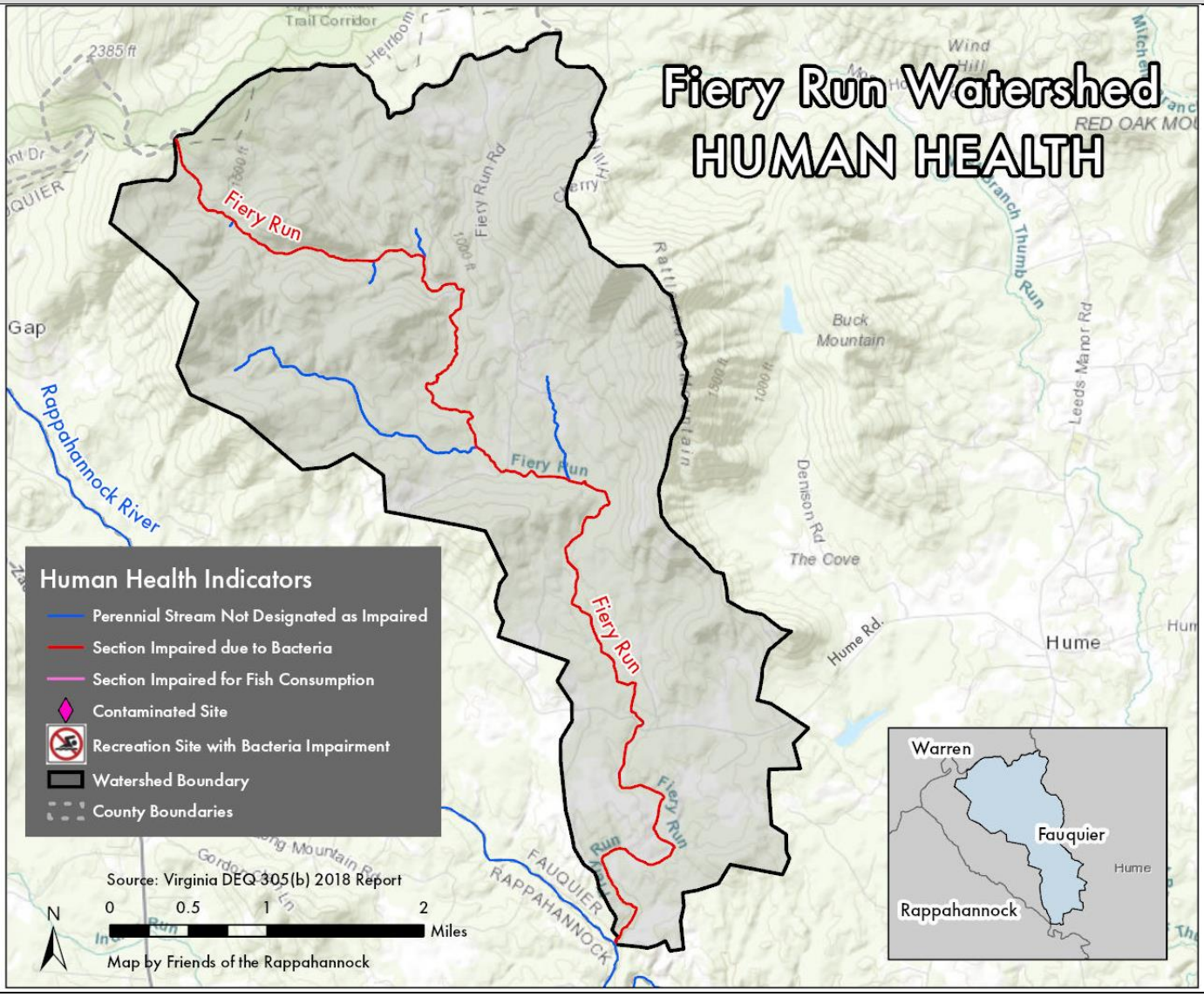
*BMP-eligible farmland, using state cost shares

Fiery Run

HUMAN HEALTH: B

F	A	Pass	Pass
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
74.8% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No recreation impairment at public access sites

For more information on indicators and grading scales, see Appendix 1

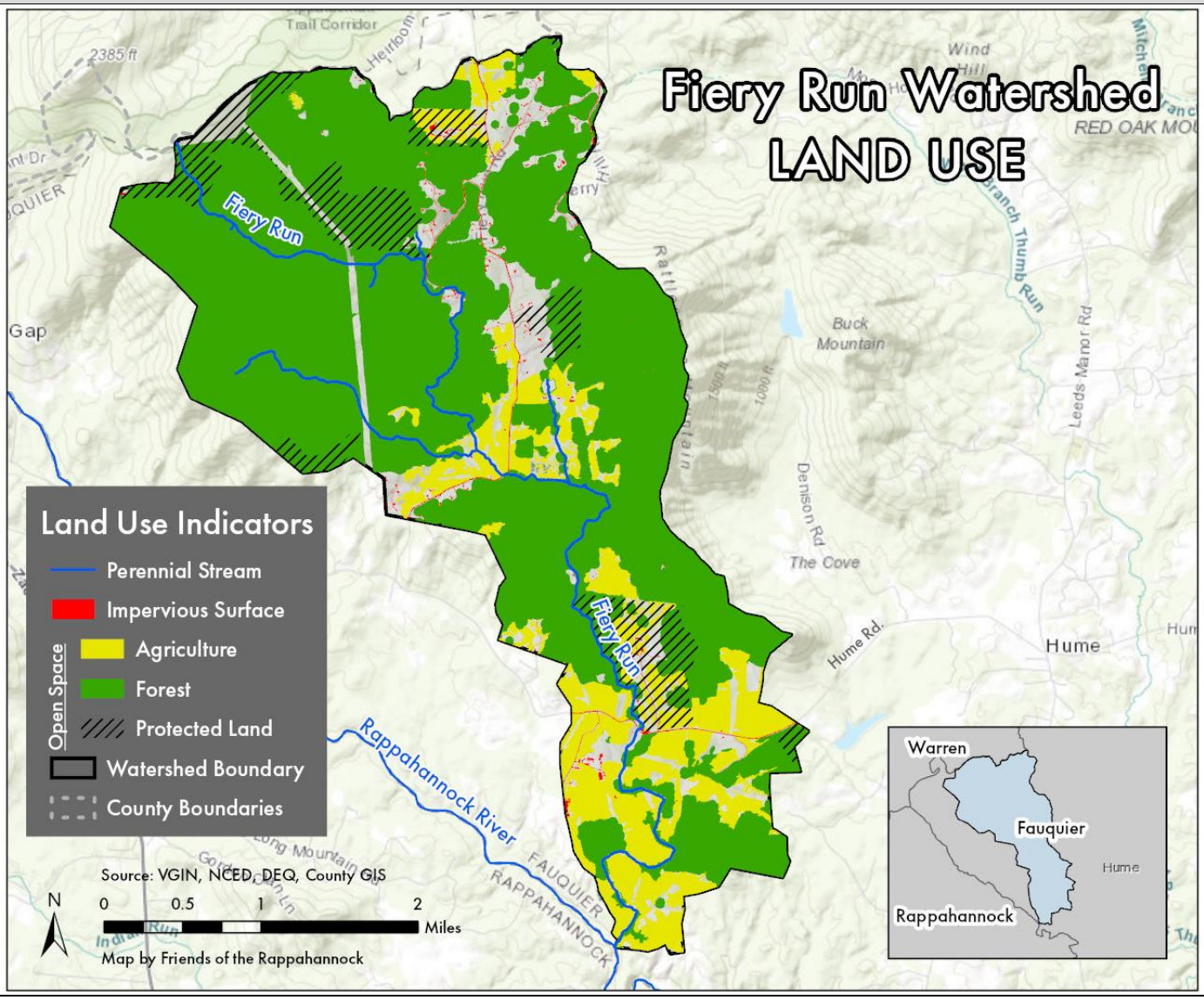


Fiery Run

LAND USE: C

A	D	A	F
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
98.6 to 1 forest to impervious surface ratio	12.9% of open spaces under protection	35.3% of farmland treated by year, average 2007-2018	0 residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

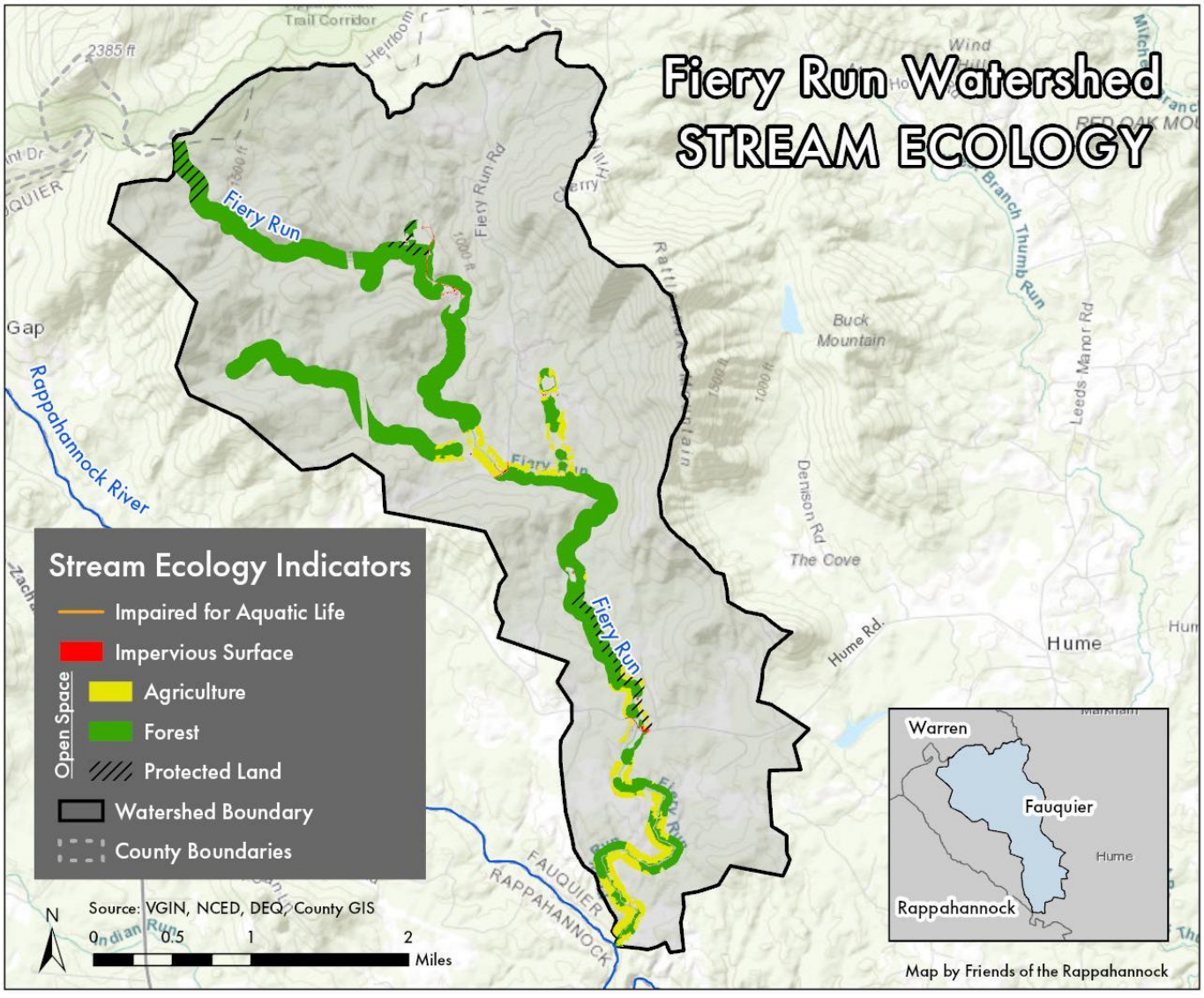


Fiery Run

STREAM ECOLOGY: B-

A	A	B	F
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
0% of stream-miles listed as impaired for aquatic life	0.64% of land within 300 feet of perennial streams are impervious	80.6% of land within 300 feet of perennial streams are forested	10.7% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

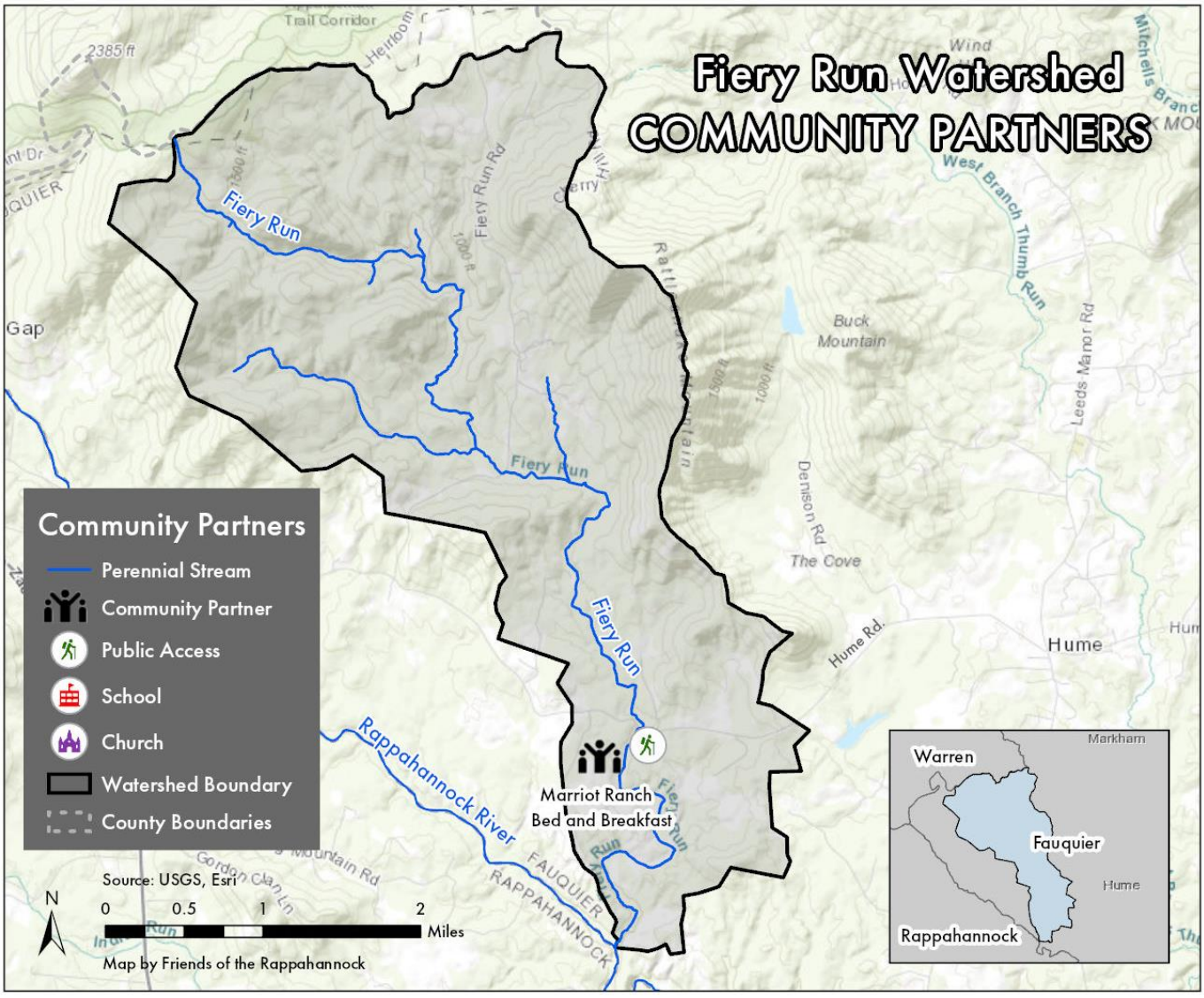


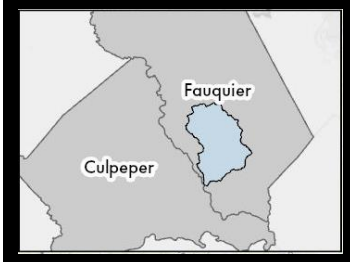
COMMUNITY ENGAGEMENT: C

Fiery Run

C	N/A	N/A	N/A
Public Access	Watershed Education	River Cleanups	Road Crossing Signage
Private stream access via Marriott Ranch	No public schools in watershed	No data on river cleanups	No lined roads in watershed

For more information on indicators and grading scales, see Appendix 1





Marsh Run Report Card

C

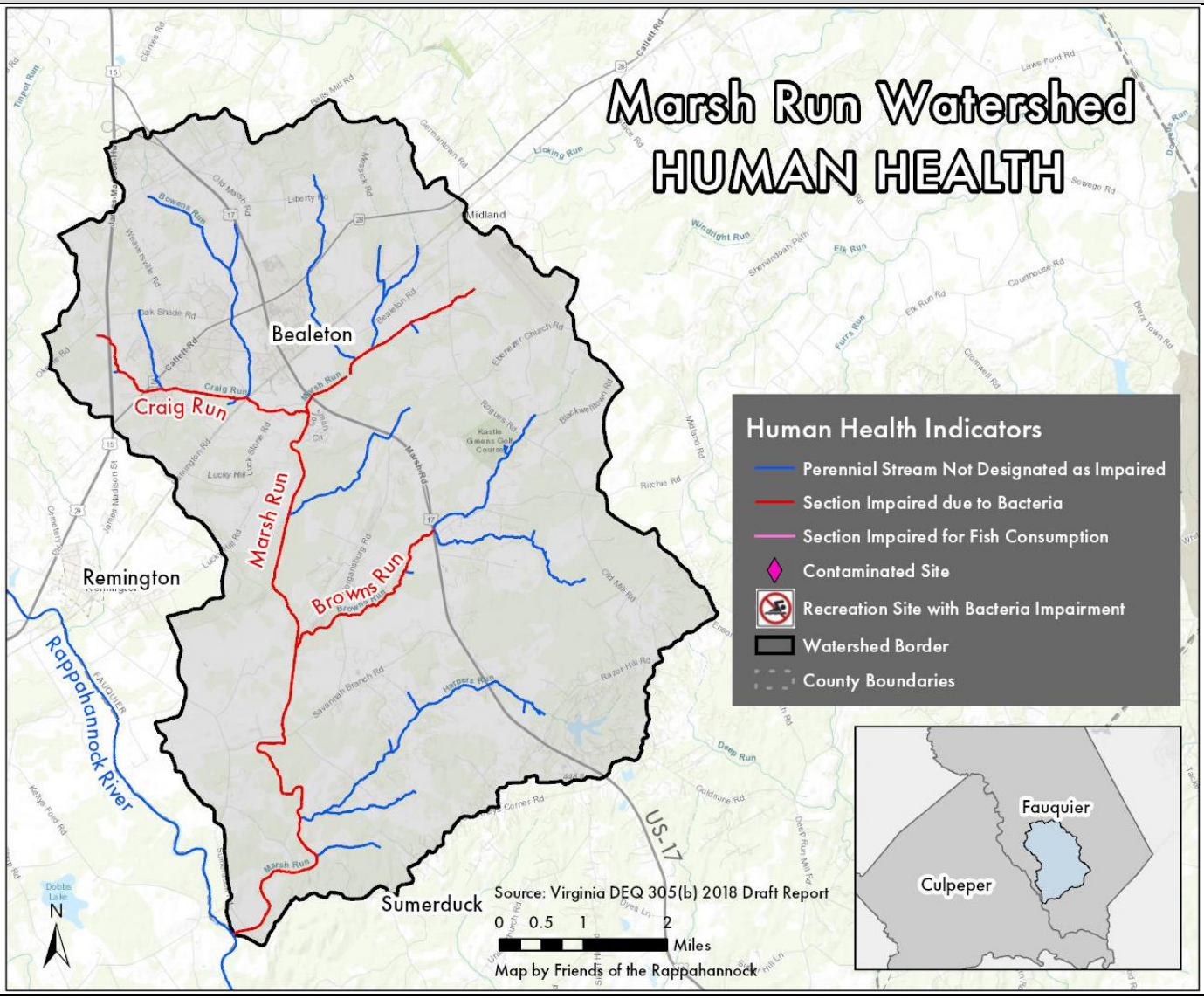
Subject	Grade	Comments
Human Health	B	• 41.3% of stream-miles have unsafe bacteria count • No fish contamination impairment
Land Use	D+	• 12.3 to 1 forest-impervious ratio • 13.3% of open spaces under protection
Stream Ecology	C	• 15.0% of stream-miles have degraded aquatic life • 66.6% of land within 300 feet of perennial streams are forested
Community Engagement	D+	• Public access without interpretive signage (Phelps Wildlife Management Area) • 9.1% of stream crossings marked with stream name

Marsh Run

HUMAN HEALTH: B

D	A	Pass	Pass
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
41.3% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No impairment

For more information on indicators and grading scales, see Appendix 1

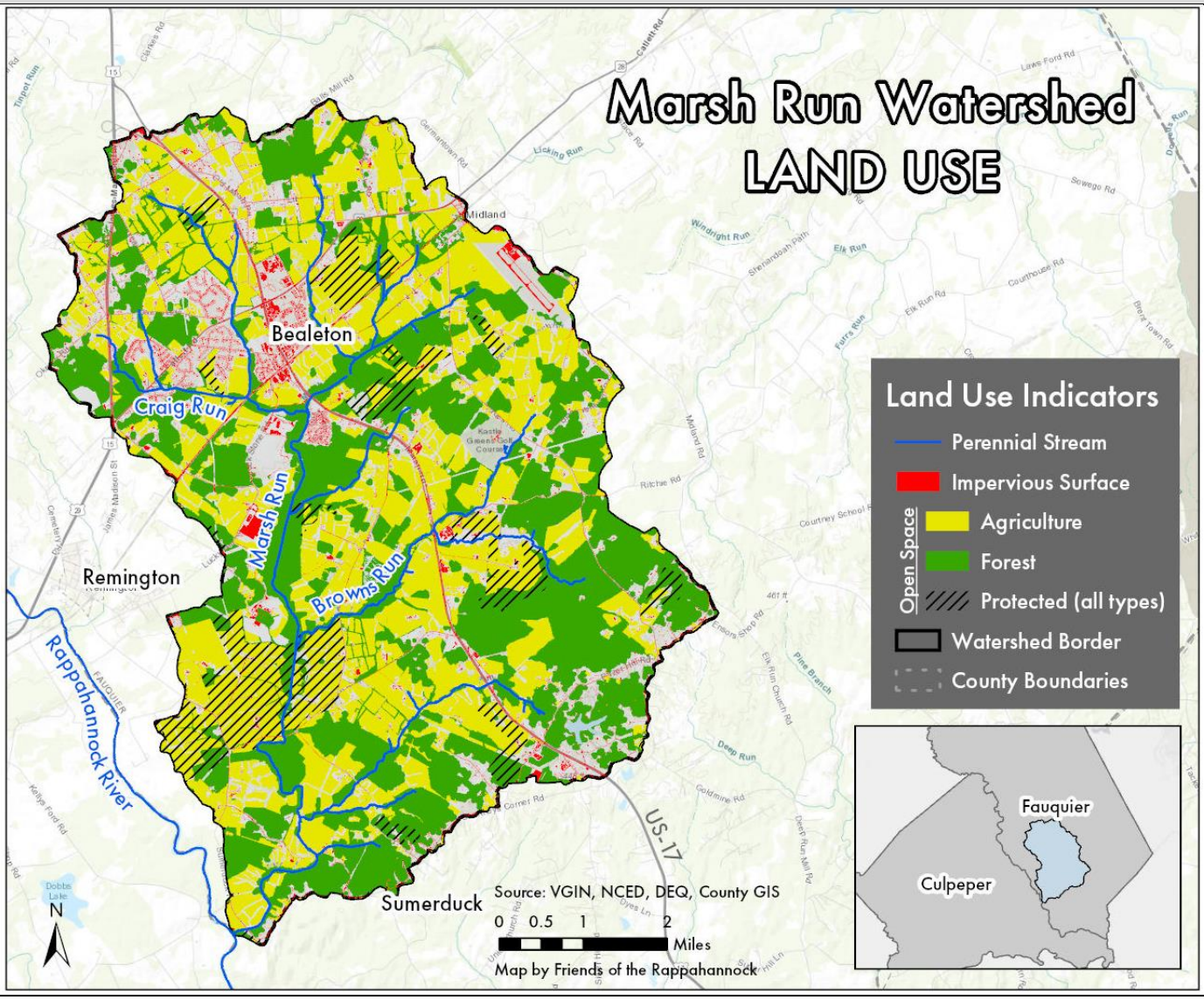


Marsh Run

LAND USE D+

B	D	C	F
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
12.3 to 1 forest to impervious surface ratio	13.3% of open spaces under protection	18.1% of farmland treated by year, average 2007-2018	0 residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

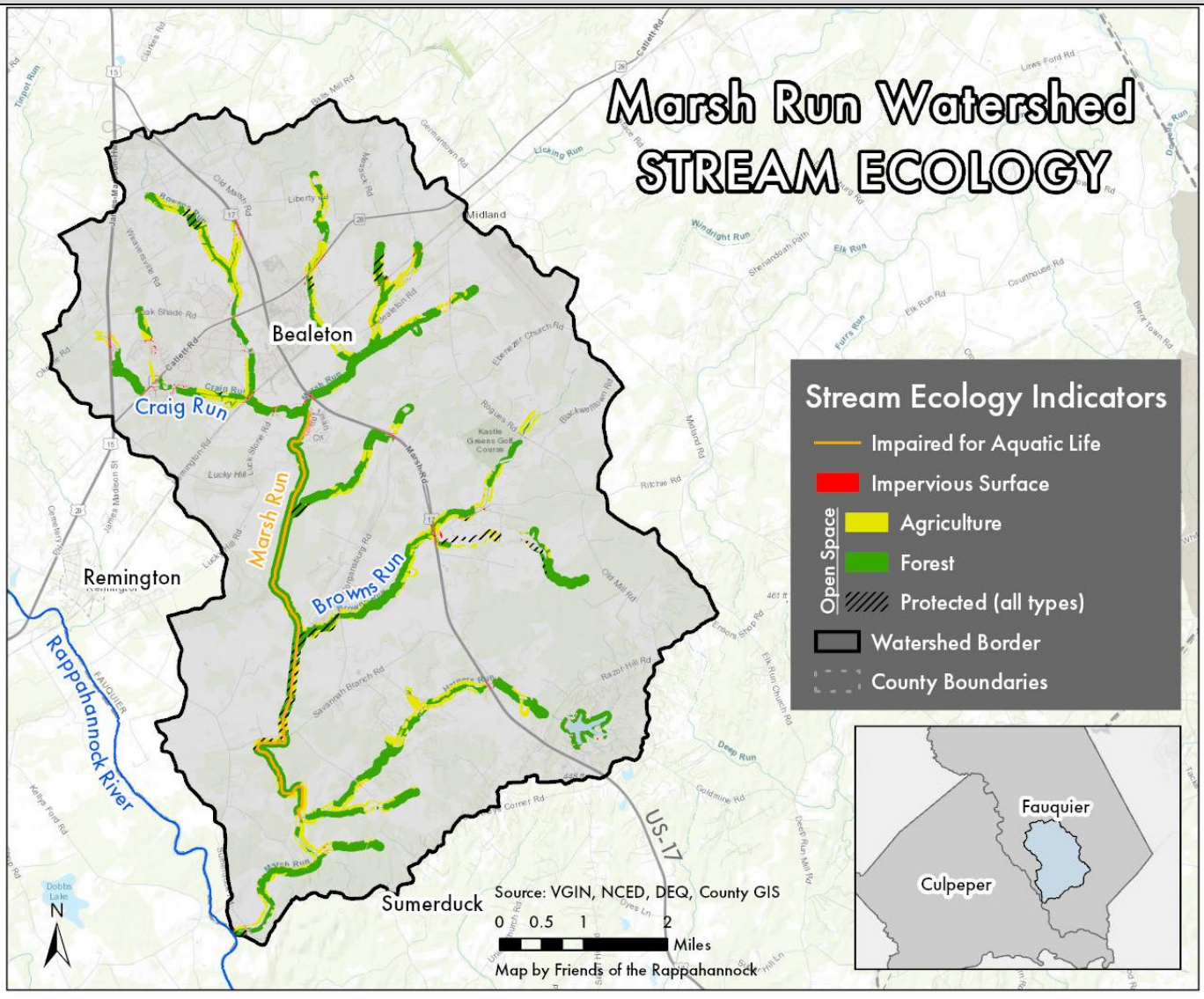


Marsh Run

STREAM ECOLOGY C

B	A	D	F
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
15.0% of stream-miles listed as impaired for aquatic life	1.8% of land within 300 feet of perennial streams are impervious	66.6% of land within 300 feet of perennial streams are forested	11.0% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

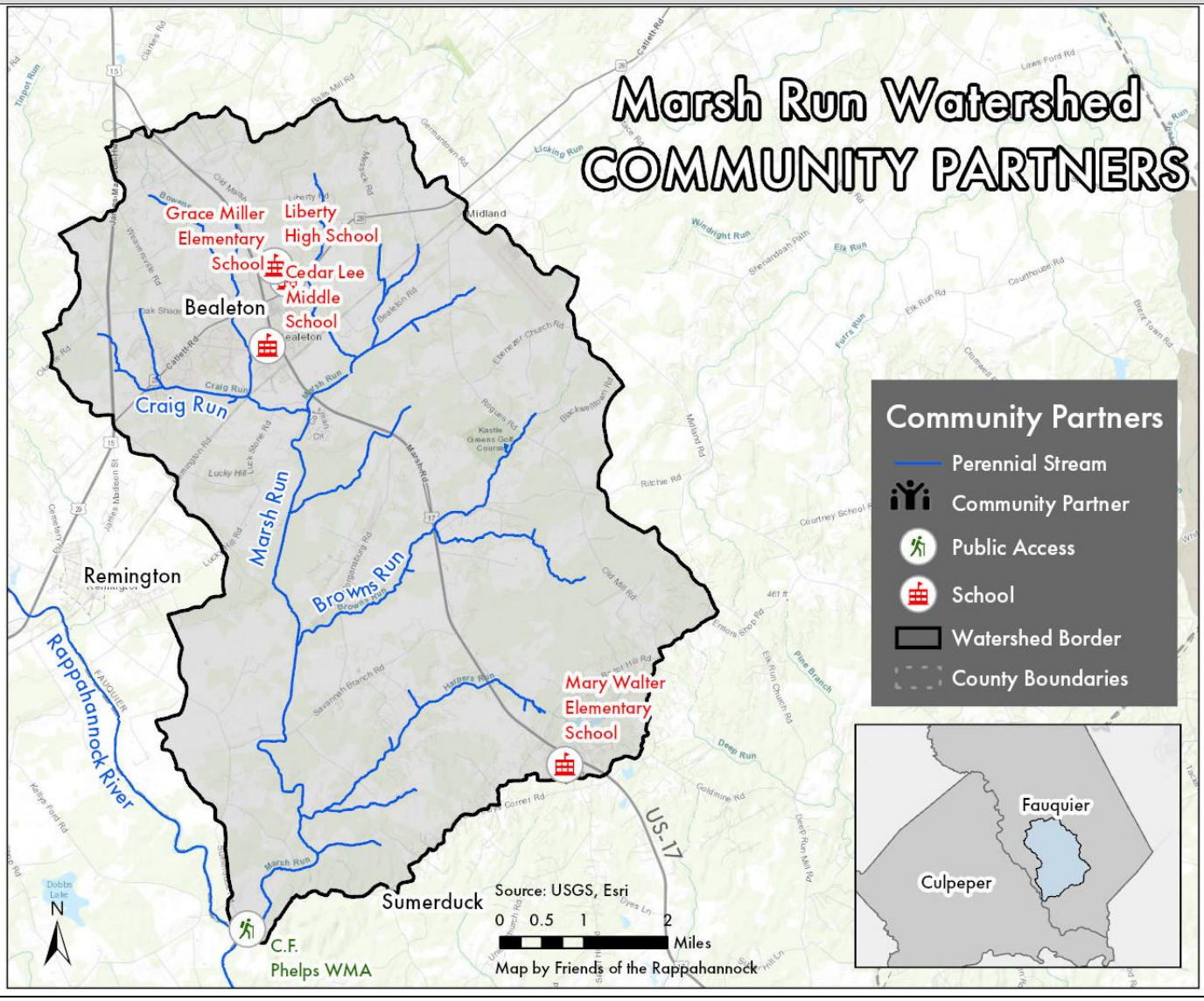


COMMUNITY ENGAGEMENT: D+

Marsh Run

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
B	N/A	N/A	F
Public access without interpretive signage (Phelps WMA)	No data on watershed education	No data on river cleanups	9.1% (1 of 11) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Thumb Run Report Card

C+

Subject	Grade	Comments
Human Health	B	• 70.9% of stream-miles have unsafe bacteria count • No listed contaminated sites
Land Use	C	• 43.8% of open spaces under protection • 7.2% of farmland treated by year, average 2007-2018*
Stream Ecology	C+	• 18.9% of stream-miles have degraded aquatic life • 64.3% of land within 300 feet of perennial streams are forested
Community Engagement	C	• 50% of stream crossings marked • No public access via park or trail

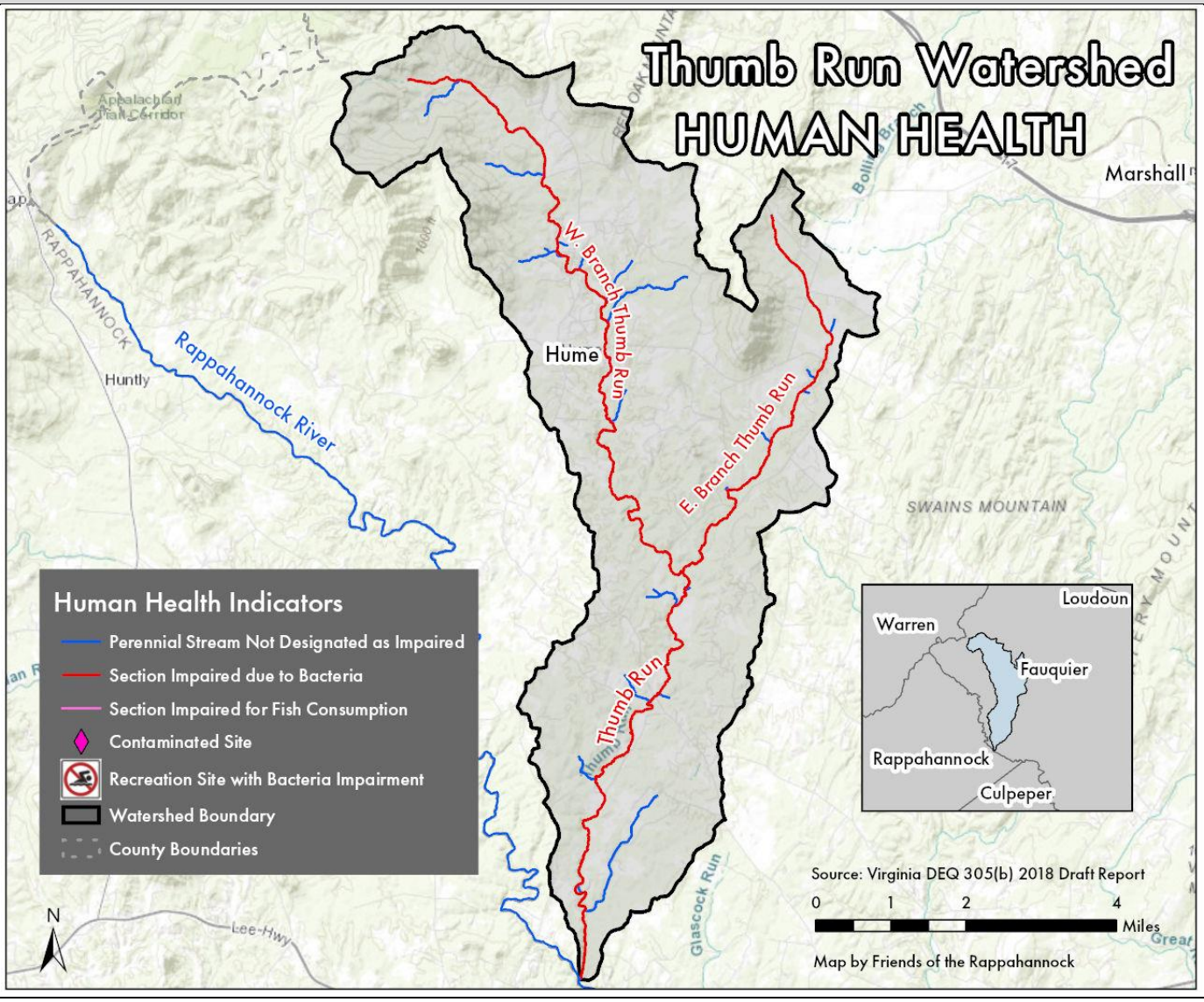
*Of BMP eligible farmland, using state cost shares

Thumb Run

HUMAN HEALTH: B

F	A	Pass	Pass
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
70.9% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No recreation sites listed as impaired for recreation

For more information on indicators and grading scales, see Appendix 1

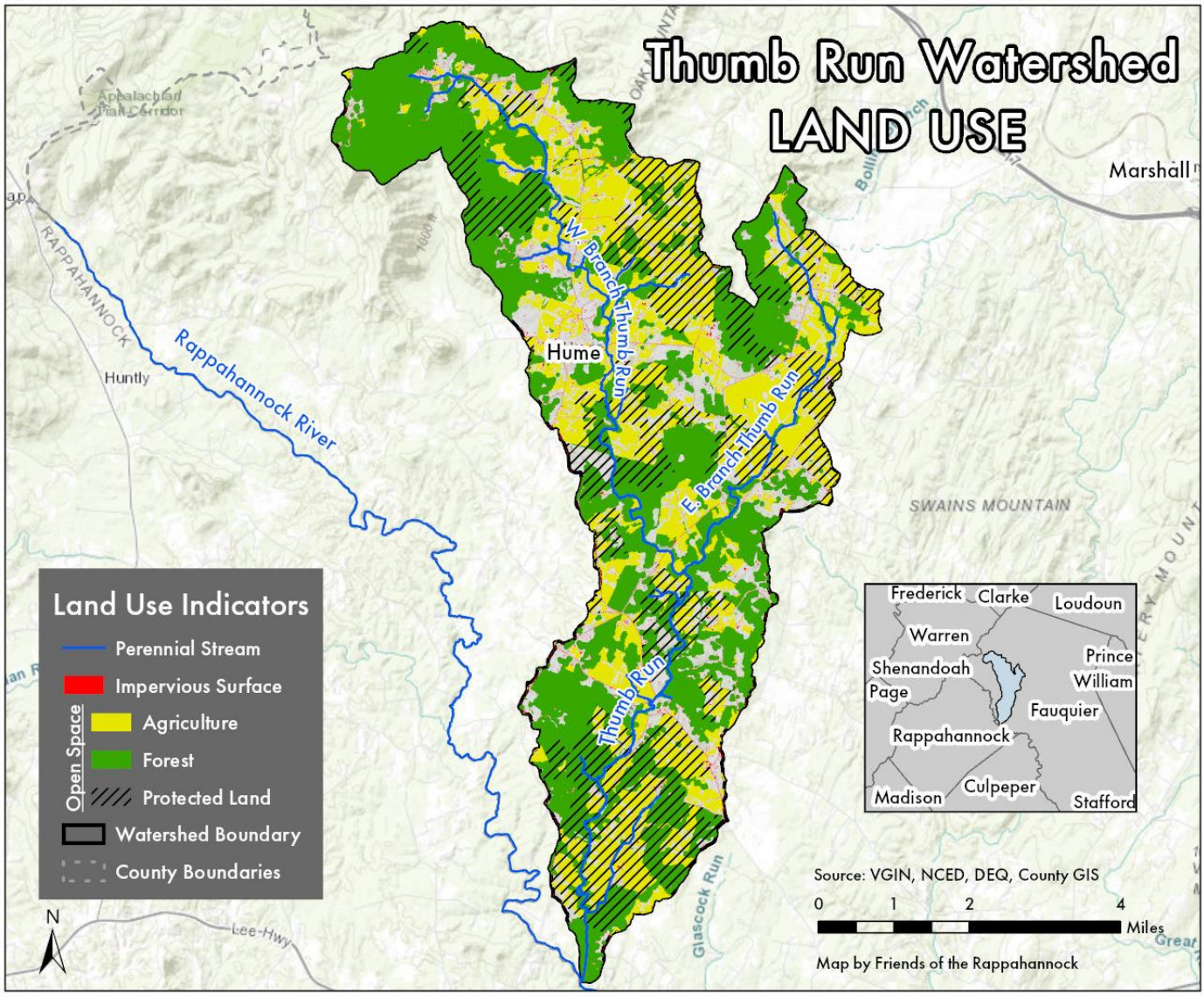


Thumb Run

LAND USE: C

Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
A	A	D	F
38.5 to 1 forest to impervious surface ratio	43.8% of open spaces under protection	7.2% of farmland treated by year, average 2007-2018	No residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

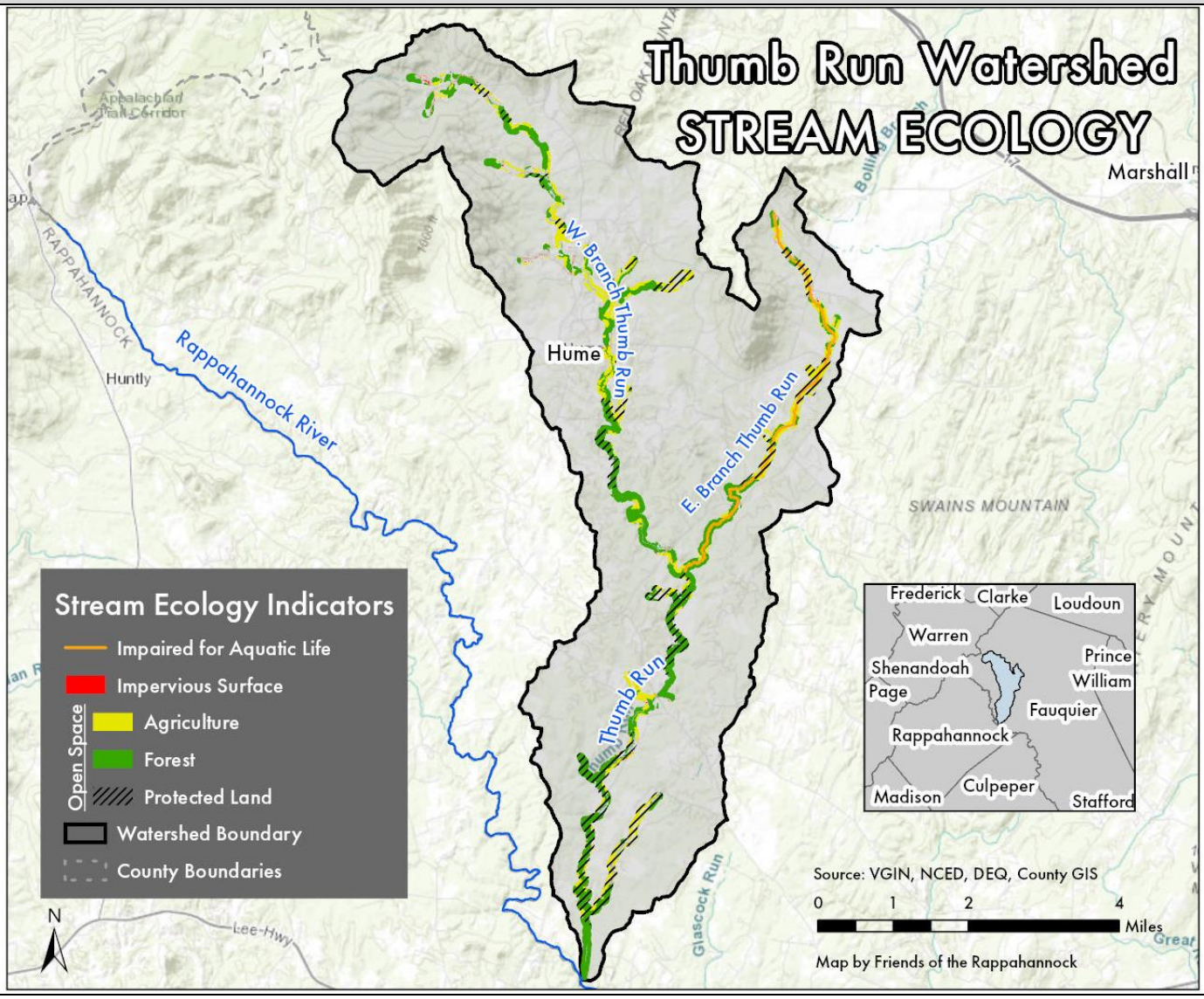


Thumb Run

STREAM ECOLOGY: C+

B	A	D	C
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
18.9% of stream-miles listed as impaired for aquatic life	1.1% of land within 300 feet of perennial streams are impervious	64.3% of land within 300 feet of perennial streams are forested	50.3% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

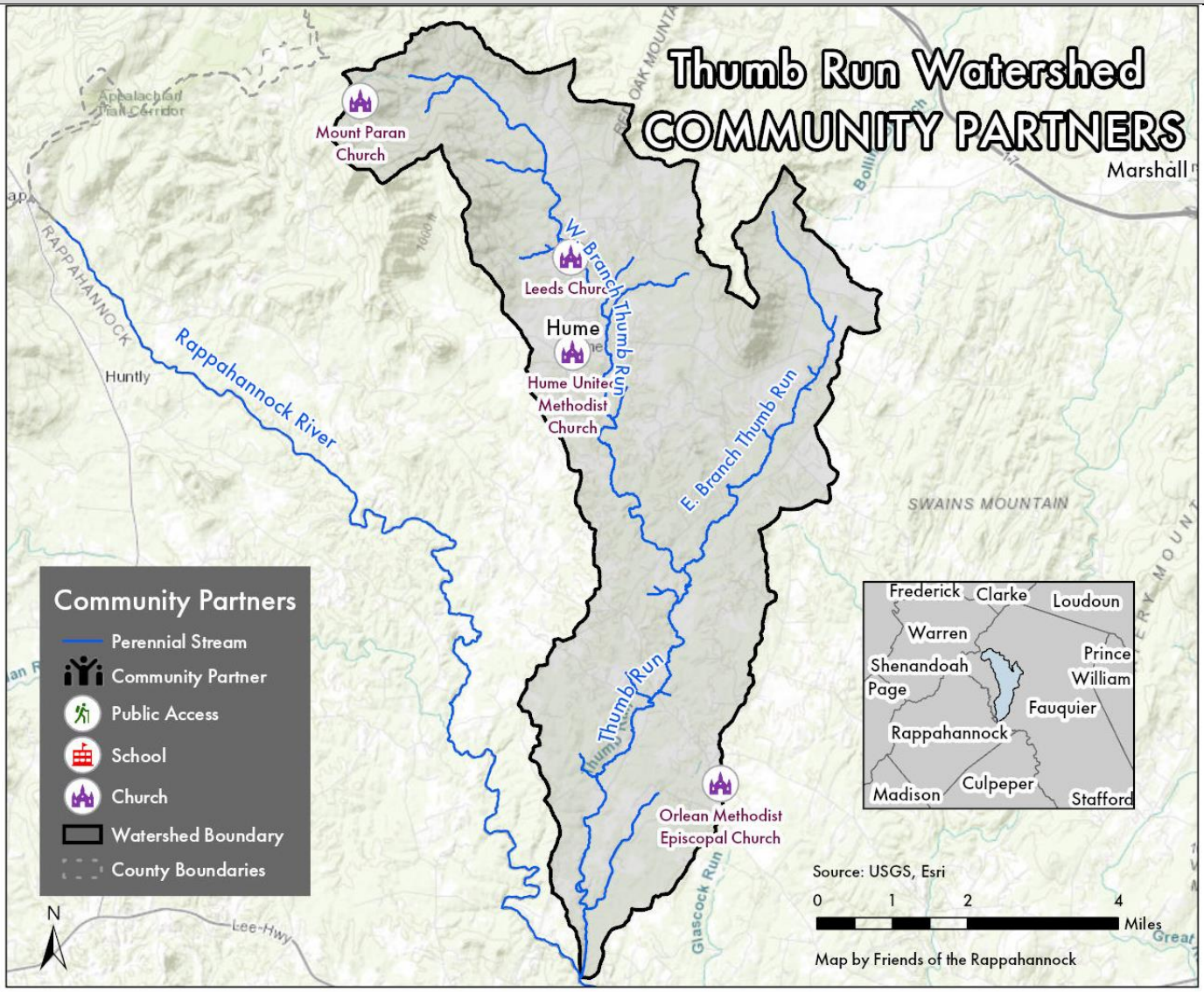


Thumb Run

COMMUNITY ENGAGEMENT: C

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
F	N/A	N/A	A
No public access	No public schools in watershed	No data on river cleanups	50% (3 of 6) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Rappahannock County Stream Results

Jordan River Report Card

B+

Subject	Grade	Comments
Human Health	A-	• 16.6% of stream-miles have unsafe bacteria count • No fish tissue impairment
Land Use	A-	• 60.4% of open spaces under protection • 25.1% of farmland treated with BMP annually *, 2007-2018
Stream Ecology	B	• 0% of stream-miles listed as impaired for aquatic life • 78.5% of land within 300 feet of perennial streams are forested
Community Engagement	B+	• Public access without interpretive signage (Jordan River Trail) • 100% stream crossings marked with stream name

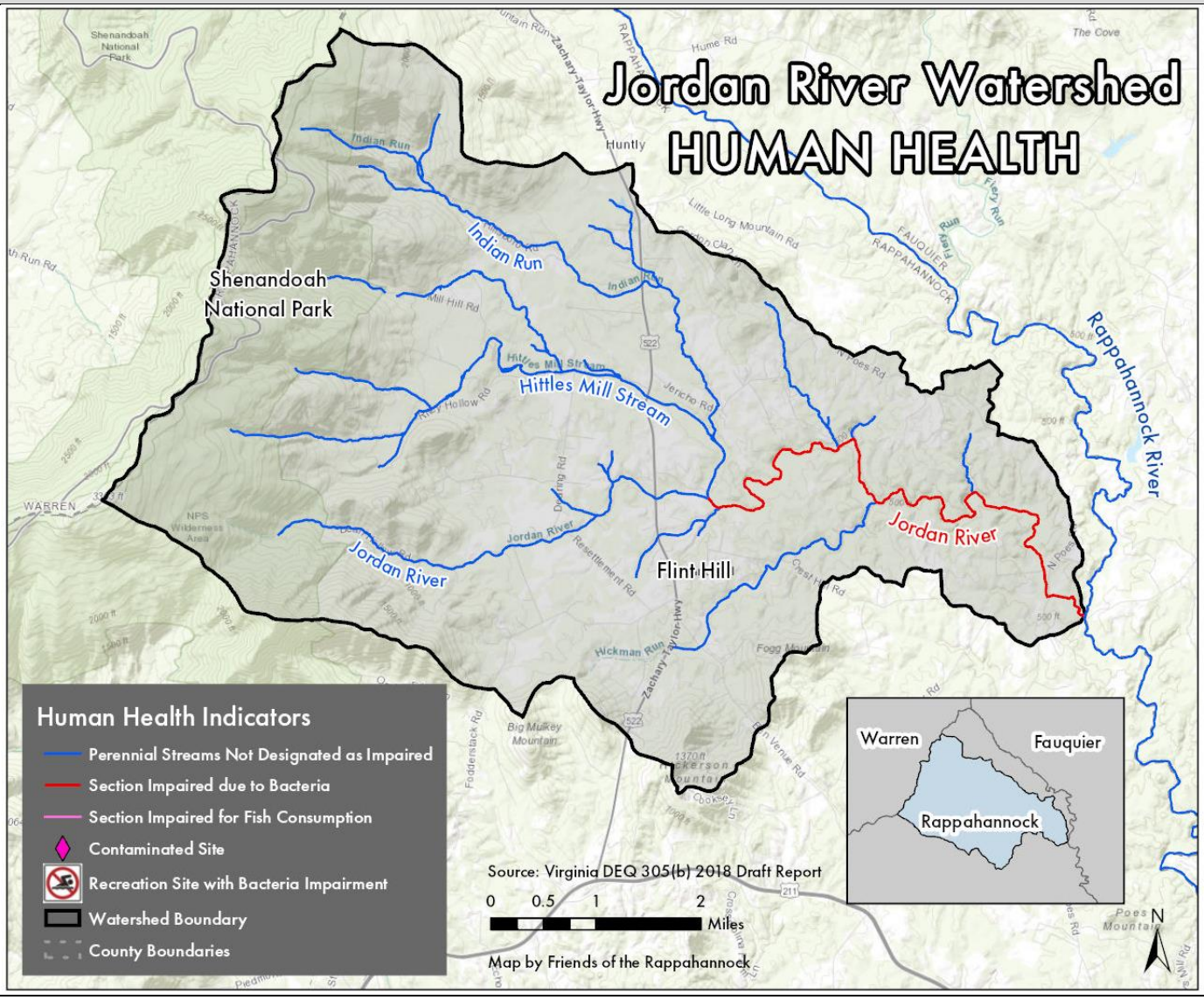
*Of BMP-eligible farmland, using state cost shares

Jordan River

HUMAN HEALTH: A-

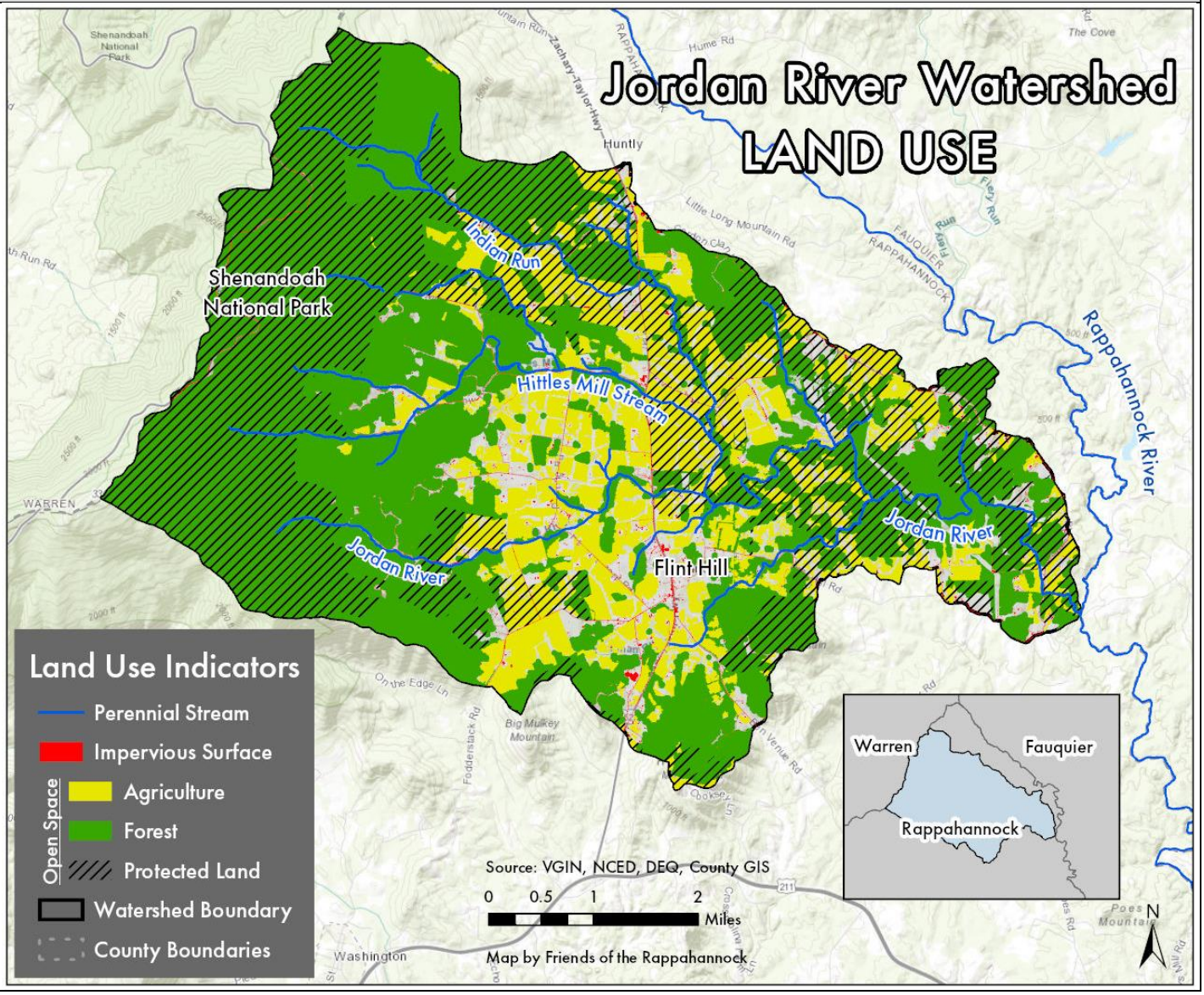
B	A	Pass	Pass
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
16.6% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No impairment at public access sites

For more information on indicators and grading scales, see Appendix 1



Jordan River	LAND USE: A-			
	A	A	B	A
	Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
	59.3 to 1 forest to impervious surface ratio	60.4% of open spaces under protection	25.1% of farmland treated by year, average 2007-2018	4.2 residential BMPs/10,000 pop. installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

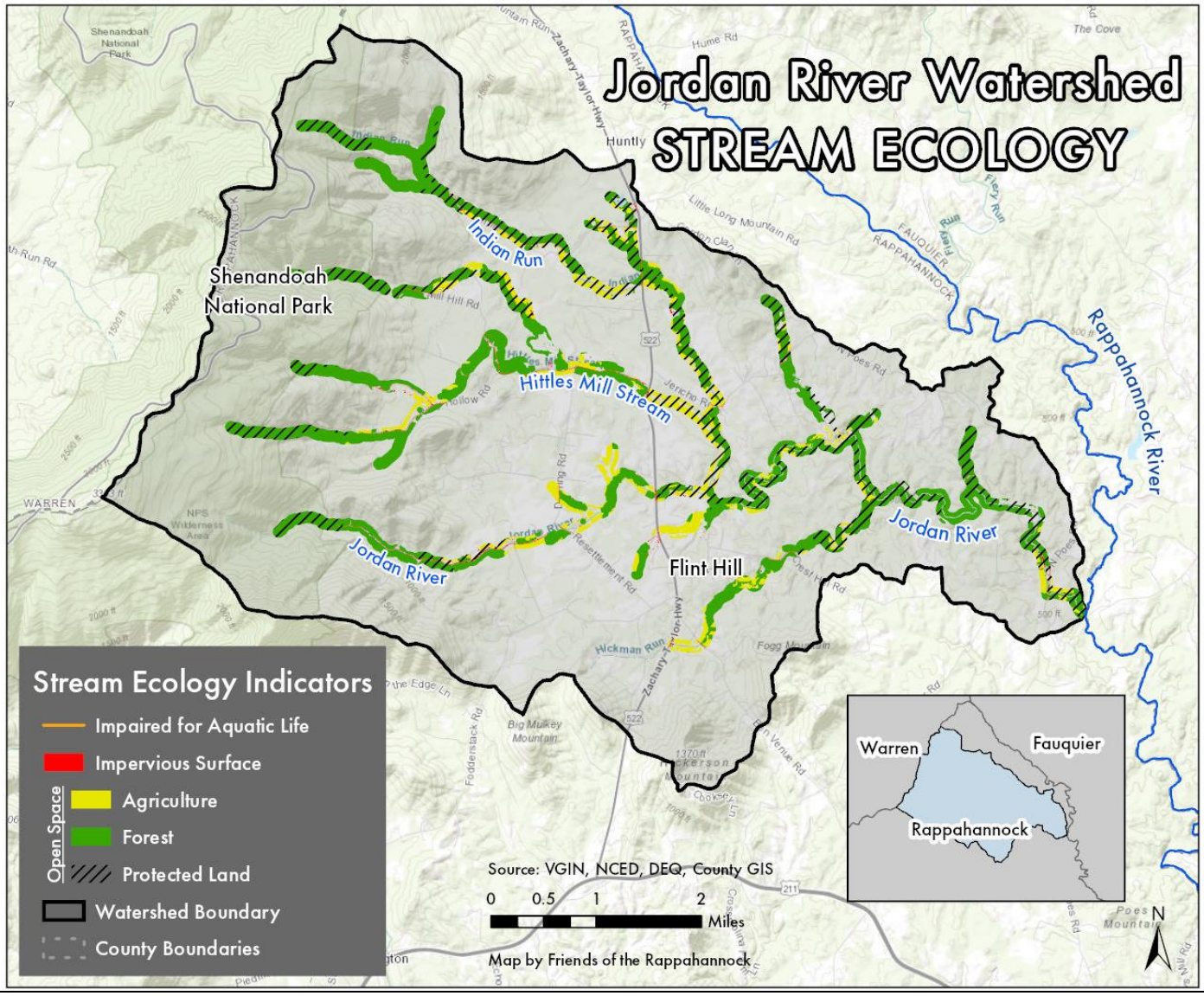


Jordan River

STREAM ECOLOGY: B

A	A	C	B
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
0% of stream-miles listed as impaired for aquatic life	1.51% of land within 300 feet of perennial streams are impervious	78.5% of land within 300 feet of perennial streams are forested	60.7% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

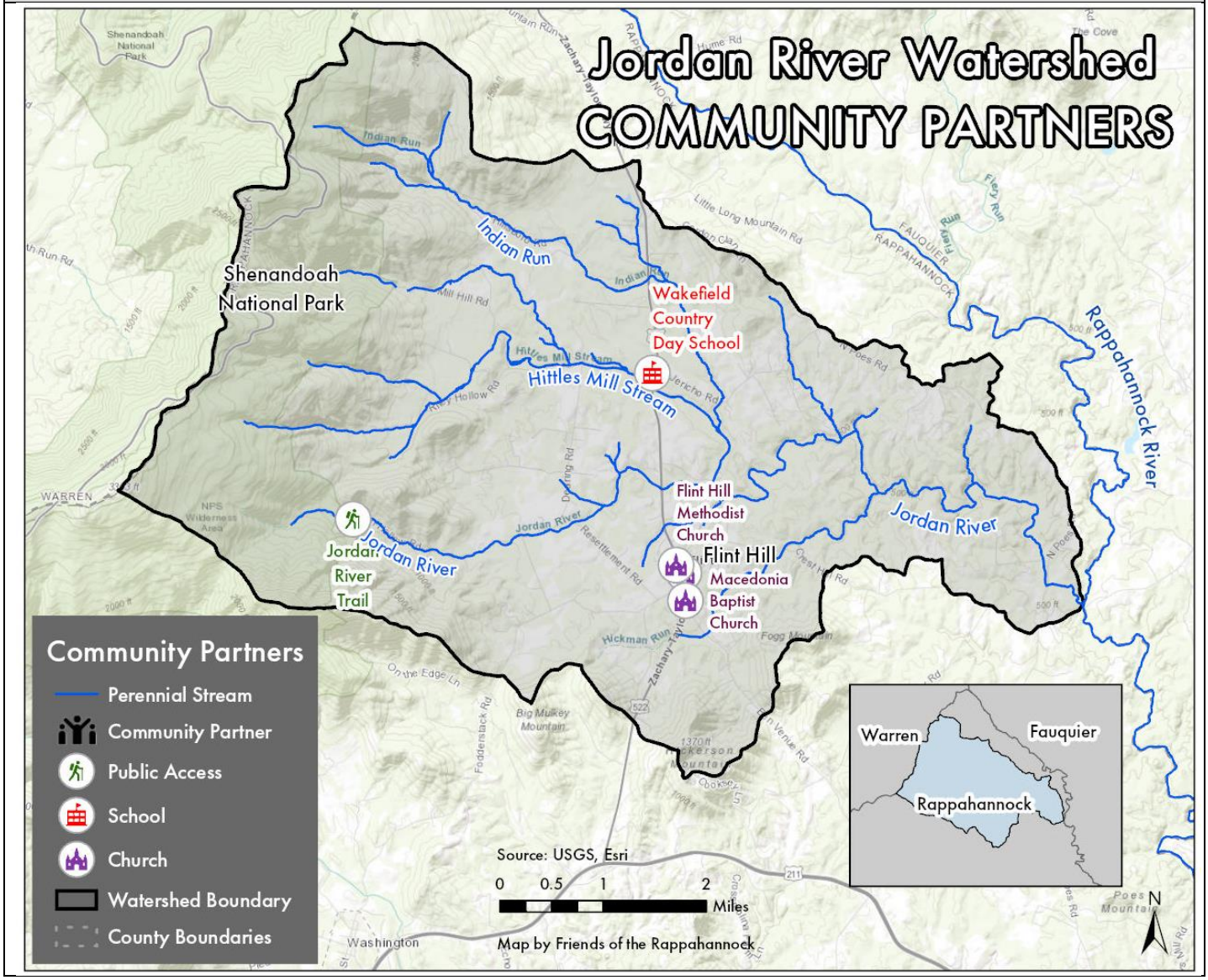


Jordan River

COMMUNITY ENGAGEMENT: B+

Public Access	Watershed Education	River Cleanups	Road Crossing Signage
B	N/A	N/A	A
Public access without interpretive signage (Jordan River Trail)	No public schools in watershed	No data on river cleanups	100% (4 of 4) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Rush River Report Card

B-

Subject	Grade	Comments
Human Health	C+	• 22.9% of stream-miles have unsafe levels of bacteria • Elevated bacteria levels in the Rush River at Rappahannock County Park
Land Use	B+	• 51.9% of open spaces under protection • 12.5% of farmland treated with BMP annually*, 2007-2018
Stream Ecology	C	• 68.9% of land within 300 feet of riparian area are forested • 38.7% of riparian open spaces are under protection
Community Engagement	A	• Public access with interpretive signage at Rappahannock River Park • 75% of stream crossings marked with stream name

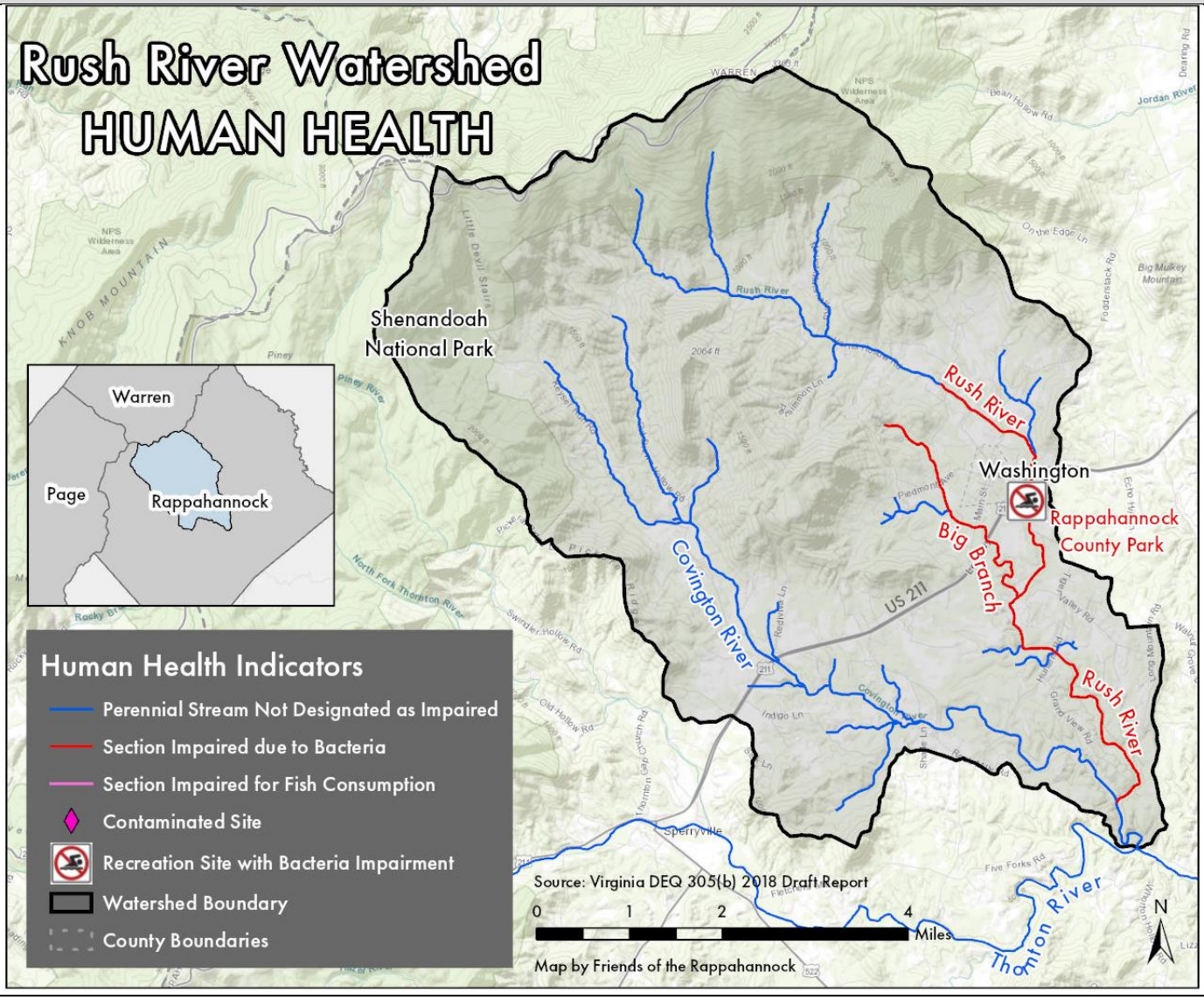
*Of BMP eligible farmland, using state cost shares

Rush River

HUMAN HEALTH: C+

C	A	Pass	Fail
Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
22.9% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	Recreation impairment at Rappahannock County Park

For more information on indicators and grading scales, see Appendix 1

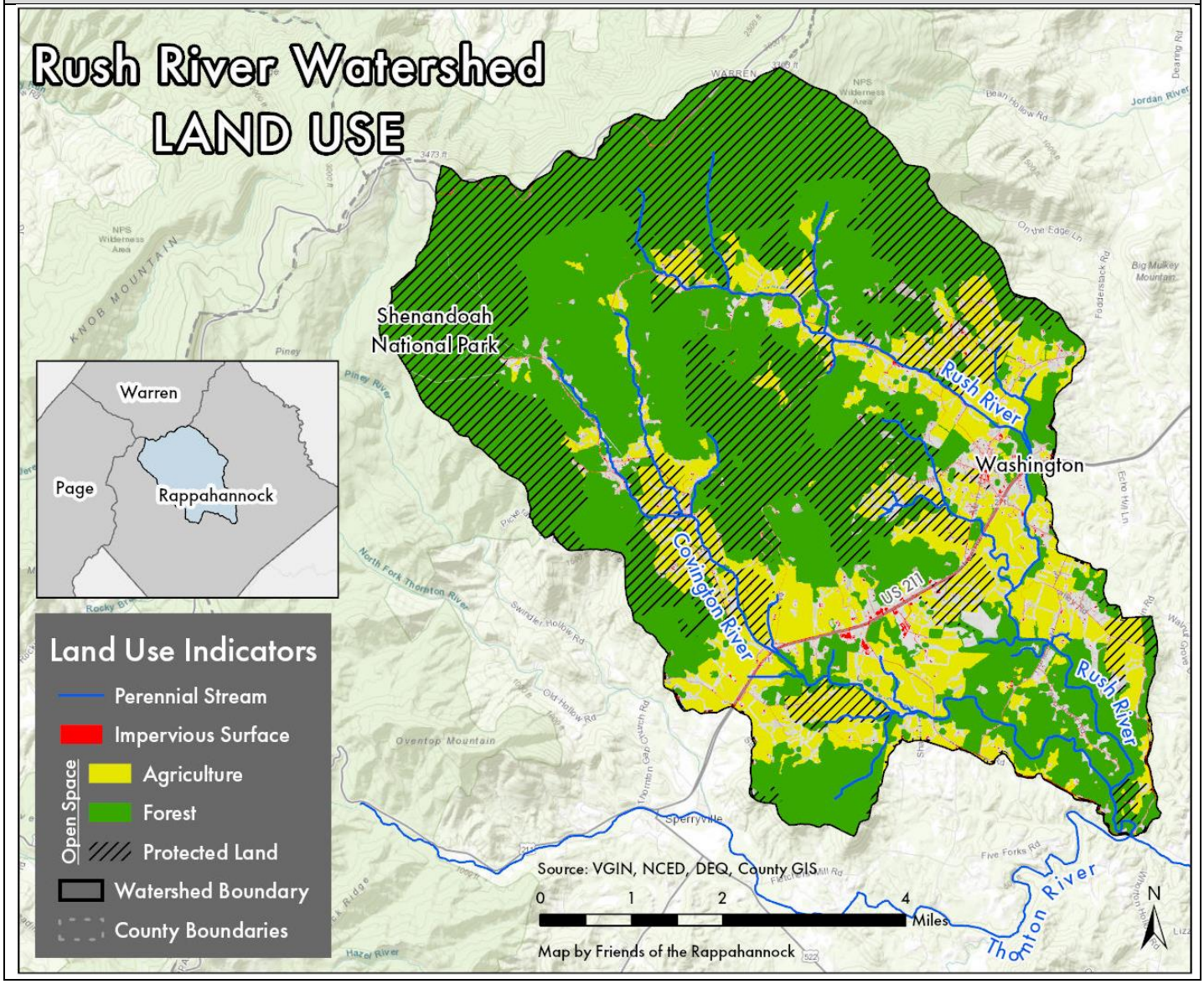


LAND USE: B+

Rush River

A	A	C	A
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
51.1 to 1 forest to impervious surface ratio	51.9% of open spaces under protection	12.5% of farmland treated by year, average 2007-2018	3.4 residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

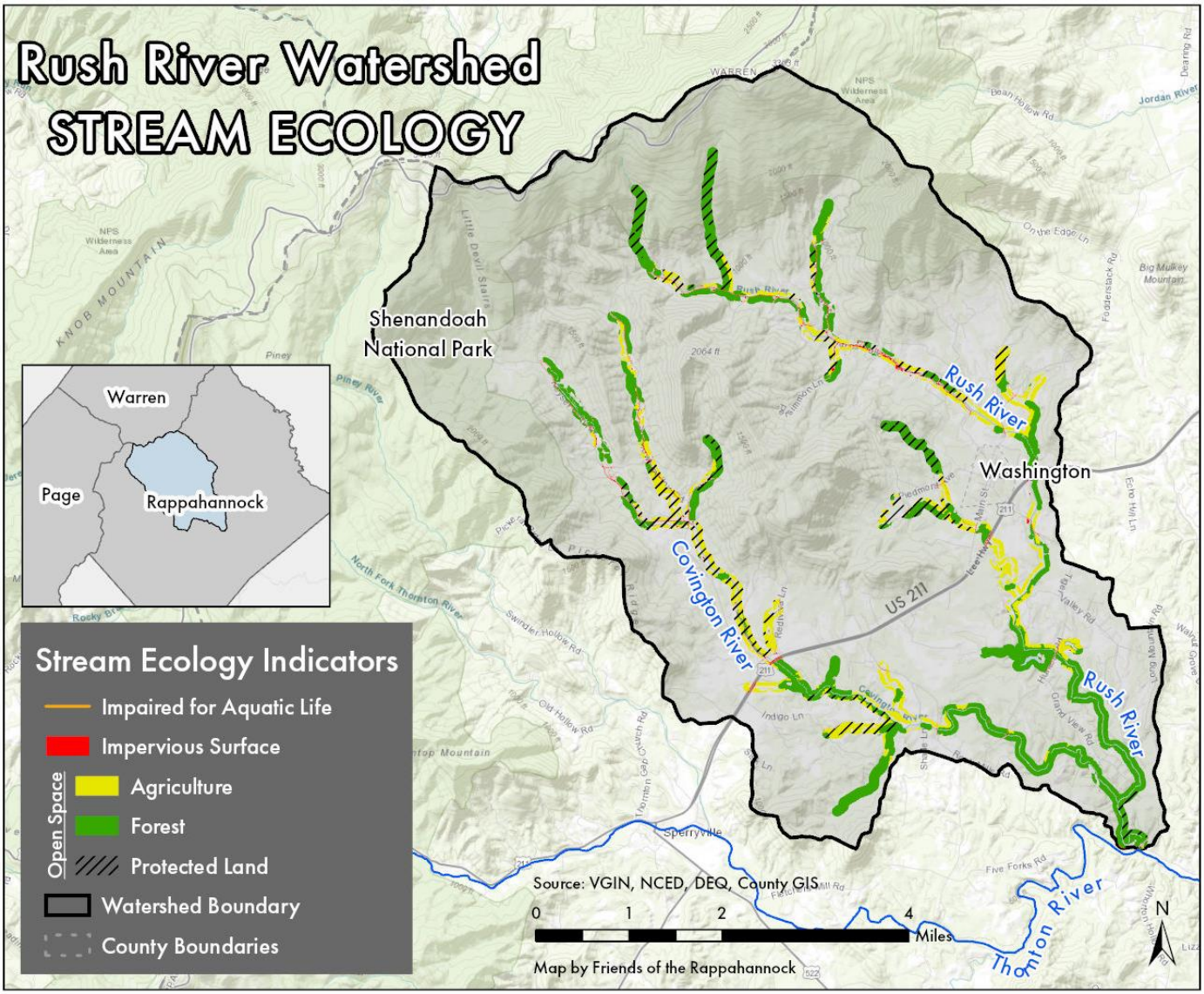


Rush River

STREAM ECOLOGY: C

A	B	D	D
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
0% of stream-miles listed as impaired for aquatic life	2.8% of land within 300 feet of perennial streams are impervious	68.9% of land within 300 feet of perennial streams are forested	38.7% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

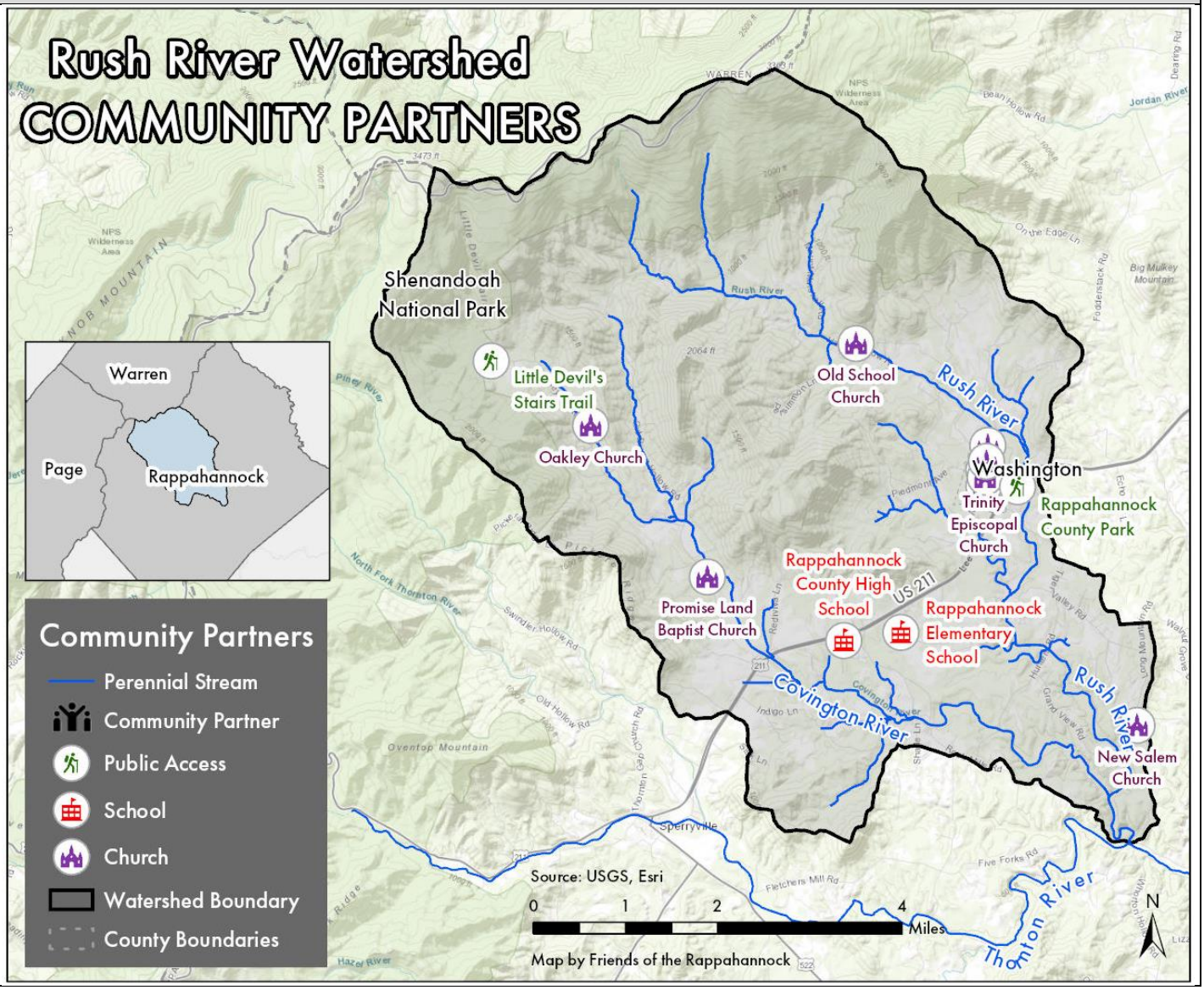


COMMUNITY ENGAGEMENT: A

Rush River

A	N/A	N/A	A
Public Access	Watershed Education	River Cleanups	Road Crossing Signage
Public Access with interpretive signage at Rappahannock County Park	No data on watershed education	No data on river cleanups	75% (3 of 4) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Thornton River Report Card

B-

Subject	Grade	Comments
Human Health	A-	• 14.3% of stream-miles have unsafe levels of bacteria • No recreation impairment at public access sites
Land Use	C	• 49.6 to 1 forest to impervious surface ratio • No residential BMPs installed (2015-2018)*
Stream Ecology	C	• 0.9% of stream-miles have degraded aquatic life • 69.7% of riparian areas are forested
Community Engagement	A-	• Public trail with interpretive signage (Sperryville Trail) • 2 river cleanups between 2015-2019

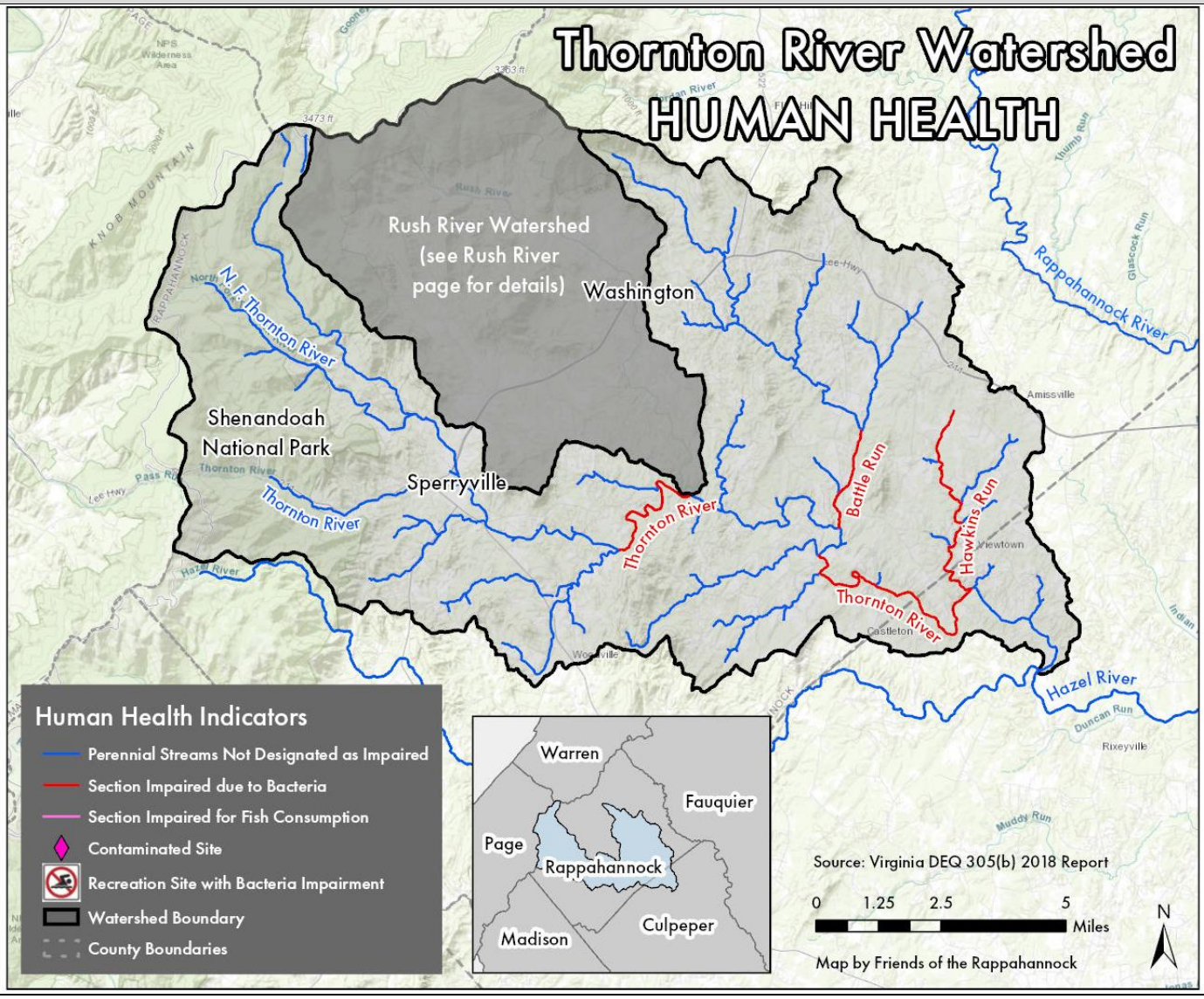
*Using state cost shares

Thornton River

HUMAN HEALTH: A-

Bacteria	Fish Consumption	Contaminated Sites	Recreational Health Risk
B	A	Pass	Pass
14.3% of stream-miles listed as impaired for recreation due to bacteria	0% of stream-miles listed as impaired for contaminated fish tissue	No contaminated sites	No recreation impairment at public access sites

For more information on indicators and grading scales, see Appendix 1

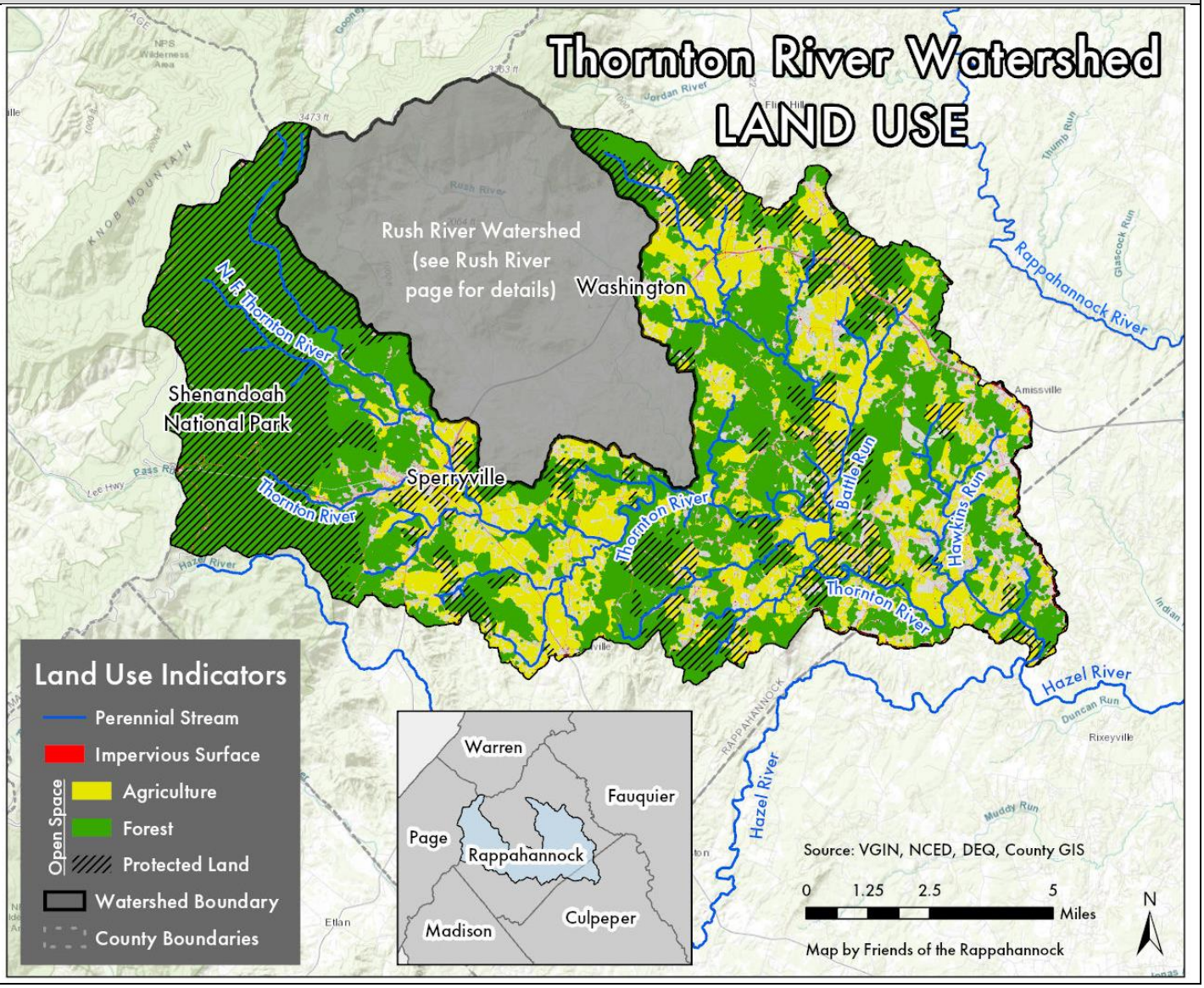


Thornton River

LAND USE: C

A	A	D	F
Forest-Impervious Ratio	Open Space Protection	Agricultural BMPs	Residential BMPs
49.6 to 1 forest to impervious surface ratio	43.8% of open spaces under protection	6.2% of farmland treated by year, average 2007-2018	No residential BMPs installed using state cost share (2015-2018)

For more information on indicators and grading scales, see Appendix 1

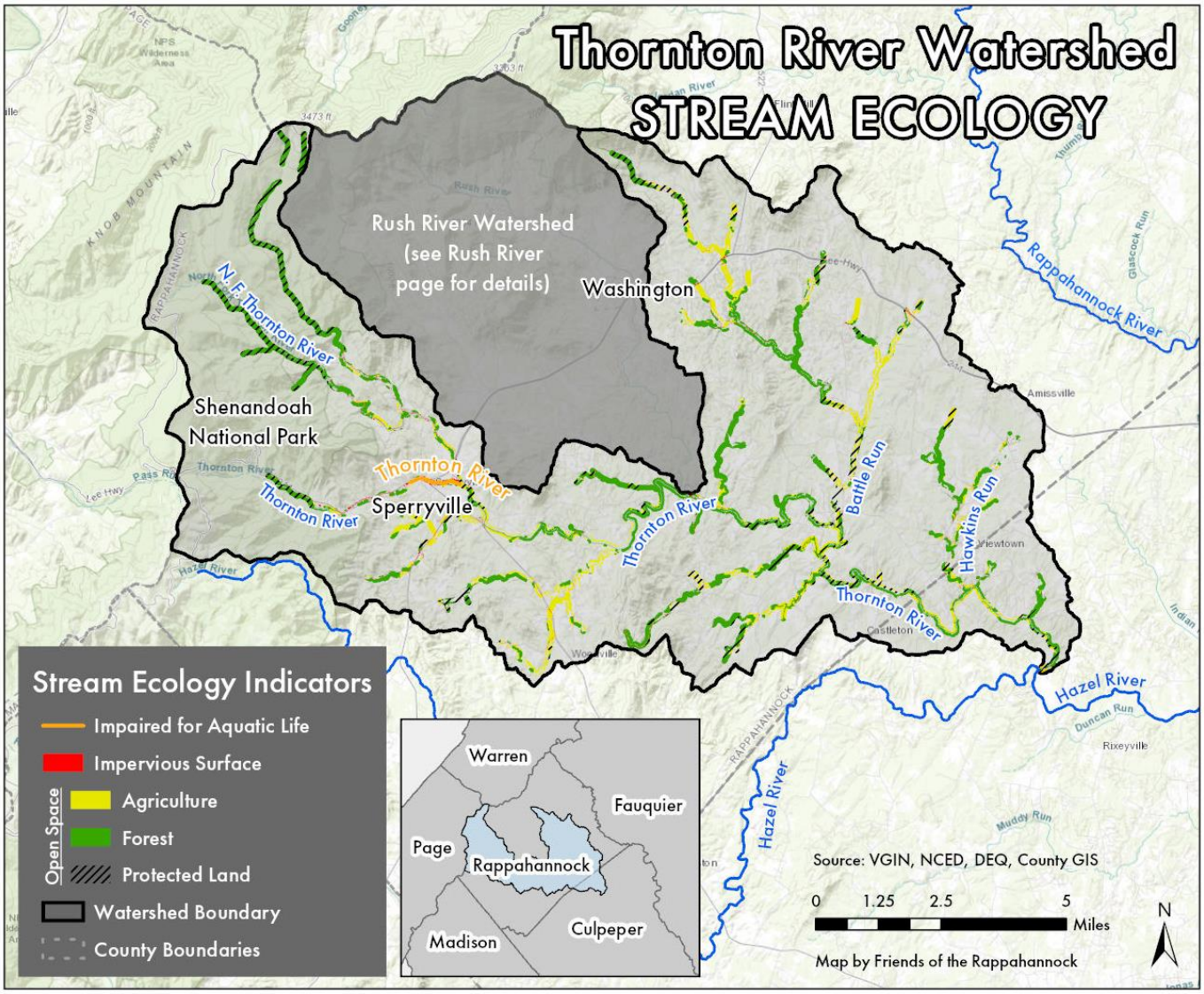


Thornton River

STREAM ECOLOGY: C

B	B	D	D
Aquatic Life	Impervious Surfaces	Forest Canopy	Open Space Protection
0.9% of stream-miles listed as impaired for aquatic life	2.2% of land within 300 feet of perennial streams are impervious	69.7% of land within 300 feet of perennial streams are forested	36.2% of open spaces within 300 feet of perennial streams under protection

For more information on indicators and grading scales, see Appendix 1

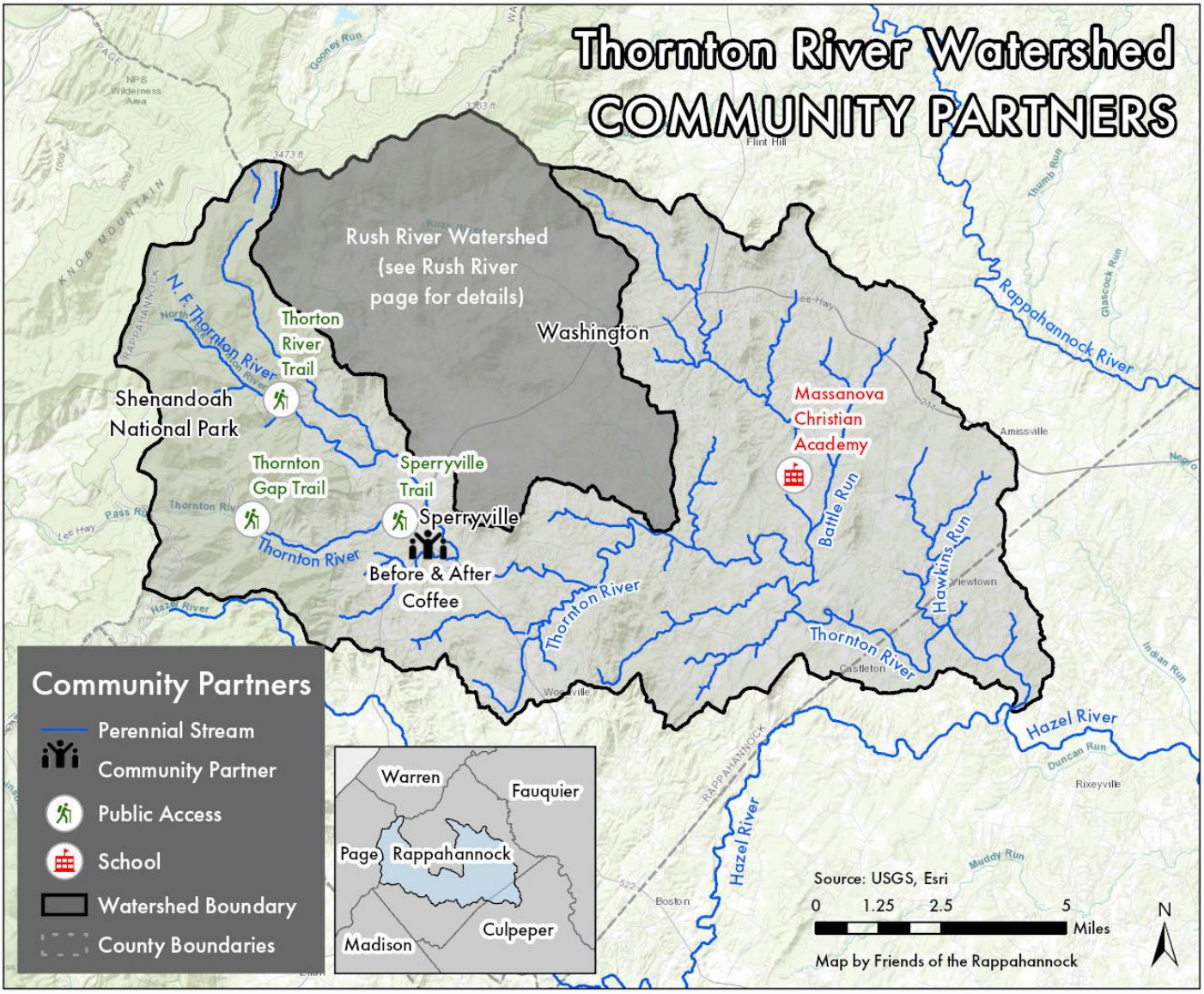


Thornton River

COMMUNITY ENGAGEMENT: A-

A	N/A	A	B
Public Access	Watershed Education	River Cleanups	Road Crossing Signage
Trail with interpretive signage (Sperryville Trail)	No data on watershed education	2 river cleanups, 2015-2019	45.4% (5 of 11) stream/road crossings marked with stream name

For more information on indicators and grading scales, see Appendix 1



Stream Superlatives

The best and the worst of the report card streams—and how they can get better

Culpeper County – Honor Roll

Mountain Run Public Access- Grade: A

• Culpeper County and the town of Culpeper contain six public parks (Yowell Meadow Park, Mountain Run Park, Rockwater Park, Lake Pelham, Wine Street Memorial Park, and Lenn Park) that access streams and lakes along Mountain Run

• Trails and parks with stream access encourage community stewardship of public spaces and create opportunities for service projects such as river cleanups

Conservation Spotlight: Rockwater Park

• Opened in 2018, Culpeper's newest park features trails adjacent to a feeder creek to Mountain Run

• Prior to the town purchasing the land, residential development was discussed for the 32-acre property

Rockwater Park (Photo by Town of Culpeper)

Hughes River Forest-Impervious Ratio - Grade: A

• The Hughes River watershed contains 91 times as much forest as impervious surface

• Forests improve water quality by promoting groundwater infiltration, controlling erosion, creating wildlife habitat and moderating water temperature

• Impervious surfaces harm water quality by concentrating stormwater flows and washing pollutants into streams

Conservation Spotlight: Groundwater

• When rainwater permeates the ground, it seeps through layers of soil and rock, which filters pollutants and contaminants, before joining surface water via springs and seeps

• Groundwater is a major water source for rural communities

Mountain Run Stream Crossing Signage - Grade: A

• 8 of 16 (50%) of lined road crossings over named streams in the watershed have signs indicating the stream name, including 5 of 6 crossings in the town of Culpeper

• Marking crossings increases community awareness of streams and helps citizens connect their local streams with the larger Rappahannock River watershed

Conservation Spotlight: Town of Culpeper River Cleanup

• In November 2019, the town of Culpeper is organizing a volunteer river cleanup with assisrance from Friends of the Rappahannock

• The cleanup will take place at public parks along Mountain Run

• For more information or to volunteer, visit riverfriends.org/events

Culpeper County – Needs Improvement

Mountain Run Bacterial Impairment at Yowell Meadow Park - Grade: Fail

- 32% of stream miles in the Mountain Run watershed are listed as impaired for recreation due to bacteria, including the section running through Yowell Meadow Park
- There is no signage to educate visitors on exposure risk or health precautions
- The primary sources of bacteria in Mountain Run are cattle farming and urban runoff

Homework: Install Riparian Forest Buffers along Mountain Run and feeder streams upstream of Yowell Meadow Park

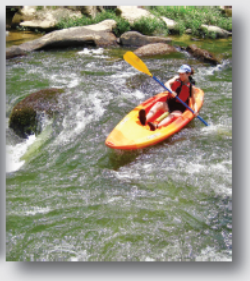
- Riparian forest buffers intercept pollutants from runoff, reducing bacteria introduction into streams
- 100% cost-share is available for qualifying projects

Lower Hazel Public Access - Grade: F

- Public access promotes water recreation, builds a sense of shared ownership and creates stewardship and education opportunities for local citizens
- No trails or parks with river access currently exist on the lower Hazel River

Homework: Consider Establishing a Public Canoe Landing on the Hazel River in Culpeper County

- The lower Hazel River is navigable by canoe and kayak
- Friends of the Rappahannock can assist with grant funding, technical assistance, and strategic guidance



Extra Credit: Develop "water trail" interpretive signage and maps to educate visitors

Mountain Run Open Space Protection - Grade: F

- The report card found that only 4.4% of undeveloped lands in the Mountain Run watershed are conserved via government ownership or private easement
- Culpeper County's population grew by 9.8 percent from 2010-2018 (Census Bureau)
- Conservation easements protect natural resources including forests and wetlands

Homework: Conserve Private Land Using the Purchase of Development Rights Program

- Under Culpeper County's Purchase of Development Rights (PDR) program, landowners may sell development potential of their land to the County while holding the right to own and use the property
- Piedmont Environmental Council (PEC) is a land trust that offers assistance for property owners considering conservation

Fiery Run Agricultural BMPs - Grade: A

• Agricultural best management practices (BMPs) can capture and treat non-point source pollutants originating from pasture, cropland, and other farm operations

• Landowners in Fiery Run watershed have treated an average of 37% of BMP-eligible farmland using Ag BMPs annually since 2006 (highest of any Report Card watershed)

Conservation Spotlight: Marriott Ranch

• Historic 4,200-acre cattle ranch and bed & breakfast in Hume

• Since 2012, Marriott Ranch has worked with John Marshall Soil and Water Conservation District to install 13 miles of cattle exclusion systems, which now treat nearly 700 acres of pasture annually


Marriott Ranch

Carter Run Riparian Forest Cover - Grade: B

• Riparian forests slow erosion, filter pollutants from runoff, recharge groundwater, cool water temperature, create habitat, and nourish streams with organic matter

• Over 80% of Carter Run's riparian area is covered under forest canopy, the second-highest total among all Report Card watersheds

Conservation Spotlight: John Marshall SWCD

• The John Marshall SWCD, established 1966, provides technical assistance and education in support of soil stewardship, agricultural conservation, and water quality protection

• John Marshall SWCD offers cost-shares for many kinds of Ag BMPs including riparian buffers, cattle exclusion, and cover crops

Great Run Open Space Protection - Grade: A

• Land use analysis revealed that 45 percent of open spaces in the Great Run watershed are conserved under private easement or government ownership

• This is the highest grade of any Report Card watershed away from Shenandoah NP

Conservation Spotlight: Fauquier County PDR Program

• Under Fauquier County's Purchase of Development Rights (PDR) program, landowners may sell development potential of their land to the County while holding the right to own and use the property

• As of 2017, over 12,000 acres of farmland have been conserved under the PDR program. the highiest of any county in Virginia

Fauquier County – Needs Improvement

Thumb Run Bacteria - Grade: F

- VaDEQ lists 70.3% of perennial streams in Thumb Run watershed for high bacteria levels
- The primary sources of bacteria are agricultural runoff, septic overflows, and pet waste
- Efforts led by the John Marshall Soil and Water Conservation District and the Fauquier County Health Department from 2006-2017 resulted in the following improvements:
  - 80 livestock exclusion projects protecting 68 miles of stream
  - 242 acres of riparian buffer
  - 445 acres of pasture management
  - 247 septic pump-outs
  - 69 septic repairs

Homework: Continue Excluding Cattle from Thumb Run

- Fencing cattle out of streams reduces bacteria pollution
- Cost-shares for cattle exclusion are available from John Marshall Soil and Water Conservation District and NRCS

Forest regeneration after excluding cattle from a stream

Great Run Green Infrastructure - Grade: F

- Impervious surfaces like buildings and parking lots (including gravel) increase erosion and flooding, and introduce pollutants including bacteria and sediment
- Green infrastructure like rain gardens and cisterns treat runoff from impervious surfaces
- No green infrastructure devices have been installed in the Great Run watershed using state cost shares during the past 10 years

A rain cistern installed by volunteers

Homework: Install Green Infrastructure in Warrenton

- Warrenton is the largest city in Fauquier County and contributes urban stormwater runoff to Great Run
- Practices such as rain gardens, pervious pavers and rain cisterns are eligible for soil and water district cost-shares

Marsh Run Road Crossing Signage - Grade: F

- Marking road crossings with the stream name can increase awareness of streams
- Only crossings where a lined road crossed a named perennial stream were assessed
- 1 of 11 stream crossings in the Marsh Run watershed were marked

Homework: Install Stream Crossing Signage in Bealeton

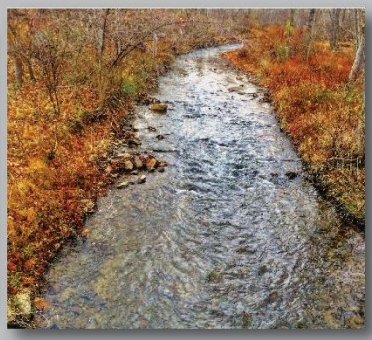
- Bealeton is a growing suburban community with many commuters
- Installing just five new stream markers will raise this grade to an A

Jordan River Open Space Protection - Grade: A

- Clean water is downstream from land conservation
- Rappahannock County is under growing development pressure from the DC metro
- Over 60 percent of undeveloped lands in the Jordan River watershed are protected
- Land can be conserved under government ownership or private easement

Conservation Spotlight: Piedmont Environmental Council

- Piedmont Environmental Council (PEC) is a community-based nonprofit whose mission is to promote and protect the natural resources, rural economy, history and beauty of the VA Piedmont
- Since its founding in 1972, PEC has helped communities across the Piedmont to conserve over 400,000 acres of land
- To learn more, visit PEC's website at www.pecva.org



Rush River Public Access - Grade: A

- Rappahannock County Park is a valuable local recreation site and stream access point
- Public access promotes water recreation and builds a sense of shared ownership
- Access creates stewardship and education opportunities for students and adults
- Public spaces attract tourism that helps Rappahannock County businesses

Conservation Spotlight: Shenandoah National Park

- The park contains 516 miles of trails, including 101 miles of the A.T.
- 18.6% of Rappahannock County falls within the park
- In 2017 the park attracted 1.4 million visitors, adding $95.8 million in economic benefits and supporting 1,204 local jobs (Source: NPS)

Thornton River River Cleanups - Grade: A

- Chemicals and microplastics leach from discarded litter and pollute soil and water
- Volunteer cleanups are an easy and affordable way to encourage local stewardship
- You can organize your own cleanup! Friends of the Rappahannock can loan supplies and help you get set up. No crew is too small. Visit www.riverfriends.org for more info.

Conservation Spotlight: Thornton River Cleanup Day

- Thornton River Cleanup Day is an annual river cleanup in April on the Thornton River organized by downtown Sperryville businesses
- Cleanup materials and assistance have been provided by Friends of the Rappahannock ,VDOT and numerous other groups

Rappahannock County – Needs Improvement

Jordan River Riparian Forest Canopy - Grade: C

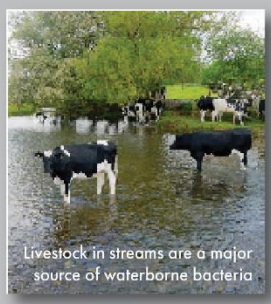
- Streams with insufficient forest cover suffer increased erosion, pollution, and aquatic habitat loss
- GIS analysis revealed that only 78 percent of riparian areas in the Jordan River watershed had forest cover; 90% earns an "A" grade


Wakefield Country Day School students plant a tree in Rappahannock County

Homework: Establish Riparian Forest Buffers along the Jordan River and its Feeder Streams

- Riparian forest buffers slow erosion, filter pollutants from runoff, recharge groundwater and create habitat
- Buffers of 35 feet in width or greater are most effective
- 100% cost shares are available

Extra Credit: Recruit volunteers from Wakefield Country Day School or Rappahannock County HS


Livestock in streams are a major source of waterborne bacteria

Rush River Bacterial Impairment at Rappahannock County Park - Grade: Fail

- The Rush River in the park is state-listed as having unsafe levels of e. coli bacteria, potentially exposing visitors to infection or illness
- There is no signage to inform visitors of the risk or educate them on how to protect against bacteria exposure

Homework: Exclude Cattle from the Rush River and its Feeder Streams Above Route 211

- Runoff from livestock farms is the largest source of waterborne bacteria in Rappahannock County
- Fencing cattle out of streams can reduce bacteria pollution and streambank erosion
- Cost-shares for cattle exclusion are available from local soil and water districts and NRCS

Thornton River Green Infrastructure - Grade: F

- Impervious surfaces like buildings and parking lots (including gravel) increase erosion and flooding, and introduce pollutants including bacteria
- Green infrastructure like rain barrels and rain gardens treat runoff from impervious surfaces
- No green infrastructure devices have been installed in the Thornton River watershed using state cost shares during the past 10 years


Painted Rain Barrel

Homework: Install Green Infrastructure in Sperryville

- Rain barrels are easy to install and can be purchased at Culpeper SWCD
- "Structural" practices such as rain gardens, pervious pavers and above-ground cisterns are eligible for soil and water district cost-shares

Extra Credit: Install signage to teach others about green infrastructure

Appendix 1: Indicator Overviews

How we graded the streams

Indicator Overview	**Bacteria**	Subject: Human Health

Why it's important

A body of water is considered "impaired" if it fails to meet one or more water quality standards. The U.S. EPA defines how much of a pollutant such as bacteria or nutrients can be in water before it is no longer drinkable, swimmable, fishable, or useable in other, designated ways. Impairment designations rely on annual field samples by DEQ scientists, and are reported bi-annually in the 305(b) report. The Rappahannock River basin has many sections and tributaries that are impaired for recreation due to bacteria levels present in the streams. These include Escherichia coli (E. coli), enterococci, salmonella, and fecal coliforms. Exposure to bacterial pathogens increases the likelihood of illness or infection. These bacteria are often times naturally occurring and are present in most waterways. The main sources of human-caused bacteria in the Upper Rappahannock River basin are runoff from pastureland and septic systems.

Grading Scale

Definition: The percentage of all perennial stream-miles in the tributary watershed that were listed as impaired for Recreation by VADEQ due to bacteria levels, in the most recent 305(b) report

A	B	C	D	F
0% of stream miles listed	0-20% of stream miles listed	20-40% of stream miles listed	40-60% of stream miles listed	>60% of stream miles listed

Results

Carter Run	C	30.7% of stream-miles listed as impaired for Recreation due to bacteria
Fiery Run	F	74.8% of stream-miles listed as impaired for Recreation due to bacteria
Great Run	F	63.3% of stream-miles listed as impaired for Recreation due to bacteria
Hazel River (Upper)	C	30.5% of stream-miles listed as impaired for Recreation due to bacteria
Hazel River (Lower)	C	24.0% of stream-miles listed as impaired for Recreation due to bacteria
Hughes River	B	18.4% of stream-miles listed as impaired for Recreation due to bacteria
Jordan River	B	16.6% of stream-miles listed as impaired for Recreation due to bacteria
Marsh Run	D	41.3% of stream-miles listed as impaired for Recreation due to bacteria
Mountain Run	C	31.9% of stream-miles listed as impaired for Recreation due to bacteria
Rush River	C	22.9% of stream-miles listed as impaired for Recreation due to bacteria
Thornton River	B	14.3% of stream-miles listed as impaired for Recreation due to bacteria
Thumb Run	F	70.9% of stream-miles listed as impaired for Recreation due to bacteria

Methodology

Using GIS data layers obtained through DEQ, the total stream miles listed as "not supporting" for recreation were divided by the total perennial stream miles in the tributary to produce the result.

Sources

Virginia Department of Environmental Quality. *Final 2018 305(b)/303(d) Water Quality Assessment Integrated Report.* Approved by EPA Oct. 15, 2019. GIS data obtained through request to DEQ. https://www.deq.virginia.gov/programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2018305(b)303(d)IntegratedReport.aspx

Indicator Overview	**Fish Consumption**	Subject: Human Health

Why it's important

A body of water is considered "impaired" if it fails to meet one or more water quality standards. The U.S. EPA defines how much of a pollutant such as bacteria or nutrients can be in water before it is no longer drinkable, swimmable, fishable, or useable in other, designated ways. Impairment designations rely on annual field samples by DEQ scientists, and are reported bi-annually in the 305(b) report. Many areas of the Rappahannock River was at one time exposed to polychlorinated biphenyls (PCBs) which are still present in the river bed sediments in some areas. Sections of stream impaired for fish consumption are sometimes subject to fish consumption advisories. This indicator is included to inform the public about whether it is safe to consume fish from our rivers and to provide information to decision makers.

Grading Scale

Definition: The percentage of total stream-miles in the tributary watershed that were listed as impaired for Fish Tissue by VADEQ due to heavy metals due to heavy metals, in the most recent 305(b) report

A	B	C	D	F
0% of stream miles listed	0-20% of stream miles listed	20-40% of stream miles listed	40-60% of stream miles listed	>60% of stream miles listed

Results

Carter Run	A	No stream-miles listed as impaired for fish tissue
Fiery Run	A	No stream-miles listed as impaired for fish tissue
Great Run	A	No stream-miles listed as impaired for fish tissue
Hazel River (Upper)	A	No stream-miles listed as impaired for fish tissue
Hazel River (Lower)	A	No stream-miles listed as impaired for fish tissue
Hughes River	A	No stream-miles listed as impaired for fish tissue
Jordan River	A	No stream-miles listed as impaired for fish tissue
Marsh Run	A	No stream-miles listed as impaired for fish tissue
Mountain Run	C	26.1% of stream-miles listed as impaired for fish tissue
Rush River	A	No stream-miles listed as impaired for fish tissue
Thornton River	A	No stream-miles listed as impaired for fish tissue
Thumb Run	A	No stream-miles listed as impaired for fish tissue

Methodology

Using GIS data layer obtained through DEQ, the total stream miles shown as "not supporting" for fish tissue were divided by the overall perennial stream miles in the tributary to produce the result.

Sources

Virginia Department of Environmental Quality. *Final 2018 305(b)/303(d) Water Quality Assessment Integrated Report.* Approved by EPA Oct. 15, 2019. GIS data obtained through request to DEQ. https://www.deq.virginia.gov/programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2018305(b)303(d)IntegratedReport.aspx

Indicator Overview	**Contaminated Sites**	Subject: Human Health

Why it's important

Properties listed under the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund) pose a risk to human health by adding hazardous pollutants to the environment. Contaminated sites can contribute harmful pollutants directly into streams during rain events, seep pollutants into the groundwater table which then travels to our waterways and drinking water sources. Contaminated sites were included in the report card to increase public awareness of these sites.

Grading Scale

Definition: Presence of one or more active EPA-listed RCRA or Superfund site in watershed indicates a fail

PASS	FAIL
No active RCRA or Superfund sites in watershed	One or more active RCRA or Superfund sites in watershed

Results

Carter Run	Pass	No active RCRA or Superfund sites in watershed
Fiery Run	Pass	No active RCRA or Superfund sites in watershed
Great Run	Pass	No active RCRA or Superfund sites in watershed
Hazel River (Upper)	Pass	No active RCRA or Superfund sites in watershed
Hazel River (Lower)	Pass	No active RCRA or Superfund sites in watershed
Hughes River	Pass	No active RCRA or Superfund sites in watershed
Jordan River	Pass	No active RCRA or Superfund sites in watershed
Marsh Run	Pass	No active RCRA or Superfund sites in watershed
Mountain Run	Fail	One active Superfund site in watershed
Rush River	Pass	No active RCRA or Superfund sites in watershed
Thornton River	Pass	No active RCRA or Superfund sites in watershed
Thumb Run	Pass	No active RCRA or Superfund sites in watershed

Sources

RCRA and Superfund sites locations were obtained from the EPA's Facility Registry Service at https://www.epa.gov/frs.

Indicator Overview	**Recreational Health Risk**	Subject: Human Health

Why it's important

Exposure to waters listed as impaired for recreation due to bacteria is a public health risk (see "Bacteria" indicator overview for more information). Common waterborne bacteria include Escherichia coli (E. coli), enterococci, salmonella, and fecal coliforms. Exposure to bacterial pathogens increases the likelihood of illness or infection. Community members that swim, fish, and otherwise directly interact with stream water at public access sites should be aware of DEQ impairment listings for recreation. This indicator is intended to raise public awareness of recreation impairment at public stream access sites.

Grading Scale

Definition: Any VADEQ listed Recreation impairment at any public recreation site that allows swimming site earns a Fail.

PASS	FAIL
No public access sites allowing swimming are listed as impaired for recreation	One or more public access sites allowing swimming are listed as impaired for recreation

Results

Carter Run	Pass	No impaired public access sites found
Fiery Run	Pass	No impaired public access sites found
Great Run	Pass	No impaired public access sites found
Hazel River (Upper)	Pass	No impaired public access sites found
Hazel River (Lower)	Pass	No impaired public access sites found
Hughes River	Pass	No impaired public access sites found
Jordan River	Pass	No impaired public access sites found
Marsh Run	Pass	No impaired public access sites found
Mountain Run	Fail	Recreation impairment at Yowell Meadow Park
Rush River	Fail	Recreation impairment at Rappahannock County Park
Thornton River	Pass	No impaired public access sites found
Thumb Run	Pass	No impaired public access sites found

Methodology

Recreation access sites were obtained from county GIS websites and County Park Association websites. Waterbody impairment status was gathered from VADEQ 305b reports. Any swimmable public park located on a stream listed as impaired for recreation due to bacteria earned a fail. All others received a pass.

Sources

Virginia Department of Environmental Quality. *Final 2018 305(b)/303(d) Water Quality Assessment Integrated Report.* Approved by EPA Oct. 15, 2019. GIS data obtained through request to DEQ. https://www.deq.virginia.gov/programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2018305(b)303(d)IntegratedReport.aspx

Indicator Overview	**Forest-Impervious Ratio**	Subject: Land Use

Why it's important

The land cover of a watershed is a very important indicator of watershed health. Different land covers and land use types have very different resulting impacts on waterways. Mature forests intercept rainfall before it reaches the ground, slowing any stormwater runoff. Vegetation has strong root systems that reduce erosion and protect our waterways from other forms of pollution. Conversely, hardened impervious surfaces provide no ecosystem services and exacerbate stormwater runoff which flows off parking lots and other impervious surfaces at high velocities and can carry a variety of pollutants directly into storm drains and waterways.

Grading Scale

Definition: The ratio of forested area to impervious surface within the tributary watershed

A	B	C	D	F
>20:1	10:1 - 20:1	5:1 - 10:1	2:1 - 5:1	< 2:1

Results

Carter Run	A	30.4:1 forest to impervious ratio
Fiery Run	A	98.6:1 forest to impervious ratio
Great Run	B	14.7:1 forest to impervious ratio
Hazel River (Upper)	A	50.9:1 forest to impervious ratio
Hazel River (Lower)	A	22.7:1 forest to impervious ratio
Hughes River	A	91.6:1 forest to impervious ratio
Jordan River	A	59.3:1 forest to impervious ratio
Marsh Run	B	12.3:1 forest to impervious ratio
Mountain Run	C	8.2:1 forest to impervious ratio
Rush River	A	51:1 forest to impervious ratio
Thornton River	A	49.6:1 forest to impervious ratio
Thumb Run	A	38.5:1 forest to impervious ratio

Methodology

Forest canopy included VGIN land cover classes ("Forest", "Tree", and "Woody Wetland"). Impervious surfaces included classes ("Impervious (Extracted)" and "Impervious (Local)")

Sources

Virginia Geographic Information Network (VGIN) 2016 Land Cover Dataset. Downloaded October 2017 from: https://www.vita.virginia.gov/integrated-services/vgin-geospatial-services/land-cover/

Indicator Overview	Open Space Protection	Subject: Land Use

Why it's important

Natural areas such as forests and wetlands are valuable natural resources that naturally filter water through groundwater and ecological processes. Open spaces dedicated to agricultural uses, while contributing to water pollution, are extremely low in impervious surfaces and are preferable to urban land uses in terms of their water quality effects. Open space protection using ownership, easement, or via resource protection area designation can help prevent agricultural and forest lands from becoming developed into urban land uses.

Grading Scale

Definition: The percent of open spaces (undeveloped land) that are currently under protection via government ownership, easement, or a Resource Protection Area.

A	B	C	D	F
>30%	20-30%	15-20%	10-15%	<10%

Results

Carter Run	A	30.8% of open spaces protected
Fiery Run	D	12.9% of open spaces protected
Great Run	A	45.4% of open spaces protected
Hazel River (Upper)	B	22.7% of open spaces protected
Hazel River (Lower)	F	9.2% of open spaces protected
Hughes River	A	54.4% of open spaces protected
Jordan River	A	60.4% of open spaces protected
Marsh Run	D	13.3% of open spaces protected
Mountain Run	F	4.4% of open spaces protected
Rush River	A	51.9% of open spaces protected
Thornton River	A	43.8% of open spaces protected
Thumb Run	A	45.4% of open spaces protected

Methodology

Open spaces were defined as VGIN land cover classes ("Forest", "Tree", "Scrub/Shrub", "Pasture", "Cropland", "Woody Wetlands", and "Emergent Wetlands"). Protected lands were defined as any lands that have protection according to the National Conservation Easement Database, as well as any lands in Resource Protection Area as defined by county governments. The total protected area was divided by the total Open Space acreage to produce the result.

Sources

Virginia Geographic Information Network (VGIN) 2016 Land Cover Dataset. Downloaded October 2017 from: https://www.vita.virginia.gov/integrated-services/vgin-geospatial-services/land-cover/

National Conservation Easement Database 2019. https://www.conservationeasement.us/

Other easement data from Piedmont Environmental Council

Indicator Overview	**Agricultural BMPs**	Subject: Land Use

Why it's important

Agriculture is one of the largest land uses in the Rappahannock River watershed and is the largest pollution source sector impacting the Rappahannock River and Chesapeake Bay. To address nutrients and pollution leaving agricultural fields, conservation groups like Friends of the Rappahannock, Culpeper Soil and Water Conservation District, and John Marshall Soil and Water Conservation District work with producers to provide technical assistance and cost-share for a myriad of agricultural best management practices (BMPs), to mitigate pollution and to protect our waterways.

Grading Scale

Definition: Percent of BMP-eligible agricultural land in the watershed treated per year

A	B	C	D	F	NA
>30%	20-30%	10-20%	1-10%	>10%	Less than 2% Ag

Results

Carter Run	C	13.8% of BMP-eligible farmland treated per year (2007-2018)
Fiery Run	A	35.3% of BMP-eligible farmland treated per year (2007-2018)
Great Run	D	9.7% of BMP-eligible farmland treated per year (2007-2018)
Hazel River (Upper)	C	13.0% of BMP-eligible farmland treated per year (2007-2018)
Hazel River (Lower)	C	14.2% of BMP-eligible farmland treated per year (2007-2018)
Hughes River	C	12.5 of BMP-eligible farmland treated per year (2007-2018)
Jordan River	B	25.1% of BMP-eligible farmland treated per year (2007-2018)
Marsh Run	C	18.1% of BMP-eligible farmland treated per year (2007-2018)
Mountain Run	B	25.9% of BMP-eligible farmland treated per year (2007-2018)
Rush River	C	12.5% of BMP-eligible farmland treated per year (2007-2018)
Thornton River	D	6.2% of BMP-eligible farmland treated per year (2007-2018)
Thumb Run	D	7.2% of BMP-eligible farmland treated per year (2007-2018)

Methodology

The total acres benefited of all Ag BMP treatments as indicated by DCR records, divided by the acres of BMP-eligible farmland. BMP eligible farmland was assumed to be all cropland and pasture. BMPs were counted once for each year under contract. Hay land is not considered eligible for BMPs. To estimate the total BMP eligible farmland, we took a sum of the total acreage using VGIN classes "Cropland" or "Pasture", minus the total pastureland in each watershed as estimated using the 2017 Agricultural Census within the tributary watershed, divided by the number of years of data considered. Includes all BMP installations and nutrient management plans from 2007 to 2018.

Sources

Virginia Department of Conservation and Recreation, Virginia Agricultural BMP and CREP Database Query Form. *http://consapps.dcr.virginia.gov/htdocs/progs/BMP_query.aspx (2007-2018). Location data available upon request from DCR.*

Virginia Geographic Information Network (VGIN) 2016 Land Cover Dataset. Downloaded October 2017 from: https://www.vita.virginia.gov/integrated-services/vgin-geospatial-services/land-cover/

2017 USDA Agricultural Census. https://www.nass.usda.gov/AgCensus/

Indicator Overview	**Residential BMPs**	Subject: Land Use

Why it's important

The fastest-growing pollution source in our area is urban and suburban stormwater runoff, which is occurring due to land use changes brought on by population growth. Many residential properties have inadequate or no stormwater management on site to prevent polluted stormwater runoff from entering our waterways. Residential and commercial property owners have access to several state and local programs to assist with design and installation of stormwater best management practices (BMPs), a.k.a. "green infrastructure". Examples include rain barrels, rain gardens, and urban tree plantings.

Grading Scale

Definition: Number of state cost-share funded urban stormwater BMPs per 10,000 watershed population per year in the study between 2016 and 2018

A	B	C	D	F
>1	0.6-1	0.3-0.6	0-0.3	No BMPs

Results

Carter Run	F	0 BMPs per 10,000 population per year (2016-2018)
Fiery Run	F	0 BMPs per 10,000 population per year (2016-2018)
Great Run	F	0 BMPs per 10,000 population per year (2016-2018)
Hazel River (Upper)	B	0.8 BMPs per 10,000 population per year (2016-2018)
Hazel River (Lower)	F	0 BMPs per 10,000 population per year (2016-2018)
Hughes River	A	4.0 BMPs per 10,000 population per year (2016-2018)
Jordan River	A	4.2 BMPs per 10,000 population per year (2016-2018)
Marsh Run	F	0 BMPs per 10,000 population per year (2016-2018)
Mountain Run	D	0.3 BMPs per 10,000 population per year (2016-2018)
Rush River	A	3.4 BMPs per 10,000 population per year (2016-2018)
Thornton River	F	0 BMPs per 10,000 population per year (2016-2018)
Thumb Run	F	0 BMPs per 10,000 population per year (2016-2018)

Sources

Residential BMP data obtained by request from Virginia Association of Soil and Water Conservation Districts. Includes all residential BMPs installed using SWCD-administered cost share. Population data obtained using Census Bureau census block data (2010). Data included projects completed between 2016-2018.

Indicator Overview	Aquatic Life	Subject: Stream Ecology

Why it's important

A body of water is considered "impaired" if it fails to meet one or more water quality standards. The U.S. EPA defines how much of a pollutant such as bacteria or nutrients can be in water before it is no longer drinkable, swimmable, fishable, or habitable by aquatic communities, as well as other designated ways. Impairment designations rely on annual field samples by DEQ scientists, and are reported bi-annually in the 305(b) report. Our local waterways are a complex network of ecosystems that depend on each other to properly function, and when one or more components of an ecosystem is compromised, the rest of the system cannot function properly. VA Department of Environmental Quality considers impairment of aquatic life, which can be harmed by water chemistry issues like pH and dissolved oxygen, as well as degradation of macroinvertebrates (aquatic insect) populations. FOR includes this indicator as a way to point decision makers toward damaged waterways and work towards identifying solutions.

Grading Scale

Definition: The percentage of total stream-miles in the tributary watershed that were listed as impaired for Aquatic Life by the Virginia Department of Environmental Quality, as included in the most recent 305(b) report

A	B	C	D	F
0% of stream miles listed	1-20% of stream miles listed	20-40% of stream miles listed	40-60% of stream miles listed	>60% of stream miles listed

Results

Carter Run	A	0% of stream miles listed as impaired for aquatic life
Fiery Run	A	0% of stream miles listed as impaired for aquatic life
Great Run	C	29.3% of stream miles listed as impaired for aquatic life
Hazel River (Upper)	B	10.8% of stream miles listed as impaired for aquatic life
Hazel River (Lower)	A	0.0% of stream miles listed as impaired for aquatic life
Hughes River	B	11.1% of stream miles listed as impaired for aquatic life
Jordan River	A	0.0% of stream miles listed as impaired for aquatic life
Marsh Run	B	15.0% of stream miles listed as impaired for aquatic life
Mountain Run	C	25.4% of stream miles listed as impaired for aquatic life
Rush River	A	0.0% of stream miles listed as impaired for aquatic life
Thornton River	B	0.9% of stream miles listed as impaired for aquatic life
Thumb Run	B	18.9% of stream miles listed as impaired for aquatic life

Sources

Virginia Department of Environmental Quality. *Final 2018 305(b)/303(d) Water Quality Assessment Integrated Report.* Approved by EPA Oct. 15, 2019. GIS data obtained through request to DEQ. https://www.deq.virginia.gov/programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2018305(b)303(d)IntegratedReport.aspx

GIS data obtained through request to DEQ.

Indicator Overview	**Impervious Surfaces**	Subject: Stream Ecology

Why it's important

Riparian areas are the corridors directly adjacent to waterways and are among the most important land areas in a watershed. Impervious surfaces are surfaces that prevent or significantly retard the infiltration of surface water into the ground. Common examples include manmade structures and pavement, including gravel. Streams with high concentrations of impervious surfaces generally have much higher stormwater impacts than streams with healthy riparian areas. Best management practices can catch and treat stormwater runoff prior to entering a waterway to reduce erosion and pollution. Performing this assessment will provide localities with an inventory of areas in need of restoration projects to convert impervious areas to vegetated areas in an effort to protect or improve water quality.

Grading Scale

Definition: The percent of watershed area within 300 feet on either side of any perennial stream that is impervious

A	B	C	D	F
<2%	2-5%	5-10%	10-15%	>15%

Results

Carter Run	A	0.9% of riparian area is impervious
Fiery Run	A	0.6% of riparian area is impervious
Great Run	A	1.3% of riparian area is impervious
Hazel River (Upper)	A	1.1% of riparian area is impervious
Hazel River (Lower)	A	0.9% of riparian area is impervious
Hughes River	B	2.2% of riparian area is impervious
Jordan River	A	1.5% of riparian area is impervious
Marsh Run	A	1.8% of riparian area is impervious
Mountain Run	B	2.1% of riparian area is impervious
Rush River	B	2.8% of riparian area is impervious
Thornton River	B	2.2% of riparian area is impervious
Thumb Run	A	1.1% of riparian area is impervious

Methodology

Impervious were defined as VGIN land cover classes ("Impervious (Extracted)" and "Impervious (Local)"). Perennial streams were selected based on National Hydrologic Dataset data.

Sources

Virginia Geographic Information Network (VGIN) 2016 Land Cover Dataset. Downloaded October 2017 from: https://www.vita.virginia.gov/integrated-services/vgin-geospatial-services/land-cover/

USGS National Hydrologic dataset 2018. https://nhd.usgs.gov/NHD_High_Resolution.html

Indicator Overview	**Forest Canopy**	Subject: Stream Ecology

Why it's important

Riparian areas are the corridors directly adjacent to waterways and are among the most important land areas in a watershed. Vegetated riparian buffers are the most effective strategy to protect waterways from pollution. They also are essential habitat areas for fish and wildlife. A healthy, dense, and diverse vegetated riparian buffer is a strong indicator of stream health.

Grading Scale

Definition: The percent of watershed area within 300 feet on either side of any perennial stream that are under forest cover

A	B	C	D	F
>90%	80-90%	70-80%	60-70%	<60%

Results

Carter Run	B	80.3% of riparian area is under forest cover
Fiery Run	B	80.6% of riparian area is under forest cover
Great Run	D	66.9% of riparian area is under forest cover
Hazel River (Upper)	C	70.8% of riparian area is under forest cover
Hazel River (Lower)	D	69.2% of riparian area is under forest cover
Hughes River	D	68.7% of riparian area is under forest cover
Jordan River	C	78.5% of riparian area is under forest cover
Marsh Run	D	66.6% of riparian area is under forest cover
Mountain Run	F	57.8% of riparian area is under forest cover
Rush River	D	68.9% of riparian area is under forest cover
Thornton River	D	69.7% of riparian area is under forest cover
Thumb Run	D	64.3% of riparian area is under forest cover

Methodology

Forest canopy was defined as VGIN land cover classes ("Forest", "Tree", or "Woody Wetland"). Perennial streams were selected based on National Hydrologic Dataset data.

Sources

Virginia Geographic Information Network (VGIN) 2016 Land Cover Dataset. Downloaded October 2017 from: https://www.vita.virginia.gov/integrated-services/vgin-geospatial-services/land-cover/

USGS National Hydrologic dataset 2018. https://nhd.usgs.gov/NHD_High_Resolution.html

Indicator Overview	Open Space Protection (Riparian)	Subject: Stream Ecology

Why it's important

One of the largest threats to our local water resources is development and encroachment of impervious surfaces. Riparian land protection is an essential land use mechanism which provides substantial ecosystem services including protecting water quality and habitat for fish and wildlife. In many areas of Virginia, many water resources are protected through the use of "Resource Protection Areas" under the Chesapeake Bay Act which restricts development within 100 feet of perennial streams. Larger protected land areas provide higher quality water resources and ecosystem services.

Grading Scale

Definition: The percent of open spaces (undeveloped land) that are currently under protection via ownership, easement, or a Resource Protection Area, within 300 feet on either side of any perennial stream

A	B	C	D	F
>80%	60-80%	40-60%	20-40%	<20%

Results

Carter Run	D	22.3% of riparian open spaces protected
Fiery Run	F	10.7% of riparian open spaces protected
Great Run	C	46.5% of riparian open spaces protected
Hazel River (Upper)	D	24.7% of riparian open spaces protected
Hazel River (Lower)	F	11.9% of riparian open spaces protected
Hughes River	D	38.5% of riparian open spaces protected
Jordan River	B	60.7% of riparian open spaces protected
Marsh Run	F	11.0% of riparian open spaces protected
Mountain Run	F	4.4% of riparian open spaces protected
Rush River	D	38.7% of riparian open spaces protected
Thornton River	D	36.2% of riparian open spaces protected
Thumb Run	C	50.3% of riparian open spaces protected

Methodology

See 'Open Space Protection' indicator overview. Used identical methodology, this time within 300 feet of any perennial stream as selected based on National Hydrologic Dataset data.

Sources

See 'Open Space Protection' indicator overview

USGS National Hydrologic dataset 2018. https://nhd.usgs.gov/NHD_High_Resolution.html

Indicator Overview	**Public Access**	Subject: Community Engagement

Why it's important

Public access to waterways and other natural resources is an essential part of maintaining the health of waterways in developed areas. If people can see, use, and appreciate a pristine resource like a stream, then they are less likely to contribute to pollution and more likely to engage to protect a resource. Public access also encourages economic development and creates educational opportunities that supports these natural resources. Connecting our communities with water recreation is an excellent way for decision makers to protect our natural resources.

Grading Scale

Definition: A public access site is defined as a park or trail that provides public access to the tributary or a perennial waterbody within the tributary watershed

A	B	C	D	F
Watershed contains a public boat access point or public trail providing direct access to a named stream, with interpretive signage	Watershed contains a public trail providing direct access to a named stream, with no interpretive signage	Watershed contains a private or fee access point but no public parks or trails adjacent to a named stream	Watershed contains a public park or trail adjacent to, but without direct access to, a named stream	Watershed contains no trails or parks adjacent to a named stream

Results

Carter Run	F	No public access found
Fiery Run	C	Private access via Marriott Ranch
Great Run	F	No public access found
Hazel River (Upper)	B	Public trail with no interpretive signage (Hazel River Tr., Broad Hollow Tr.)
Hazel River (Lower)	F	No public access found
Hughes River	B	Public trail with no interpretive signage (Nicholson Hollow/Old Rag Tr.)
Jordan River	B	Public trail with no interpretive signage (Jordan River Tr.)
Marsh Run	B	Public trail with no interpretive signage (Phelps WMA)
Mountain Run	A	Public parks and trails providing direct access to a named stream, with interpretive signage (6 including Yowell Meadow Park)
Rush River	A	Public park and trail with interpretive signage (Rappahannock County Park)
Thornton River	A	Public trail with interpretive signage (Sperryville Trail, Thorton River Tr., Thornton Gap Tr.)
Thumb Run	F	No public access found

Sources

Public access obtained through county GIS websites and County Park Association websites

Indicator Overview	**Watershed Education**	Subject: Community Engagement

Why it's important

Environmental education is essential to ensure the leaders of tomorrow understand the importance of healthy ecosystems and water resources. The piedmont is very fortunate to have a variety of organizations that provide watershed education opportunities and programs to teach region's youth about nature, pollution, and clean water. These lessons are then brought home and incorporated into their daily lives creating a whole generation of environmental stewards. A higher environmental literacy will produce a healthier watershed. Many students participate in Meaningful Watershed Educational Experience (MWEE), a state-mandated education program that is being implemented in schools across the state of Virginia.

Grading Scale

Definition: The percent of total K-8 public school enrollment in each watershed participating in in previous two school years

A	B	C	D	F
N/A	N/A	N/A	N/A	N/A

Results

Carter Run	NA	No data on environmental education
Fiery Run	NA	No data on environmental education
Great Run	NA	No data on environmental education
Hazel River (Upper)	NA	No data on environmental education
Hazel River (Lower)	NA	No data on environmental education
Hughes River	NA	No data on environmental education
Jordan River	NA	No data on environmental education
Marsh Run	NA	No data on environmental education
Mountain Run	NA	No data on environmental education
Rush River	NA	No data on environmental education
Thornton River	NA	No data on environmental education
Thumb Run	NA	No data on environmental education

Editor's Note

Students across the Rappahannock watershed get environmental education in a variety of ways, including their own teachers, nonprofits, and government organizations. That's a good thing for the students, but it makes it hard to track the lessons that are taking place. Rather than presenting incomplete and faulty data, we decided to skip this subject for the 2019 report card. Friends of the Rappahannock is working on developing a system to keep tabs on how well schools in the Rappahannock watershed are meeting their watershed education goals. The next Report Card will contain updated numbers and grades on environmental education, which will give a more comprehensive look at the work being done by organizations across our area.

Indicator Overview	River Cleanups	Subject: Community Engagement

Why it's important	There is a never ending barrage of litter, trash, and debris coming off our developed lands. This trash can start in a parking lot, find a storm-drain, and eventually make it to a small stream which then leads to the Rappahannock River and Chesapeake Bay. Friends of the Rappahannock and several other partners host and organize multiple river cleanups across the region throughout the year. These cleanups also provide a meaningful activity for the community to engage in their local river or stream. This indicator will help local neighborhoods and community groups identify target areas for future river cleanups and other stewardship efforts. Data only includes FOR-facilitated cleanups. Watersheds without public access were not scored.
Grading Scale	**Definition**: FOR River cleanups completed per 10,000 population per year (2016-2018)

A	B	C	D	F	NA
>1 cleanup	0.6-1 cleanups	0.3-0.6 cleanups	0.1-0.3 cleanups	No cleanups	No public access

Re			
	Carter Run	NA	No data on river cleanups
	Fiery Run	NA	No data on river cleanups
	Great Run	NA	No data on river cleanups
	Hazel River (Upper)	NA	No data on river cleanups
	Hazel River (Lower)	NA	No data on river cleanups
	Hughes River	NA	No data on river cleanups
	Jordan River	NA	No data on river cleanups
	Marsh Run	NA	No data on river cleanups
	Mountain Run	NA	No data on river cleanups
	Rush River	NA	No data on river cleanups
	Thornton River	A	2 river cleanups

Editor's note

When we were researching River Cleanups, we only uncovered two river cleanups in the Upper Rappahannock Report Card study area, both of which took place in Sperryville during the Thornton River Cleanup Days in 2018 and 2019. We **know** that other organizations, governments, and citizens are doing river cleanups. Unfortunately, we don't know where and when they're taking place. For that reason, rather than presenting incomplete data, we assigned "NA" grades to all watersheds that were lacking data. We are working with other partners to find a better system for tracking river cleanups to create a more comprehensive system for the next report card.

Indicator Overview	**Road Crossing Signage**	Subject: Community Engagement

Why it's important

Every opportunity to engage our communities with their local waterways is important. One of the simplest ways is through small, routine signage. The vast network of roads in our region crosses thousands of creeks, streams, and the Rappahannock River. Without any signage, the smaller waterways go unnoticed, and are treated as out of sight, out of mind. If our communities know the name and multiple locations of a local waterway, they have the opportunity to become a steward. This could be as simple as not littering, not fertilizing a lawn, or even organizing a local river cleanup.

Grading Scale

Definition: Percent of crossings between lined roads and perennial waterways which are marked with the stream name.

A	B	C	D	F	NA
>=50%	40-50%	30-40%	20-30%	>20%	No lined roads

Results

Carter Run	F	0% (0 of 7) stream crossings marked
Fiery Run	NA	No lined roads in watershed
Great Run	A	50% (2 of 4) stream crossings marked
Hazel River (Upper)	A	71.4% (5 of 7) stream crossings marked
Hazel River (Lower)	F	14.3% (2 of 14) stream crossings marked
Hughes River	D	25% (1 of 4) stream crossings marked
Jordan River	A	100% (4 of 4) stream crossings marked
Marsh Run	F	9.1% (1 of 11) stream crossings marked
Mountain Run	A	50% (8 of 16) stream crossings marked
Rush River	A	75% (3 of 4) stream crossings marked
Thornton River	B	45.4% (5 of 11) stream crossings marked

Methodology

All roads with center lines were selected, and intersected with perennial stream crossings. Google Street View and field testing were used to assess whether each crossing location was marked with the stream name.

Sources

Road layers were obtained from local county GIS websites and Census Tiger Line data.

Streams from USGS National Hydrologic dataset 2019. https://nhd.usgs.gov/NHD_High_Resolution.html