Objective: To collaboratively identify subwatersheds (HUC12) with the highest priority need for addressing fish habitat fragmentation; enable necessary road-stream crossing assessment; and, communicate the vital linkages between connectivity improvements and fish habitat rehabilitation.

Action: Determine locations with the highest priority need for enhancing or restoring fish habitat connectivity.

Summary of the Eastern Brook Trout Joint Venture Accomplishments

Habitat fragmentation can strongly influence the sustainability of wild Brook Trout populations by limiting their dispersal, thereby reducing gene flow, and preventing access to critical habitats that support different phases of their life history. To remediate habitat fragmentation, the Eastern Brook Trout Joint Venture collaborates with key partners to establish priority focus areas where anthropogenic fish passage barriers are identified as a primary threat to conserving wild Brook Trout and facilitates the elimination of impassable barriers within priority areas by providing support to regional and local groups.

From previous work, the Rivanna drainage (02080204) in Virginia was selected as a priority fish habitat connectivity focus area for the three Eastern Fish Habitat Partnerships (ACFHP, EBTJV, and SARP). From a Brook Trout perspective, the Eastern Brook Trout Joint Venture has identified four subwatersheds (HUC12) in the Rivanna drainage that collectively contain twenty-three catchments where wild Brook Trout are present (Table 1). Twenty-one of these catchments contain wild Brook Trout only (Catchment Classification Code 1.1 or 1.1P), while two contain wild Brook Trout and wild Rainbow Trout (Catchment Classification Code 1.3 or 1.3P) (Table 2). Additionally, the Eastern Brook Trout Joint Venture has grouped contiguous catchments occupied by wild trout into patches. The twenty-three catchments containing wild Brook Trout in the Rivanna drainage are located within four patches (Table 3). The Eastern Brook Trout Joint Venture has also determined the level of a patch’s vulnerability to climate change, which is predicated on its sensitivity, defined as predicted changes in water temperature per unit increase in air temperature, and exposure, defined as the predicted frequency, magnitude and duration of water temperatures over a range of temperatures. The four Brook Trout Habitat Patches in the Rivanna drainage all have high sensitivity and high exposure and so they are highly vulnerable to the negative effects caused by climate change. All of the aforementioned data are readily
accessible in the Eastern Brook Trout Joint Venture’s Brook Trout Integrated Spatial Data and Tools.

According to the North Atlantic Aquatic Connectivity Collaboration (NAACC), the four Wild Brook Trout Habitat Patches in the Rivanna drainage collectively have seventy-nine road-stream crossings (Appendix I). While the NAACC database indicates none of these road-stream crossings in the these Wild Brook Trout Habitat Patches have been assessed to determine if they obstruct fish movement, the Road-Stream Crossing Data from Trout Streams in this area of the Rivanna drainage indicates that fourteen road-stream crossings have been evaluated to determine if they are barriers to fish passage (Table 4). Ten of the assessed road-stream crossing are not physical barriers to fish movement, one is a minor barrier and three are moderate barriers.

The NAACC also developed a process for prioritizing HUC12s for road-stream crossing surveys. Table 5 contains the results of this prioritization process for the four HUC12s containing wild Brook Trout patches in the Rivanna drainage. Based on the NAACC approach the North Fork Moormans River-Moormans River HUC12 has been designated as the highest priority for assessing road-stream crossings among the four HUC 12s and the Swift Run HUC12 has the lowest.

The Eastern Brook Trout Joint Venture recently revised its range-wide habitat goals, based on the results of an assessment of wild Brook Trout status at the catchment scale, and two of the four goals focus on habitat connectivity (see Eastern Brook Trout Roadmap to Conservation). As such, the Eastern Brook Trout Joint Venture is firmly committed to supporting the assessment of the road-stream crossings in those Wild Brook Trout Habitat Patches located within the Rivanna drainage. Our Fish Habitat Partnership is in agreement with NAACC road-stream prioritization process designating the North Fork Moormans River-Moormans River HUC12 as the highest assessment priority followed by Doyles River HUC12, the Lynch River-North Fork Rivanna River HUC12, and the Swift Run HUC12, in descending order of priority.
Table 1. Subwatersheds (HUC12) within the Rivanna Drainage Containing Wild Brook Trout

<table>
<thead>
<tr>
<th>Subwatershed Name</th>
<th>Subwatershed Code</th>
<th>Number of Catchments Containing Wild Brook Trout</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Fork Moormans River-Moormans River</td>
<td>020802040103</td>
<td>6</td>
</tr>
<tr>
<td>Doyles River</td>
<td>020802040104</td>
<td>7</td>
</tr>
<tr>
<td>Lynch River-North Fork Rivanna River</td>
<td>020802040301</td>
<td>4</td>
</tr>
<tr>
<td>Swift Run</td>
<td>020802040302</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 2. Catchments within the Rivanna Drainage Containing Wild Brook Trout

**North Fork Moormans River-Moormans River**

<table>
<thead>
<tr>
<th>Catchment Feature ID</th>
<th>Catchment Classification Code</th>
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<tbody>
<tr>
<td>8566529</td>
<td>1.1</td>
</tr>
<tr>
<td>8566531</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566587</td>
<td>1.1</td>
</tr>
<tr>
<td>8566663</td>
<td>1.1P</td>
</tr>
<tr>
<td>8567113</td>
<td>1.3P</td>
</tr>
<tr>
<td>8567117</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**Doyles River**

<table>
<thead>
<tr>
<th>Catchment Feature ID</th>
<th>Catchment Classification Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8566453</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566463</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566467</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566475</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566485</td>
<td>1.1P</td>
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<tr>
<td>8566567</td>
<td>1.1</td>
</tr>
<tr>
<td>8567103</td>
<td>1.1P</td>
</tr>
</tbody>
</table>

**Lynch River-North Fork Rivanna River**

<table>
<thead>
<tr>
<th>Catchment Feature ID</th>
<th>Catchment Classification Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8566447</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566419</td>
<td>1.1</td>
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<tr>
<td>8567091</td>
<td>1.1</td>
</tr>
<tr>
<td>8567093</td>
<td>1.1P</td>
</tr>
</tbody>
</table>
**Swift Run**

<table>
<thead>
<tr>
<th>Catchment Feature ID</th>
<th>Catchment Classification Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8566387</td>
<td>1.1</td>
</tr>
<tr>
<td>8566389</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566391</td>
<td>1.1P</td>
</tr>
<tr>
<td>8566393</td>
<td>1.1P</td>
</tr>
<tr>
<td>8567081</td>
<td>1.1</td>
</tr>
<tr>
<td>8567083</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Table 3. Wild Brook Trout Habitat Patches within the Rivanna Drainage

<table>
<thead>
<tr>
<th>Subwatershed Name</th>
<th>Wild Brook Trout Habitat Patch Feature ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Fork Moormans River-Moormans River</td>
<td>8567189.0</td>
</tr>
<tr>
<td>Doyles River</td>
<td>8566567.0</td>
</tr>
<tr>
<td>Lynch River-North Fork Rivanna River</td>
<td>8566447.0</td>
</tr>
<tr>
<td>Swift Run</td>
<td>8567083.0</td>
</tr>
</tbody>
</table>

Table 4. Road-Stream Crossing Data from Trout Streams within the Rivanna Drainage.

**Doyles River**

<table>
<thead>
<tr>
<th>Name of Road</th>
<th>Structure ID</th>
<th>Crossing ID</th>
<th>Physical Barriers to Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browns Gap Turnpike</td>
<td>---</td>
<td>377</td>
<td>(Bridge)</td>
</tr>
</tbody>
</table>

**Lynch River-North Fork Rivanna River**

<table>
<thead>
<tr>
<th>Name of Road</th>
<th>Structure ID</th>
<th>Crossing ID</th>
<th>Physical Barriers to Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Home Road</td>
<td>365</td>
<td>364</td>
<td>Moderate</td>
</tr>
<tr>
<td>Simmons Gap Road</td>
<td>367</td>
<td>366</td>
<td>None</td>
</tr>
<tr>
<td>Broken Back Mountain Road</td>
<td>369</td>
<td>368</td>
<td>None</td>
</tr>
<tr>
<td>Simmons Gap Road</td>
<td>371</td>
<td>370</td>
<td>None</td>
</tr>
</tbody>
</table>
**Swift Run**

<table>
<thead>
<tr>
<th>Name of Road</th>
<th>Structure ID</th>
<th>Crossing ID</th>
<th>Physical Barriers to Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Horseshoe Road</td>
<td>313</td>
<td>312</td>
<td>None</td>
</tr>
<tr>
<td>Goose Pond Road</td>
<td>315</td>
<td>314</td>
<td>None</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>341</td>
<td>340</td>
<td>None</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>339</td>
<td>335</td>
<td>None</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>334</td>
<td>331</td>
<td>Moderate</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>330</td>
<td>326</td>
<td>None</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>325</td>
<td>324</td>
<td>None</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>323</td>
<td>322</td>
<td>Moderate</td>
</tr>
<tr>
<td>Mutton Hollow Road</td>
<td>321</td>
<td>320</td>
<td>Minor</td>
</tr>
</tbody>
</table>

Table 5: NAACC Prioritization Results for Road-Stream Crossing Surveys in Four HUC12s within the Rivanna Drainage.

<table>
<thead>
<tr>
<th>HUC12 Name</th>
<th>Result Priority*</th>
<th>Brook Trout: EBTJV - Categorical Area Weighted Avg.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Fork Moormans River- Moormans River</td>
<td>Tier 5</td>
<td>2.19</td>
</tr>
<tr>
<td>Doyles River</td>
<td>Tier 6</td>
<td>2.24</td>
</tr>
<tr>
<td>Lynch River-North Fork Rivanna River</td>
<td>Tier 6</td>
<td>1.62</td>
</tr>
<tr>
<td>Swift Run</td>
<td>Tier 19</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Tier 1 = Highest Priority, Tier 20 = Lowest Priority  
**4 = highest priority, 0 = lowest priority
Appendix I: Listing of Road-Stream Crossings in Four Wild Brook Trout Patches within the Rivanna Drainage.

**North Fork Moormans River**

<table>
<thead>
<tr>
<th>Road</th>
<th># of Crossings</th>
<th>NAACC Crossing Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sky Line Drive</td>
<td>1</td>
<td>xy3820960078746924</td>
</tr>
<tr>
<td>Black Rock Gap Road</td>
<td>11</td>
<td>xy3820519878749243</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3819478678733424</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3818770978737062</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3818627178738046</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3818374878738762</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3817873578741106</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3816563978745144</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3815681878748647</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3814970478748681</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3814800778748602</td>
</tr>
<tr>
<td>Sugar Hollow Road</td>
<td>1</td>
<td>xy3812927978723996</td>
</tr>
</tbody>
</table>

**Doyles River and Tributaries**

<table>
<thead>
<tr>
<th>Road</th>
<th># of Crossings</th>
<th>NAACC Crossing Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters Lane</td>
<td>1</td>
<td>xy3821240278679125</td>
</tr>
<tr>
<td>Browns Gap Turnpike</td>
<td>7</td>
<td>xy3820781078674145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3819818078670755</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3817188878675105</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3816144078673538</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3815491378670012</td>
</tr>
<tr>
<td>Road Name</td>
<td>Number</td>
<td>ID</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------</td>
<td>---------------</td>
</tr>
<tr>
<td>Blackwells Hollow Road</td>
<td>2</td>
<td>xy3814728278668474</td>
</tr>
<tr>
<td>xy3813843078663925</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unnamed Road #1</td>
<td>1</td>
<td>xy3819910478671499</td>
</tr>
<tr>
<td>Unnamed Road #2</td>
<td>2</td>
<td>xy3819759778666608</td>
</tr>
<tr>
<td>xy3819667478669796</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unnamed Road #3</td>
<td>1</td>
<td>xy3819187978667708</td>
</tr>
<tr>
<td>Doyles River Crossing</td>
<td>1</td>
<td>xy3819157178667559</td>
</tr>
<tr>
<td>Doyles Side Lane</td>
<td>1</td>
<td>xy3819034378667213</td>
</tr>
<tr>
<td>Unnamed Road #5</td>
<td>1</td>
<td>xy3818154878670155</td>
</tr>
<tr>
<td>Steppe Howard Lane</td>
<td>1</td>
<td>xy3818019778670645</td>
</tr>
<tr>
<td>Unnamed Road #6</td>
<td>1</td>
<td>xy3817599578672248</td>
</tr>
<tr>
<td>Batten Road</td>
<td>2</td>
<td>xy3819069578689381</td>
</tr>
<tr>
<td>Fox Mountain Road</td>
<td>1</td>
<td>xy3818678978685616</td>
</tr>
<tr>
<td>CCC Road</td>
<td>1</td>
<td>xy3816976278674357</td>
</tr>
<tr>
<td>Slam Gate Road</td>
<td>4</td>
<td>xy3816492178675795</td>
</tr>
<tr>
<td>Old Ice Pond Road</td>
<td>1</td>
<td>xy3816038478681142</td>
</tr>
<tr>
<td>Blufton Road</td>
<td>1</td>
<td>xy3815882978687679</td>
</tr>
<tr>
<td>Mt Air Farm</td>
<td>1</td>
<td>xy3816038478681142</td>
</tr>
<tr>
<td>Unnamed Road #7</td>
<td>1</td>
<td>xy3815690578685683</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3816152978682717</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3815102378666985</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3814869878667845</td>
</tr>
<tr>
<td></td>
<td></td>
<td>xy3814672178659124</td>
</tr>
<tr>
<td>Road</td>
<td># of Crossings</td>
<td>NAACC Crossing Code</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Simmons Gap Fire Road</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Unnamed Road #1</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Route 601</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Unnamed Road #2</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Mission Home Road^2</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Simmons Gap Road^3</td>
<td>3</td>
<td>No codes</td>
</tr>
<tr>
<td>Route 614</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Broken Back Mountain Road^4</td>
<td>1</td>
<td>xy3824872878583398</td>
</tr>
<tr>
<td>Boonesville Road</td>
<td>1</td>
<td>xy3824318078575185</td>
</tr>
<tr>
<td>Dyke Road</td>
<td>1</td>
<td>xy3823690878542623</td>
</tr>
<tr>
<td>Plunkett Road</td>
<td>1</td>
<td>xy3822485478520871</td>
</tr>
<tr>
<td>Whilhoit Farm Road</td>
<td>1</td>
<td>xy3821564878497024</td>
</tr>
</tbody>
</table>

^1 One road-stream crossing is a bridge.

^2 Already assessed-moderate barrier to fish movement.

^3 Two road-stream crossings have already assessed and both are not barriers to fish movement.

^4 Already assessed-not a barrier to fish movement.
### Swift Run and Tributaries

<table>
<thead>
<tr>
<th>Road</th>
<th># of Crossings</th>
<th>NAACC Crossing Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Horseshoe Road(^5)</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Goose Pond Road(^6)</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Mutton Hollow Road(^7)</td>
<td>7</td>
<td>No codes</td>
</tr>
<tr>
<td>Dyke Road</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Garth Road</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Celt Road</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Keith Road</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Amicus Road</td>
<td>1</td>
<td>No code</td>
</tr>
<tr>
<td>Durrett Ridge Road</td>
<td>1</td>
<td>No code</td>
</tr>
</tbody>
</table>

\(^5,6\) Already assessed—not barriers to fish movement.

\(^7\) Already assessed—four road-stream crossings are not barriers to fish movement, one is a minor barrier to fish movements, and two are moderate barriers to fish movements.