Conserving the Eastern Brook Trout - Action Strategies

January 2018

Eastern Brook Trout JOINT VENTURE

Eastern Brook Trout Joint Venture

easternbrooktrout.org

A Fish Habitat Partnership

Conserving Eastern Brook Trout


Clint Ferguson

Our Brook Trout Heritage

The wild Brook Trout is an American symbol of persistence, adaptability, and the pristine wilderness that covered North America prior to European settlement. It is the only native trout that inhabits the cold, clear streams of the eastern United States, and is prized by anglers. It's truly a heritage species.

Unfortunately, detrimental land and water use practices have taken a toll on our landscape, greatly diminishing the presence of wild Brook Trout throughout its native range. Today it's estimated that only 8% of the subwatersheds (HUC 12) that historically supported wild Brook Trout in the eastern portion of the U.S. are classified as Intact (i.e. at least 50% of the catchments in a subwatershed have wild Brook Trout present). Most wild Brook Trout are relegated to headwater streams, where forest cover is still prevalent. Unable to thrive in poor water quality or degraded habitats, wild Brook Trout are excellent indicators of clean water and healthy aquatic systems. Therefore the decline of wild Brook Trout throughout its historic eastern range should serve as a warning about the state of our waters.

However, this set of circumstances is certainly not hopeless. Through a coordinated and focused effort, we have a unique opportunity to reverse the trend of wild Brook Trout decline by collaboratively restoring habitat and improving water quality that will benefit both wild Brook Trout and our well-being for generations to come.

Working Together to Bring Back Wild Brook Trout

The historic dispersal of wild Brook Trout populations in the East represents approximately 70% of the wild Brook Trout range in the U.S. and about 30% of its native range in North America. In 2004, state and federal agencies, conservation groups and academics concerned about the decline of eastern Brook Trout formed the Eastern Brook Trout Joint Venture (EBTJV), a Fish Habitat Partnership operating in accordance with the guiding principles of the National Fish Habitat Action Plans. The EBTJV provides leadership in Brook Trout conservation that is grounded by science; and, through its network of the region's top scientists and fisheries managers, the EBTJV identifies priority needs, delivers valuable decision-support tools, and promotes proven techniques for conserving wild Brook Trout populations. The EBTJV also directs funding and leverages other resources towards collaborative, mission-focused Brook Trout conservation projects.

The vision of the Eastern Brook Trout Joint Venture is to ensure healthy, fishable wild Brook Trout populations throughout their historic eastern U.S. range.

Science-Based Conservation Actions

In response to a need for guidance in setting wild Brook Trout conservation priorities, the EBTJV completed a range-wide assessment of wild Brook Trout distribution and status at the subwatershed-level (HUC 12) in 2006 (Hudy et. al. 2008). While this initial assessment provided Brook Trout resource managers, decision-makers, and the public with an essential understanding of the current "state" of wild Brook Trout in the eastern portion of its U.S. range, many EBTJV partners felt that an assessment at a finer scale would yield better assistance by establishing a more workable set of wild Brook Trout conservation strategies. Therefore, the EBTJV conducted a second range-wide assessment of wild Brook Trout at the catchment scale, which was completed in 2015 (Hudy et. al. 2013; Coombs and Nislow 2015).

2015 Catchment Assessment Findings

There were 271,949 catchments assessed within the EBTJV geographic boundary, which had a combined area totaling 628,530 km^2. Each catchment was classified based on the presence/absence of wild trout (Brook Trout, Brown Trout, and Rainbow Trout). Twenty-two percent (22%) of the assessed catchments contained wild Brook Trout. Among the 61,148 catchments that had wild Brook Trout present, 67% were classified as allopatric Brook Trout (1.1) (Table 1). The remaining wild Brook Trout catchments were classified as Brook Trout sympatric with Brown Trout (1.2), Brook Trout sympatric with Rainbow Trout (1.3), and Brook Trout sympatric with Brown Trout and Rainbow Trout (1.4).

Table 1. Brook Trout Catchment Metrics

Catchment Classification Code	Number of Catchments	Area (km^2) of the Catchments
1.1	41,070	128,834
1.2	13,099	37,279
1.3	1,688	5,173
1.4	5,291	14,350
Totals	61,148	185,636

The analysis of catchment data also entailed identifying wild Brook Trout patches and classifying them using the Catchment Classification protocol. A "patch" is defined as a group of contiguous catchments occupied by wild trout. Patches are not connected physically (i.e., they are separated by a dam, unoccupied warm water habitat, downstream invasive species, etc.) and are generally assumed to be genetically isolated. There were 9,860 Brook Trout patches identified range-wide, with a combined area of 190,473 km^2 (Table 2). See State Maps in the Appendix I for a visual depiction of the locations of these wild Brook Trout patches.

Table 2. Brook Trout Patch Metrics

Patch Classification Code	Number of Patches	Area (km^2) of the Patches
1.1	6,022	108,528
1.2	2,210	45,575
1.3	370	6,049
1.4	1,258	30,321
Totals	9,860	190.473

The EBTJV's Approach

Building from its wild Brook Trout assessment work, the EBTJV has developed strategies that provide the blueprint for Brook Trout conservation actions at multiple scales across the range. As we move forward, the EBTJV and our partners are using this roadmap to guide our conservation decisions at all delivery levels.

Conservation Goals

Conserve, enhance or restore wild Brook Trout populations that have been impacted by habitat modification, non-native species and other population level threats.

Encourage partnerships among management agencies and stakeholders to seek solutions to regional environmental and ecological threats.

Develop and implement outreach and educational programs to raise public awareness about the challenges that wild Brook Trout populations are facing.

Develop support for program implementation to perpetuate and restore wild Brook Trout populations throughout their historical eastern U.S. range.

Conservation Scales

Brook Trout conservation occurs at three scales, or levels:

Range-wide: Conservation goals and habitat objectives are established at this scale in an effort to guide activities at the State scale.

State: States identify focal watersheds and determine the conservation actions that will contribute best to meeting range-wide habitat objectives.

Local: Local partners implement wild Brook Trout conservation projects that are congruent with the range-wide habitat objectives and input provided by their respective State.

EBTJV's Range-Wide Habitat Goals and Objectives

The EBTJV's wild Brook Trout conservation efforts across the eastern U.S. are directed by four range-wide habitat goals, along with their associated objectives. Success in meeting these goals and objectives will require widespread cooperation and collaboration among our many partners. The progress made towards achieving these goals and objectives will be measured using the results of our partnership's 2022 wild Brook Trout assessment.

Goal: Maintain the current number of wild Brook Trout patches (i.e. no net loss).

Objective: Retain at least 6,022 allopatric wild Brook Trout patches (1.1) across the EBTJV geographic range by the year 2022.

Objective: Retain at least 3,838 sympatric wild Brook Trout patches (1.2, 1.3, and 1.4) across the EBTJV geographic range by the year 2022.

Goal: Increase the average size (km^2) of wild Brook Trout patches, which is currently 19 km^2.

Objective: Increase the size (km^2) of 30 wild Brook Trout patches by the year 2022.

Goal: Increase connectivity within and among wild Brook Trout catchments.

Objective: Complete Aquatic Organism Passage projects within 45 wild Brook Trout catchments by 2022.

Goal: Restore wild Brook Trout to catchments where they are extirpated.

Objective: Establish wild Brook Trout in 15 extirpated catchments by the year 2022.

EBTJV's Key Conservation Actions

The EBTJV has also established a number of key conservation actions. Our partnership believes these actions generate additional focus towards strategic elements needed for achieving success in conserving wild Brook Trout.

Key Conservation Actions:

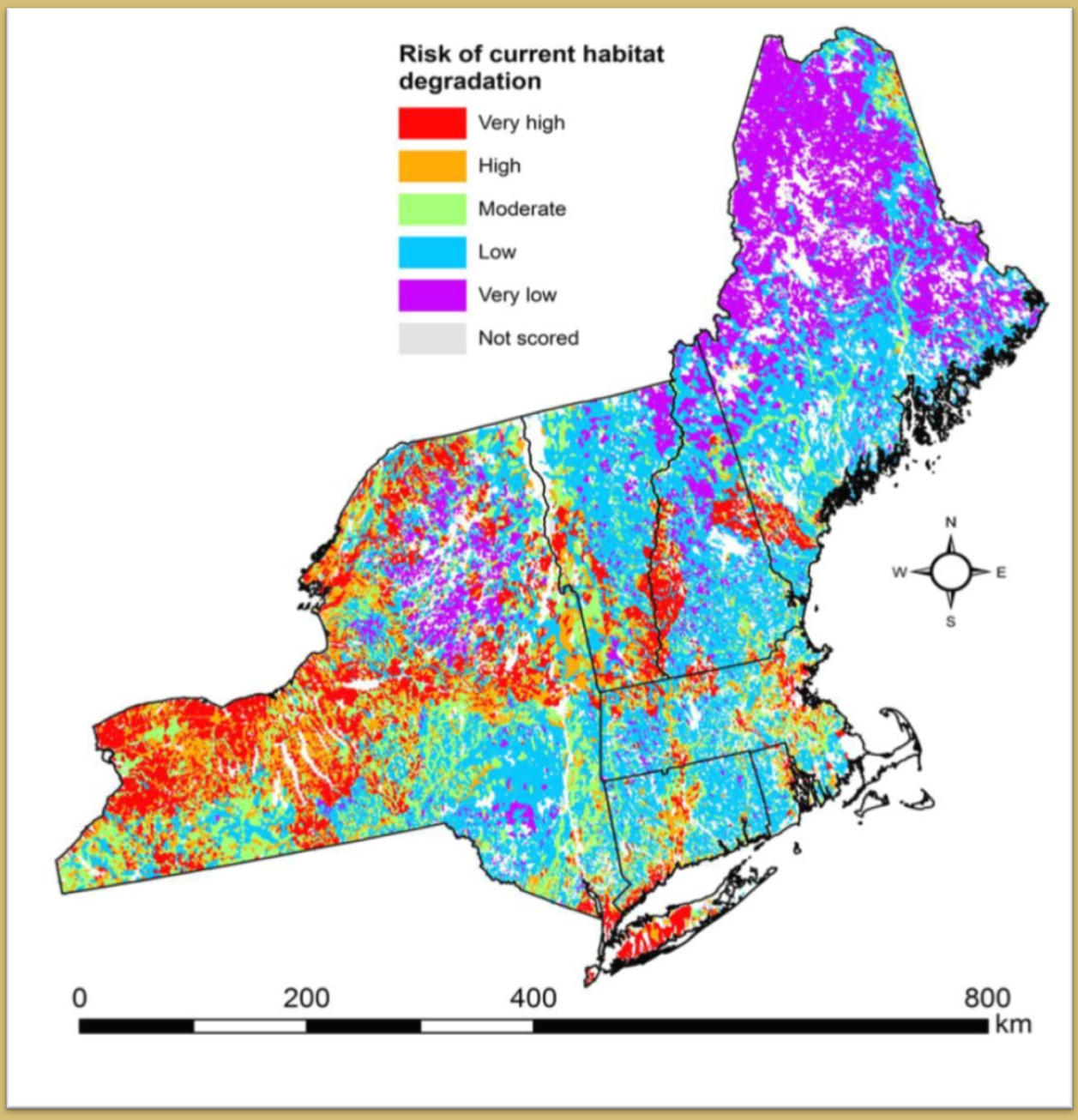
- **Increase recreational fishing opportunities for wild Brook Trout**
- **Conserve and increase habitats that support robust wild Brook Trout populations**
- **Restore and reconnect suitable habitats adjacent to robust wild Brook Trout populations**
- **Conserve genetic diversity of wild Brook Trout populations**
- **Conserve unique wild Brook Trout life history strategies (e.g., lacustrine populations, large river populations, and coastal populations)**
- **Minimize threats to wild Brook Trout populations (e.g., degraded water quality, invasive species, altered hydrologic regimes)**

Fish Habitat Risk Assessment

The National Fish Habitat Partnership's national assessment of fish habitat, Through a Fish's Eye: The Status of Fish Habitats in the United States (2015), summarizes the results of human effects on fish habitat in contiguous streams and assigns a risk of current habitat degradation for watersheds within 14 regions. The results also identify some of the major sources of habitat degradation. The following provides a synopsis of fish habitat conditions in the Northeast, Mid-Atlantic, and Southeast Atlantic regions of the U.S., as well as within the EBTJV's geographic range.

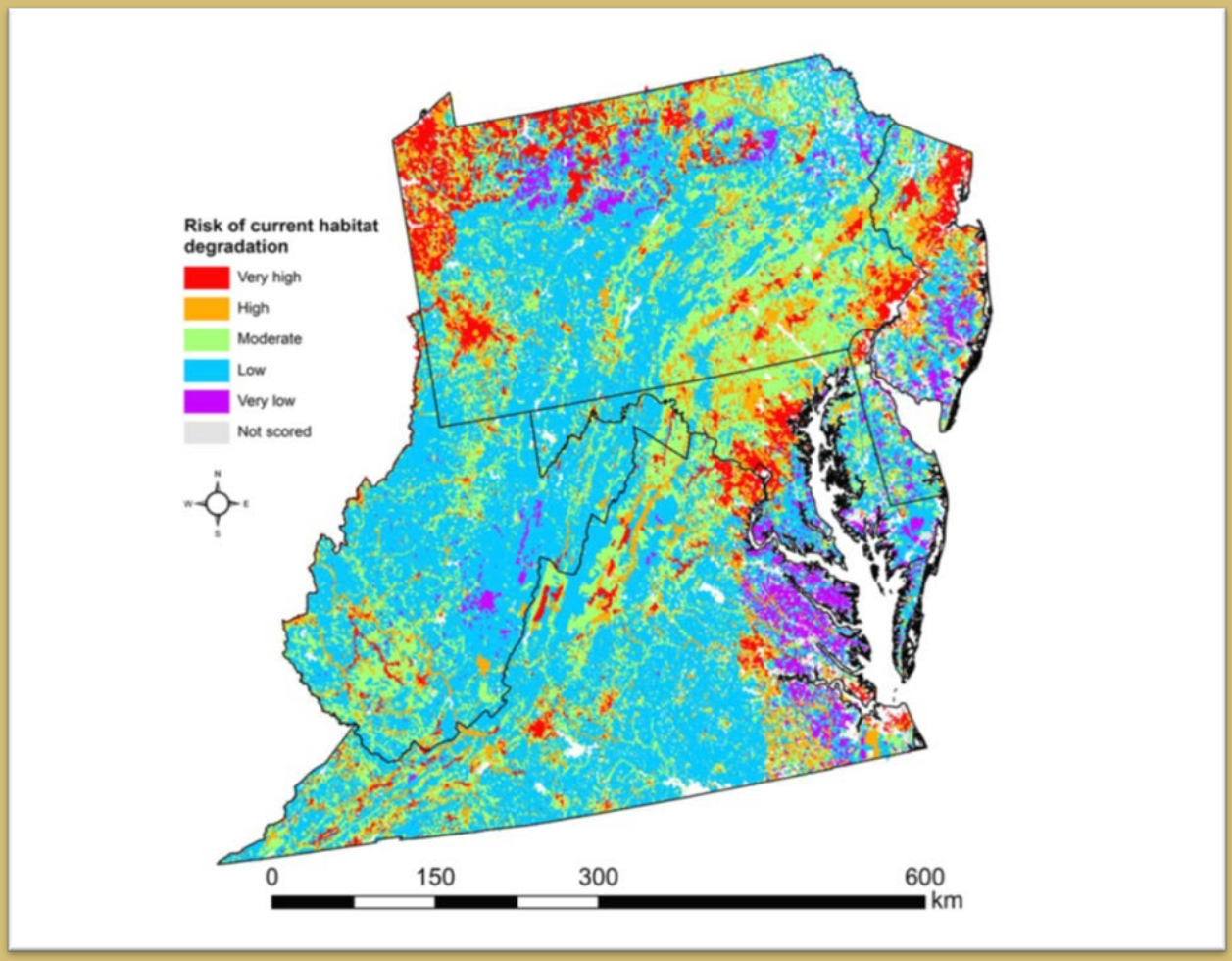
Northeast Region

In general, the northern portion of this region, such as Maine, upper Vermont and New Hampshire, and the Adirondack and Catskill Mountains in New York, are at lower risk of current degradation than the southern areas of the Northeast, where population pressures are more intense. Overall, 53 percent of the stream miles in the Northeastern States have a low or very low risk of habitat degradation. However, the Northeastern States have experienced extensive alteration and loss of aquatic habitats in many areas. As a result, 32 percent of the stream miles have high or very high risk of aquatic habitat degradation and the region is one of the most threatened in the conterminous United States. The most common disturbances in the region are urban and suburban development, roads, and pasture land. The disturbances that most affected scores for high risk streams were roads, suburban sprawl, pasture and agricultural land use, and urban development.



Mid-Atlantic Region

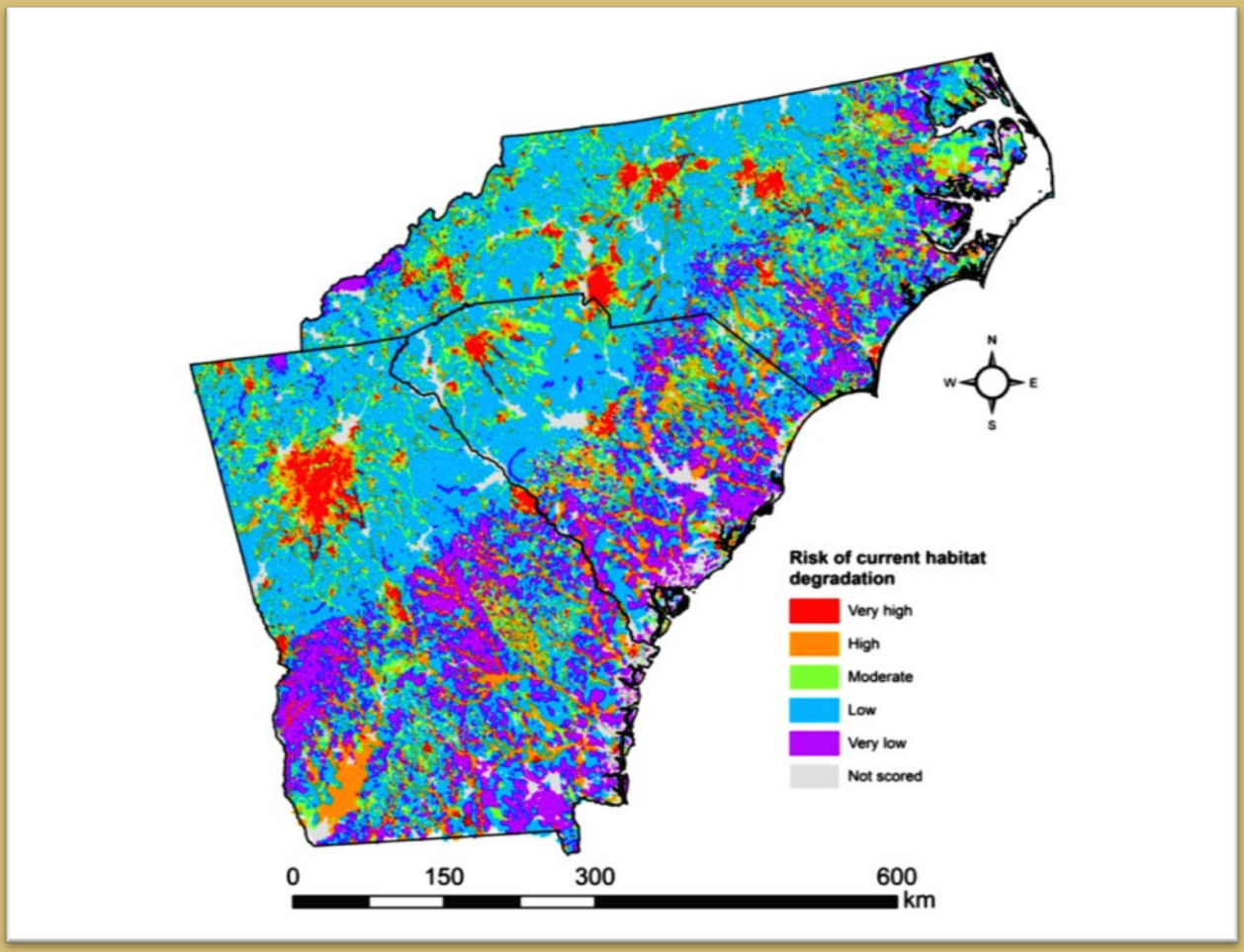
The majority of streams, particularly in the headwater reaches, in the Mid-Atlantic States have a low risk of current habitat degradation using the factors assessed, with most of these streams located in heavily-wooded West Virginia, Delmarva Peninsula, southern New Jersey, rural portions of central and eastern Virginia, and central Pennsylvania. Overall, 55 percent of the rivers and streams in the mid-Atlantic fall into the low and very low categories of risk of habitat degradation from the factors assessed. However, an examination of water flow patterns (hydrology) was not included, thus some of the areas scored as low risk may in fact be at higher risk. The most common disturbances in this region are associated with development and dams, whereas urban sprawl, agriculture, and roads were the most severe disturbances in the streams and rivers with high or very high scores. Higher degradation scores were often found in the lower parts of stream and river systems. Many streams in the western part of this region (Pennsylvania, West Virginia and Virginia) are degraded by acidic runoff and excessive sedimentation from current and legacy mining activities, particularly coal mining.



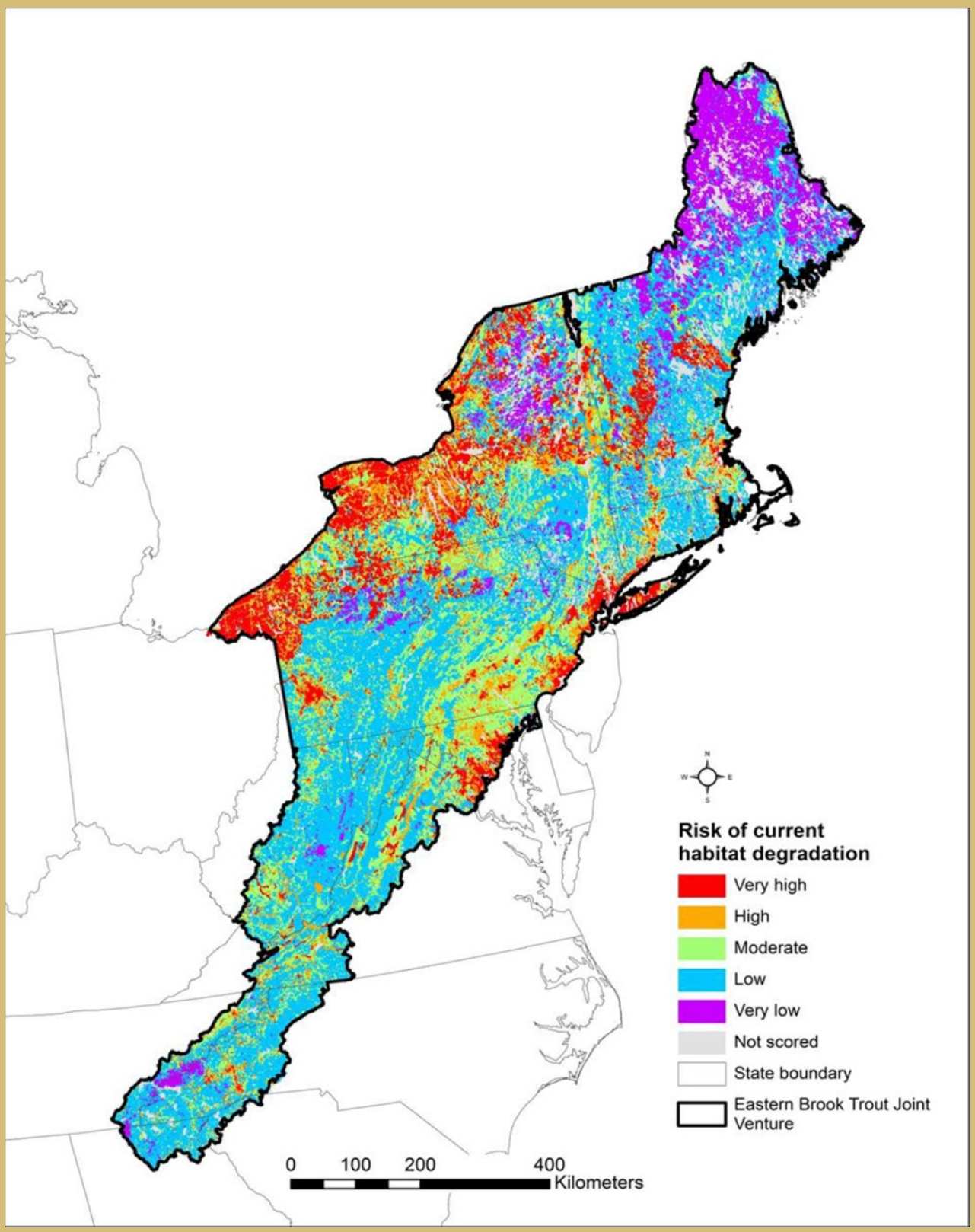
Southeast Atlantic Region

The habitats of the Southeast Atlantic states range from the mountains and uplands in the Blue Ridge and Piedmont areas in the western portion of this region to the Southeastern and Coastal Plains. Fish habitats in the higher elevation regions are typically fast-moving, clear, coldwater streams originating from seeps and springs. There are a large number of dams on waterways of the Southeast

Atlantic states. The mountains of North Carolina and most of the coastal plain of all three states have a low risk of habitat degradation. Based on the factors evaluated in this assessment, 67% of the inland stream area in the region was estimated to be at low to very low risk of current habitat degradation. On the other hand, 18 percent was predicted to be at high or very high risk of current habitat degradation. The threats to the regional aquatic habitats were generally from urban expansion, dams and water control structures, and agriculture. The key disturbances of streams classified with high or very high risk in the assessment of this region were urban land use, dams, crop land use, and impervious surface cover.



EBTJV Geographic Range



Decision Support Tools

The EBTJV believes the following suite of decision support tools provide the means for identifying priority focal areas for implementing on-the-ground actions that will produce the best wild Brook Trout conservation outcomes. Consequently, we strongly urge our partners to take full advantage of these tools to assist with your planning efforts.

Eastern Brook Trout Joint Venture Data & Tools: This interactive GIS map features data layers (Brook Trout status and habitat patches) and tools (riparian prioritization, drainage area calculator) developed and endorsed by the EBTJV.

Eastern Brook Trout Conservation Portfolio, Range-wide Assessment and Focal Area Tools: Trout Unlimited developed three conservation planning products to help identify strategic conservation opportunities and evaluate potential projects within the range of Eastern Brook Trout (EBT) in the eastern U.S. Each product gathers and interprets spatial data related to the pattern of EBT populations, their habitats, and threats to those habitats. The basic unit of analysis and summary for all three products is the Eastern Brook Trout Joint Venture's EBT population patch.

Fish Habitat Decision Support Tool: This tool was created to provide resource managers and the general public with access to the extensive spatial data and results produced from multiple fish habitat assessments. Three main analytical tools (visualization, ranking, and futuring) are combined with intuitive base-maps and mapping features to allow users to explore the details of the assessments and perform subsequent analyses.

Interactive Catchment Explorer: The Interactive Catchment Explorer (ICE) is a dynamic visualization tool that allows users to explore catchment characteristics and environmental model predictions. ICE is intended for resource managers and researchers who want to identify spatial patterns related to ecological conditions, identify priority locations for restoration or further study, and explore complex, multivariate environmental data-sets and model results.

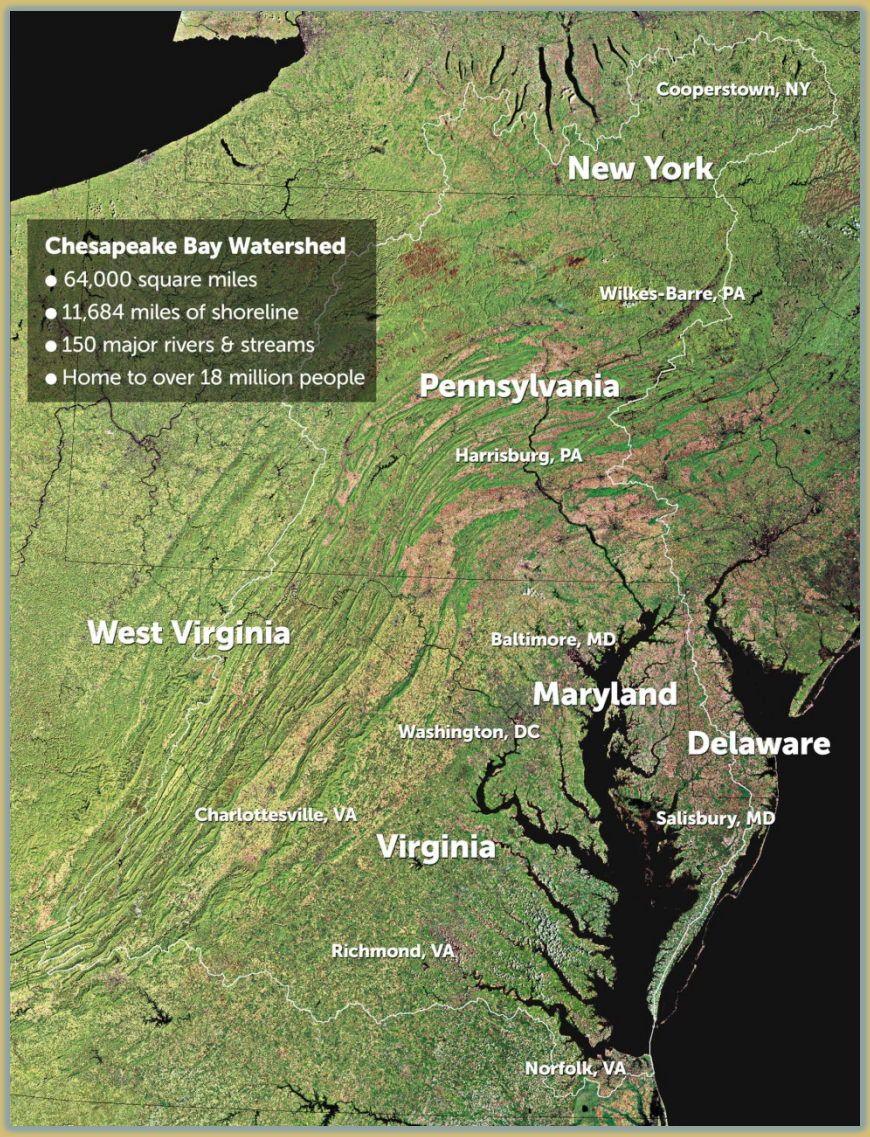
Riparian Restoration Decision Support Tool: This innovative riparian planting and restoration decision support tool allows managers and decision-makers to rapidly identify and prioritize areas along the banks of rivers, streams, and lakes for riparian restoration, making these ecosystems more resilient to disturbance and future changes in climate.

North Atlantic Aquatic Connectivity Collaborative: The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a network of individuals from universities, conservation organizations, and state and federal natural resource and transportation departments focused on improving aquatic connectivity across a thirteen-state region, from Maine to West Virginia. The NAACC has developed common protocols and training for assessing road-stream crossings (culverts and bridges) and developed a regional database for this field data. The information collected is then used to identify high priority bridges and culverts for upgrade and replacement. The tool supports planning and decision-making by providing information about where restoration projects are likely to bring the greatest improvements in aquatic connectivity and has a subwatershed prioritization map to help focus survey efforts in the project area, as well as a customizable prioritization component for use with ArcGIS Desktop. NAACC partners have also compiled resources, tools, and best practices from organizations around the country covering a wide range of topics related to addressing aquatic connectivity.

Collaborative Conservation

The EBTJV is firmly committed to facilitating collaborative approaches to conserving healthy coldwater aquatic resources and fishable wild Brook Trout populations. We meet this commitment by integrating priority Brook Trout conservation needs within other conservation groups and organizations.

The Chesapeake Bay Program is a primary example of this type of integrated collaboration. Members of the EBTJV assisted the Chesapeake Bay Program with developing a Brook Trout Management Strategy that describes how the Brook Trout Outcome contained within the 2014 Chesapeake Bay Watershed Agreement will be achieved by 2025. The priority conservation strategies in the Chesapeake Bay Brook Trout Management Strategy closely align with the EBTJV's Key Conservation Actions. Eastern Brook Trout Joint Venture State partners (PA, MD, NY, VA, WV) also participate on the Chesapeake Bay Program's Brook Trout Action Team, where they assist in developing and implementing annual work plans aimed at ensuring progress is being made towards accomplishing the Brook Trout Outcome in the Chesapeake Bay watershed.



Chesapeake Bay Program

Call to Action for Brook Trout Conservation:

The EBTJV is successful when people, organizations, businesses, foundations, and scientists work together to conserve and restore wild Brook Trout. By doing so, we promote healthy streams, lands, wildlife and people.

The individual's role:

Be the eyes and ears: Be observant of streams and changes. Sometimes these changes can be subtle, like changes in color. Sometimes they can be overt like channelization, damming and poor land management. Contact your state fish and wildlife agency when you see something that doesn't look right.

Get involved in land use decisions: Planning boards, conservation districts, townships, counties and most public land management agencies ask for public input. Be there and ask the question "How does this affect wild Brook Trout?" Conserve this iconic fish by supporting efforts to improve their habitat.

Educate yourself: The **EBTJV website** contains lots of practical, usable information about wild Brook Trout conservation. Educate yourself, and then use your education to inform, influence and instill responsible stewardship principles into decisions that affect wild Brook Trout and its habitat.

Volunteer to do wild Brook Trout conservation work: Get involved with stream monitoring, restoration activities, watershed planning or other conservation efforts.

The angler/conservation organization's role:

Support wild Brook Trout: Wild Brook Trout are a notable keystone species because their presence indicates other conservation needs are being met.

Join the Eastern Brook Trout Joint Venture: The structure of the EBTJV is designed to allow organizations to participate at the most appropriate level -- from range-wide to project level. Find the niche that best fits your organization.

Become familiar with the EBTJV's Roadmap to Restoration: Many organizations share the same types of conservation goals as those the EBTJV has developed for wild Brook Trout. Our partnership welcomes the opportunity to collaborate with your organization.

The watershed association's role:

Determine if your watershed is within the historic eastern U.S. range of wild Brook Trout: Contact your state fish and wildlife agency to determine if wild Brook Trout are present, or historically were present, within the boundaries of your watershed. If so, then let's collaborate in a joint effort to address the conservation needs of your watershed.

Review the EBTJV's conservation and habitat goals contained within our Action Strategies: There may be common interests between your watershed goals and the goals of the EBTJV. In fact, your watershed project could be eligible to receive funding and resources from the EBTJV or its partners. Work with your state agencies and take advantage of the resources they can provide.


Joe Webb

Raise awareness among your membership: Your members serve as watershed stewards. The conditions that support wild Brook Trout are directly tied to the health of your watershed.

The business' role:

Implement wild Brook Trout friendly policies: Adopting policies that are aimed at enhancing water quality can make an enormous contribution to the success of conserving wild Brook Trout. Depending on your activity, conscientious business planning can substantially minimize impacts and improve wild Brook Trout habitat.

Contribute your expertise or resources: Businesses have many valuable assets and specialties that could support wild Brook Trout conservation. From public relations talent to equipment rental to conservation easements to corporate volunteer programs, business contributions are highly valued by the EBTJV.

Donate matching funds: Many grant programs require applicants to provide non-federal matching funds. Business donations can be used to generate up to $3 for every $1 contributed when utilized for wild Brook Trout conservation projects. Please consider donating to the EBTJV and its cause. Since the EBTJV is a non-profit organization, your donation is tax deductible.

The EBTJV welcomes all individuals, organizations, associations and businesses to join the cause to provide healthy, fishable wild Brook Trout populations throughout their eastern range.


Philip Smith

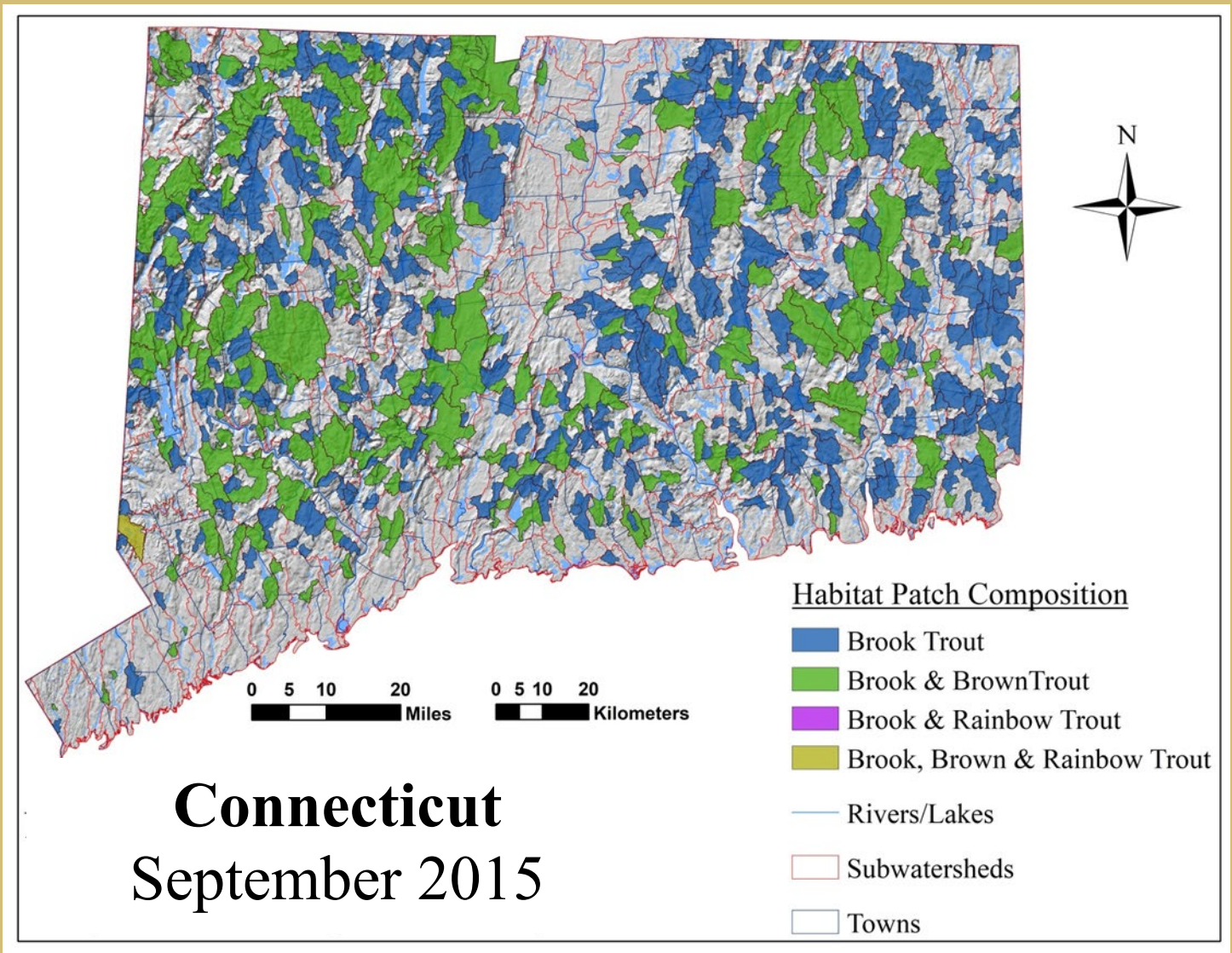
Some Final Words on Funding:

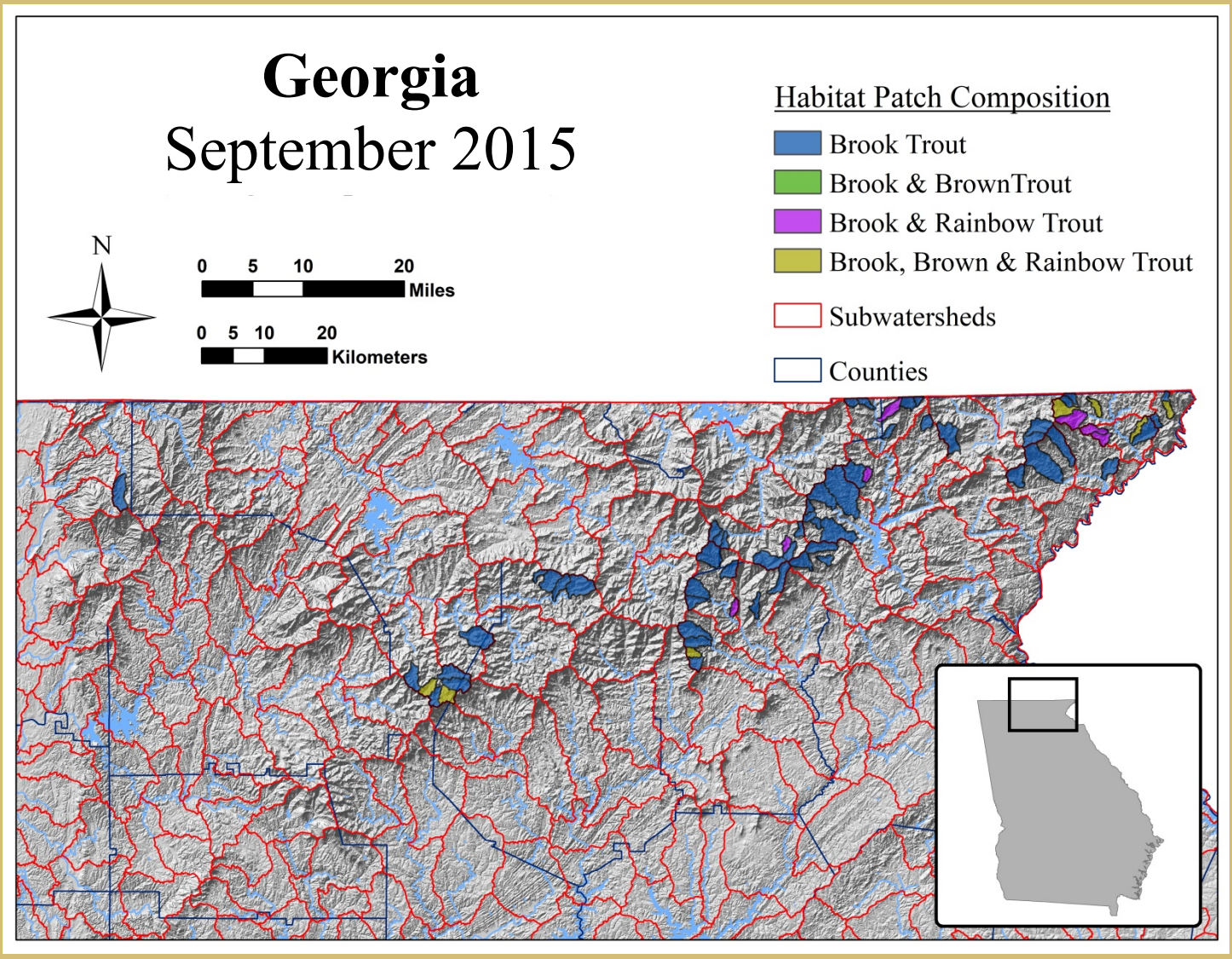
The Eastern Brook Trout Joint Venture is constantly seeking to bring new funding support to priority wild Brook Trout conservation projects. We are fortunate that our partnership has already benefited from funding provided by our state agency partners; Multistate Conservation Grant Program and National Fish and Wildlife Foundation grants; project funding from several federal agencies and other partners; and, numerous contributions from a diversity of local organizations. However, there is a need to generate additional funding if we are to be successful in achieving our vision and so we need your help. You can make a huge difference in the effort to conserve wild Brook Trout by making a tax-deductible donation that will assist the EBTJV and its partners in making strong, steady progress in saving healthy coldwater aquatic resources and sustaining fishable wild Brook Trout populations. **So please, Donate Now; we need and greatly appreciate your support!**

In summary, the success of the EBTJV is built on tactical alliances and investments. By bringing partners together to collaboratively develop and implement strategic wild Brook Trout conservation priorities, we attain more viable results.


Steve Brown

Appendix I. State Maps of Brook Trout Patch Distribution




Georgia
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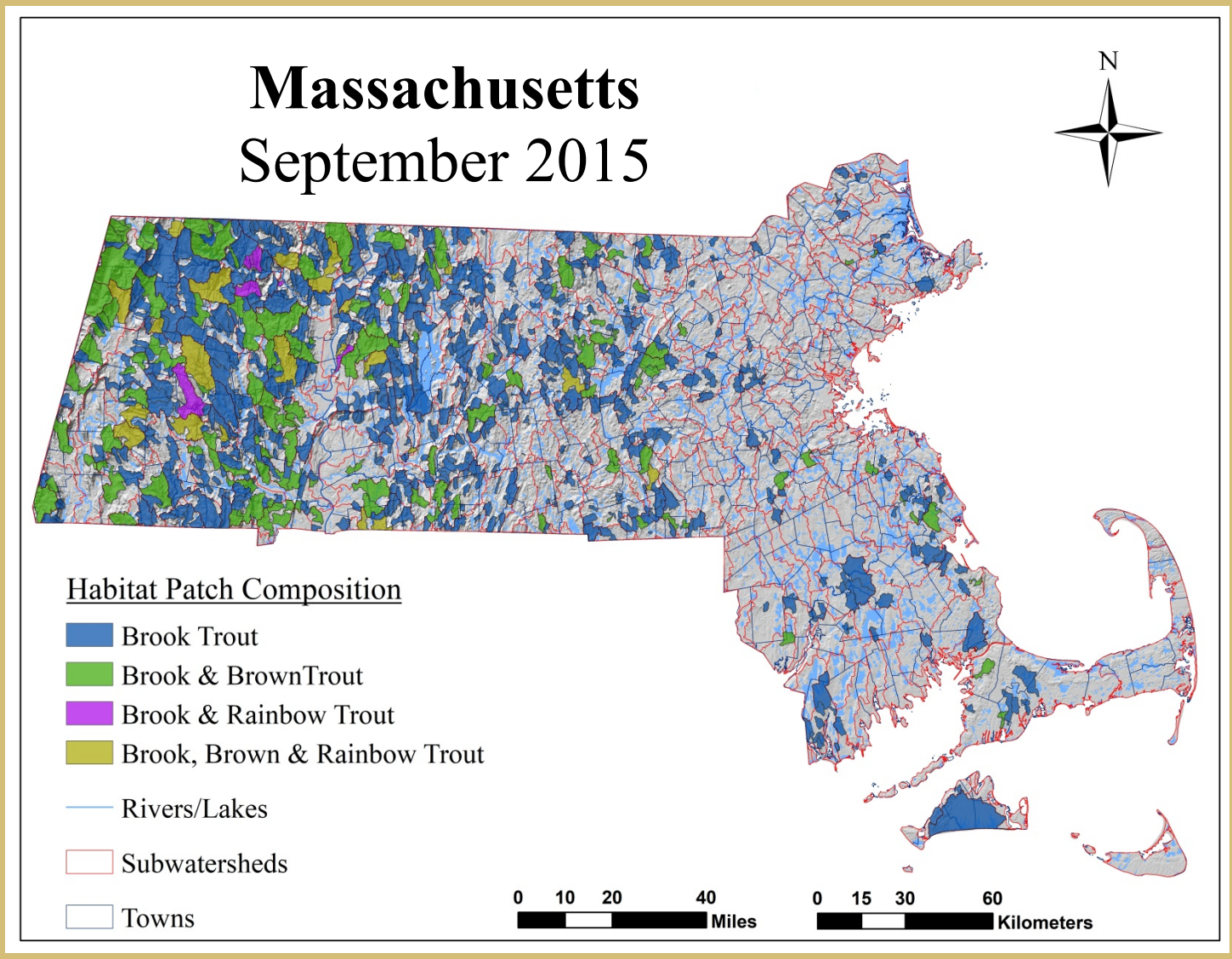
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Subwatersheds
Counties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Habitat Patch Composition
Brook Trout
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Towns
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Miles
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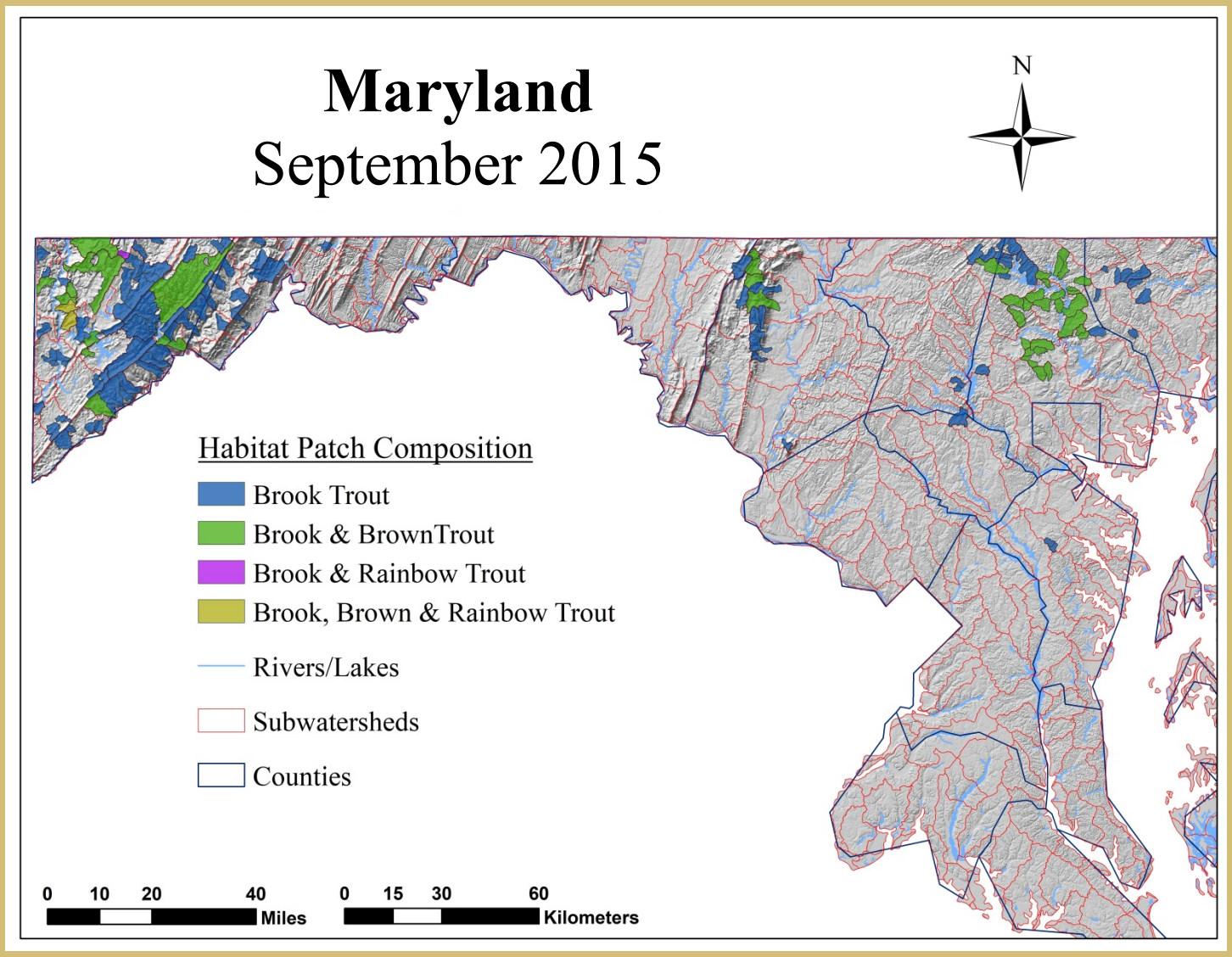
Kilometers


Maryland
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Brook & BrownTrout
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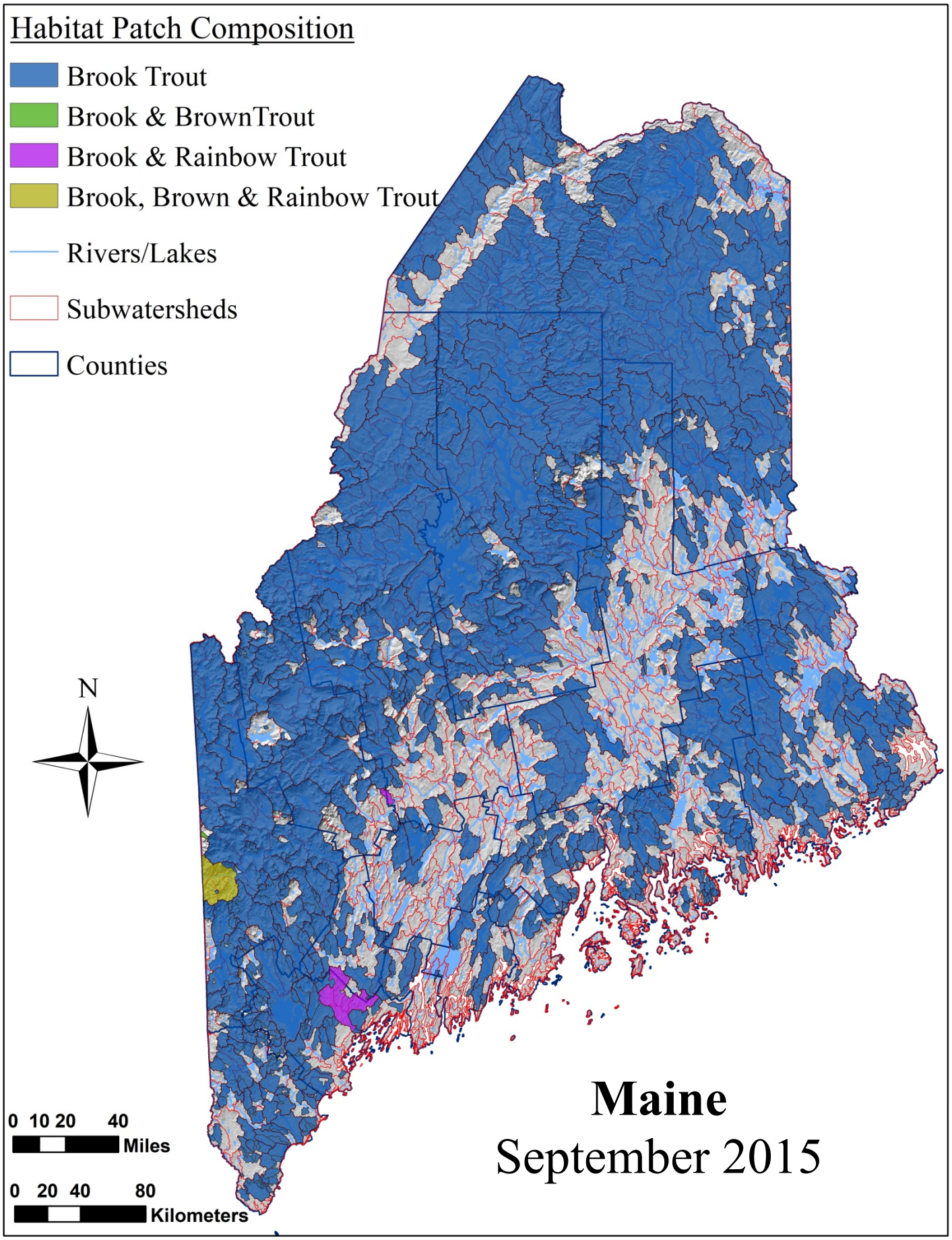
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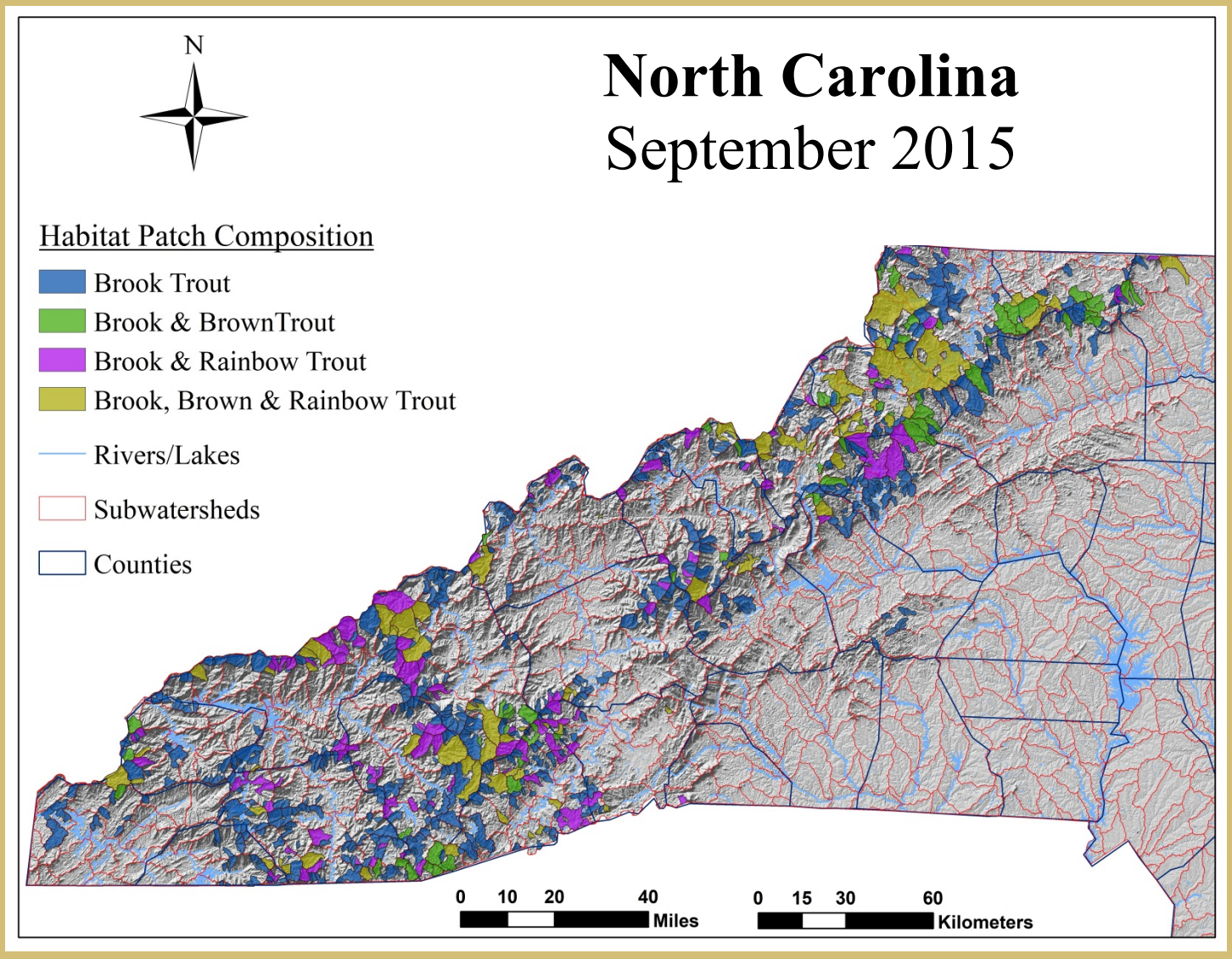
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North Carolina
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Habitat Patch Composition
Brook Trout
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Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
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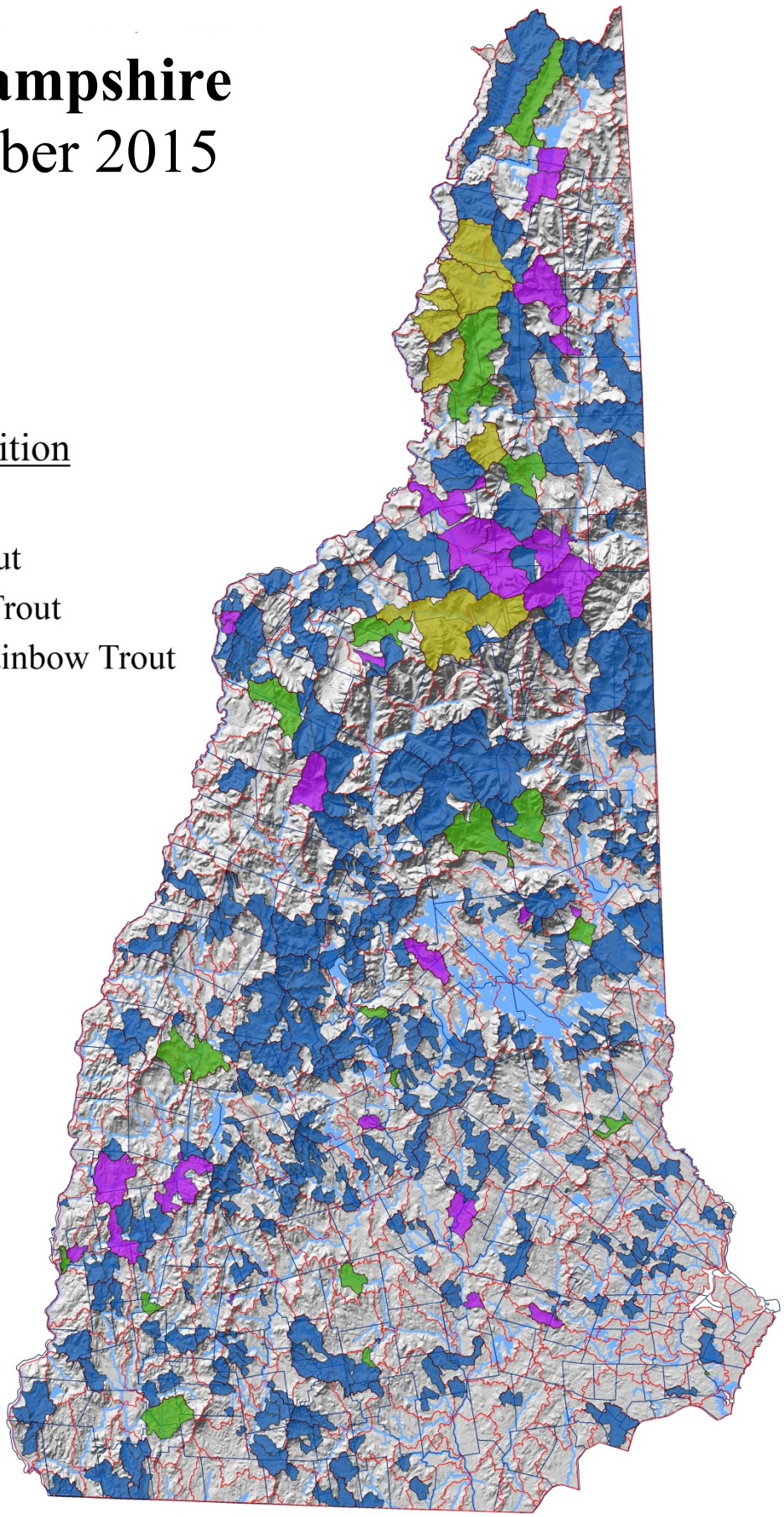
New Hampshire
September 2015



Habitat Patch Composition

- Brook Trout
- Brook & BrownTrout
- Brook & Rainbow Trout
- Brook, Brown & Rainbow Trout
- Rivers/Lakes
- Subwatersheds
- Towns

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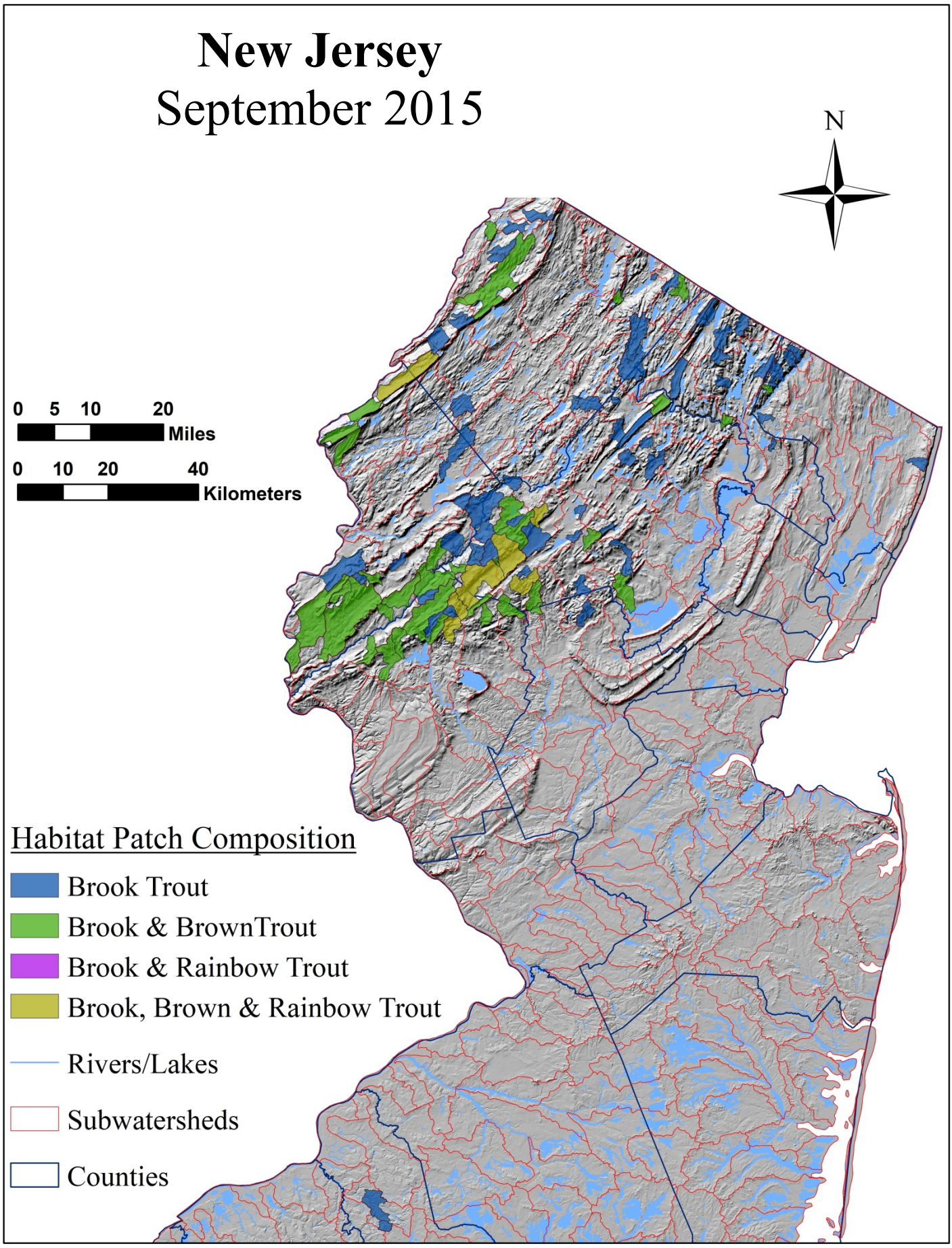
New Jersey
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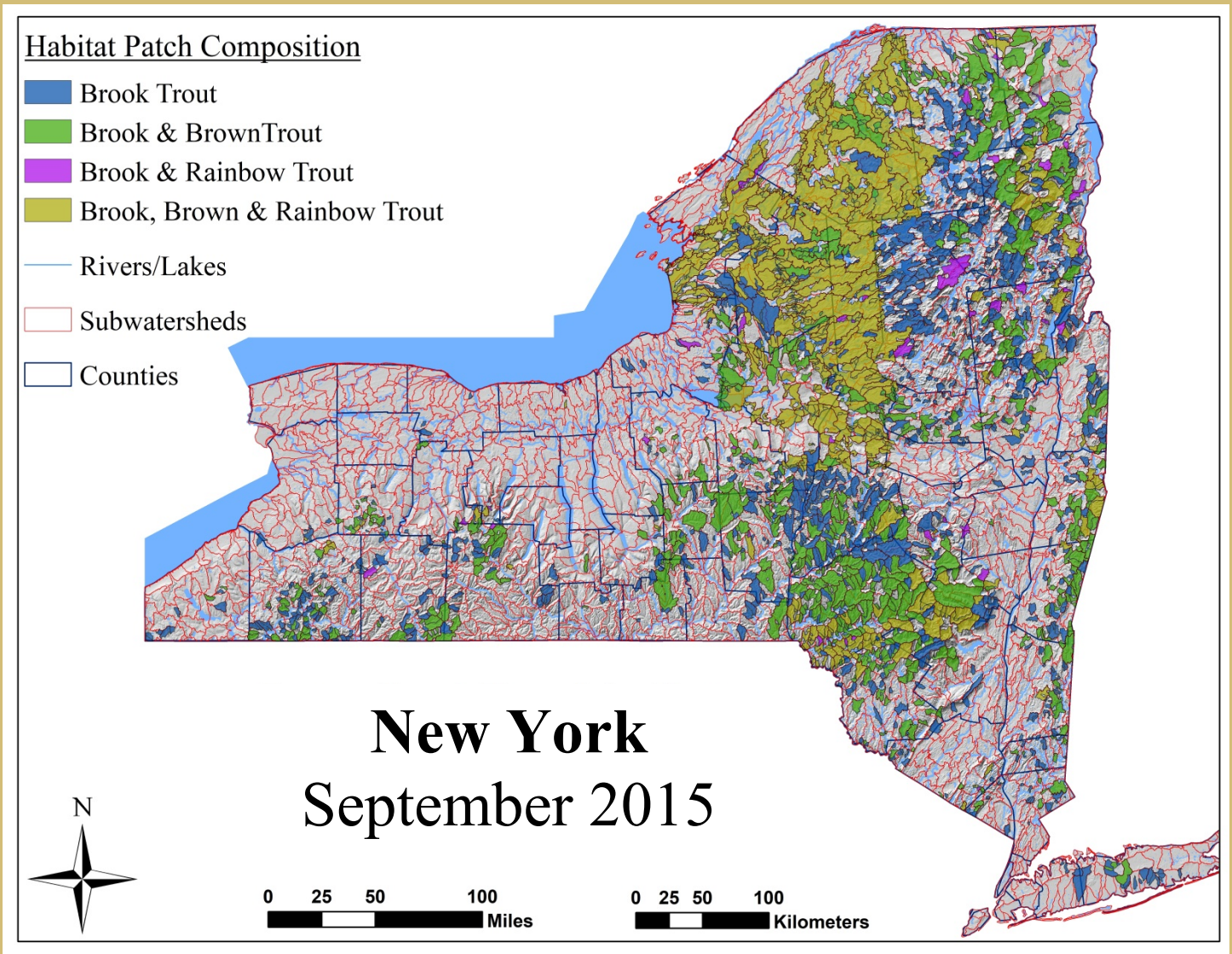
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Counties


Habitat Patch Composition
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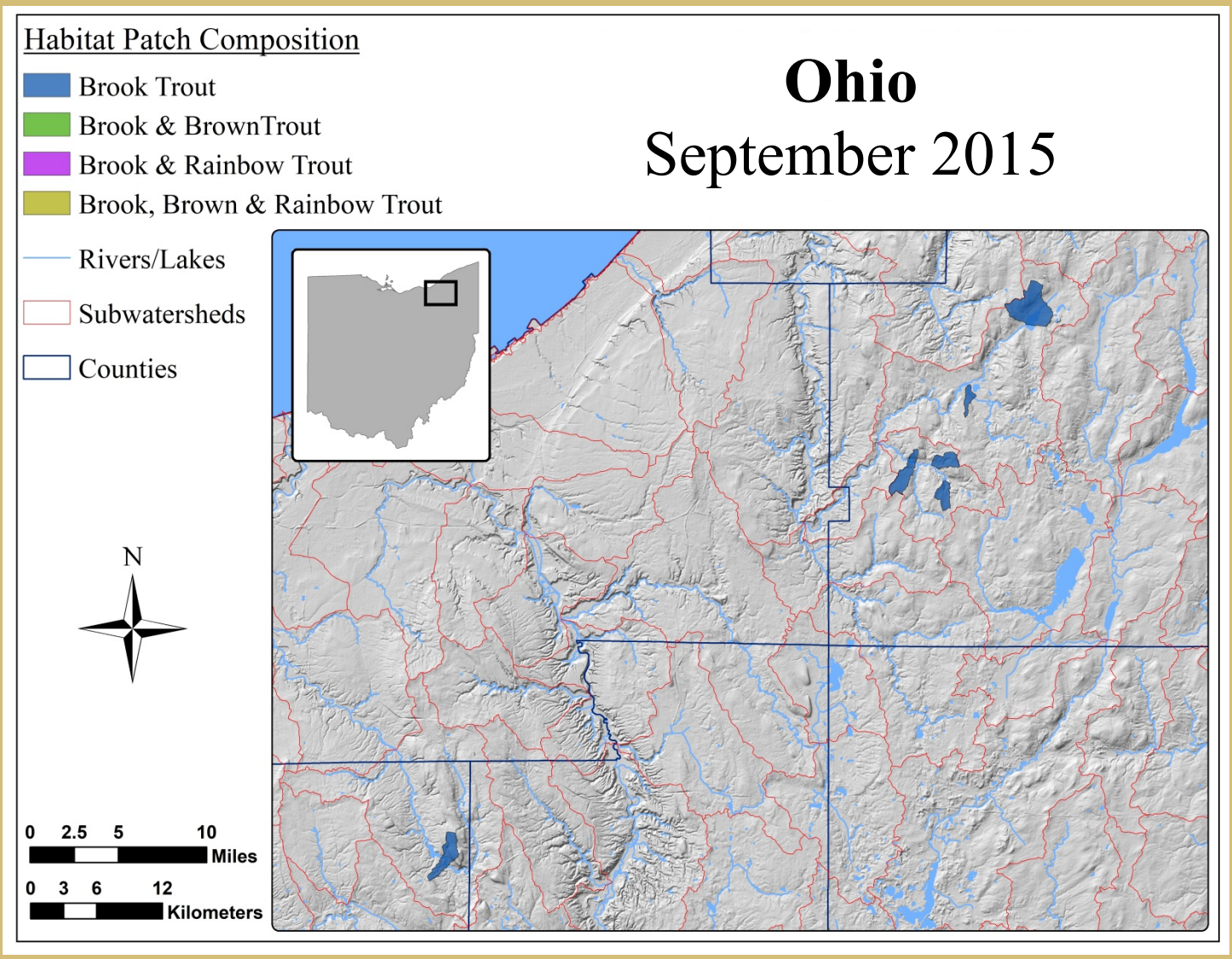
Habitat Patch Composition
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Brook, Brown & Rainbow Trout
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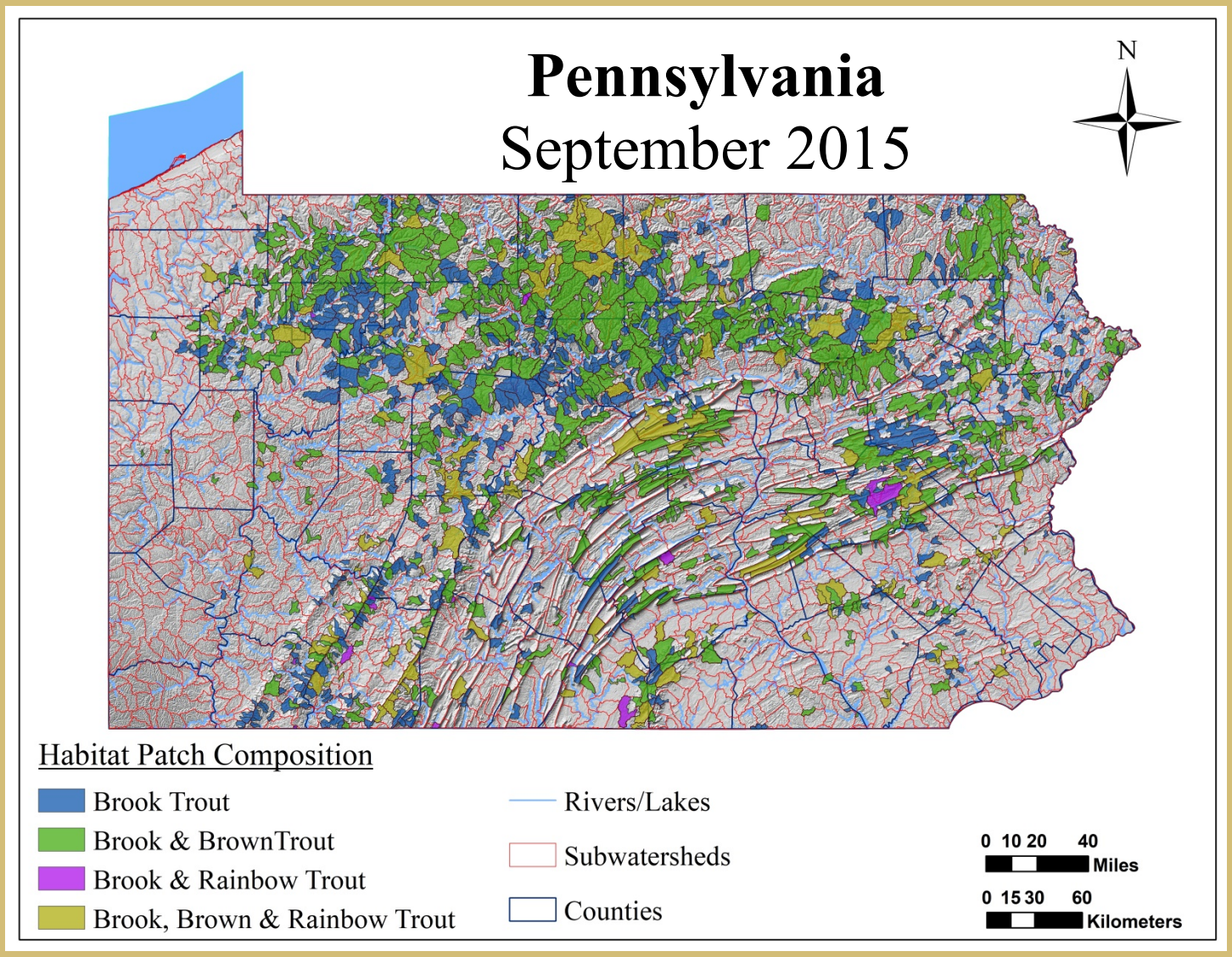
Pennsylvania
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Habitat Patch Composition
Brook Trout
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Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Counties
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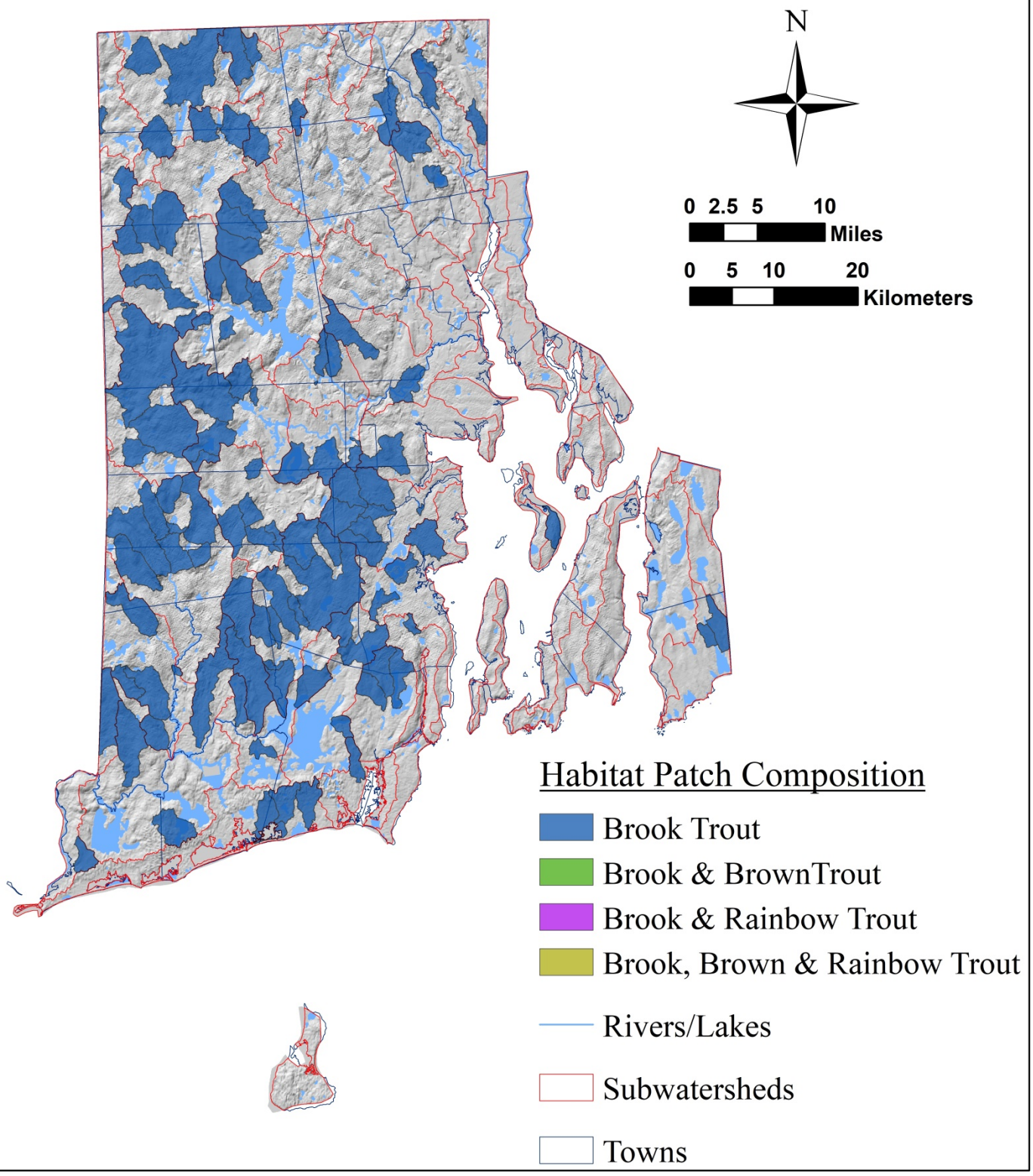
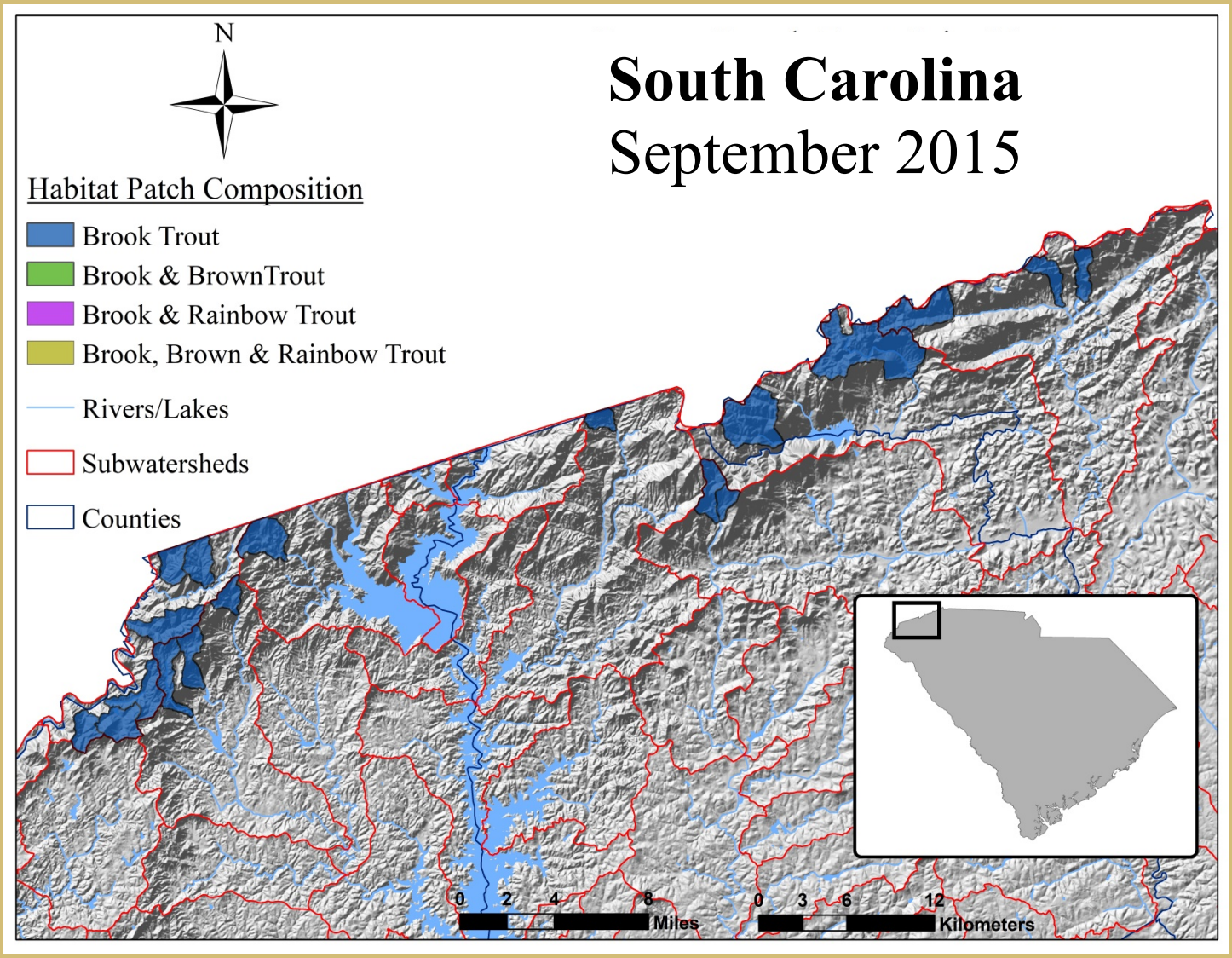
Miles
0 15 30 60
Kilometers

Rhode Island
September 2015

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South Carolina
September 2015
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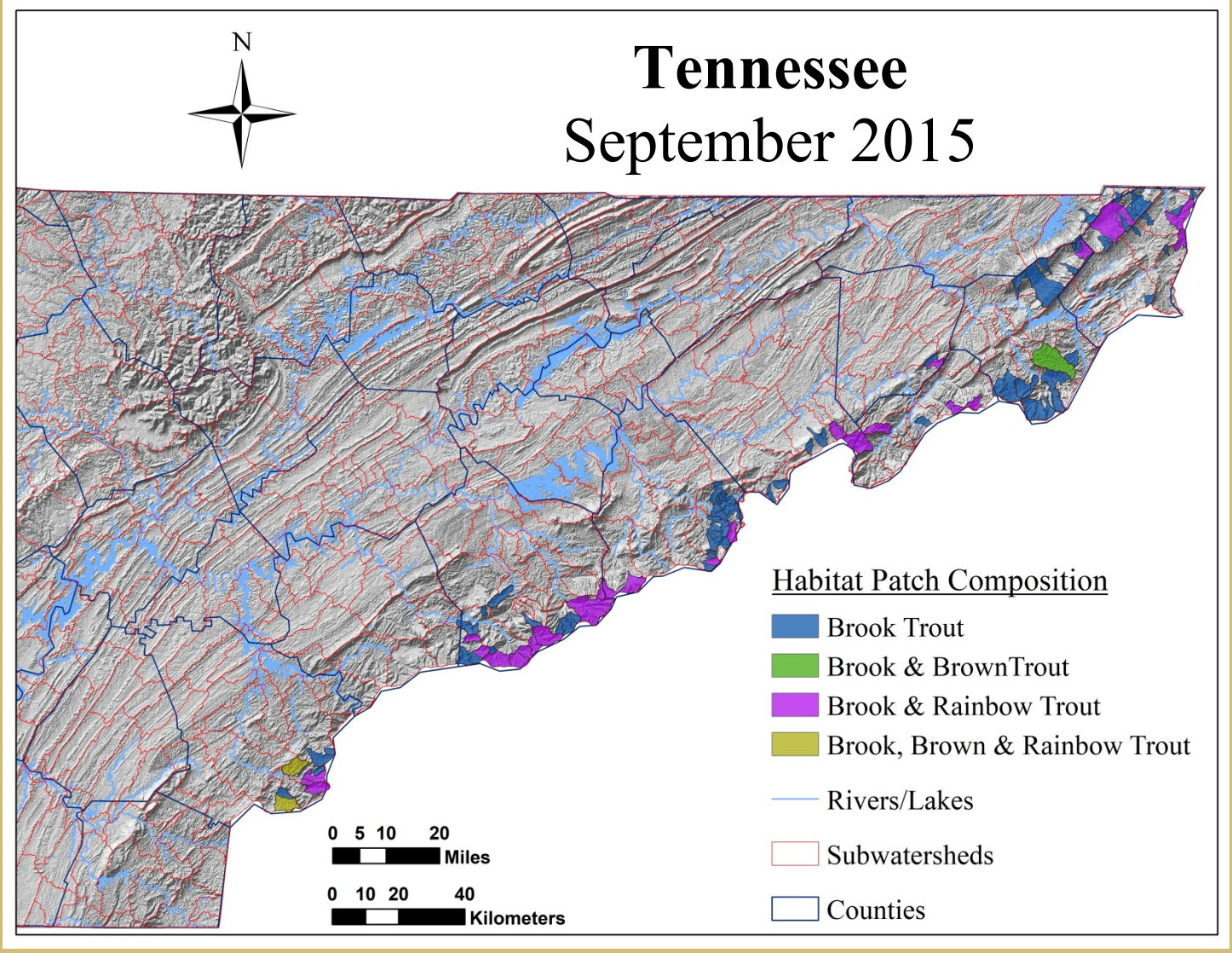
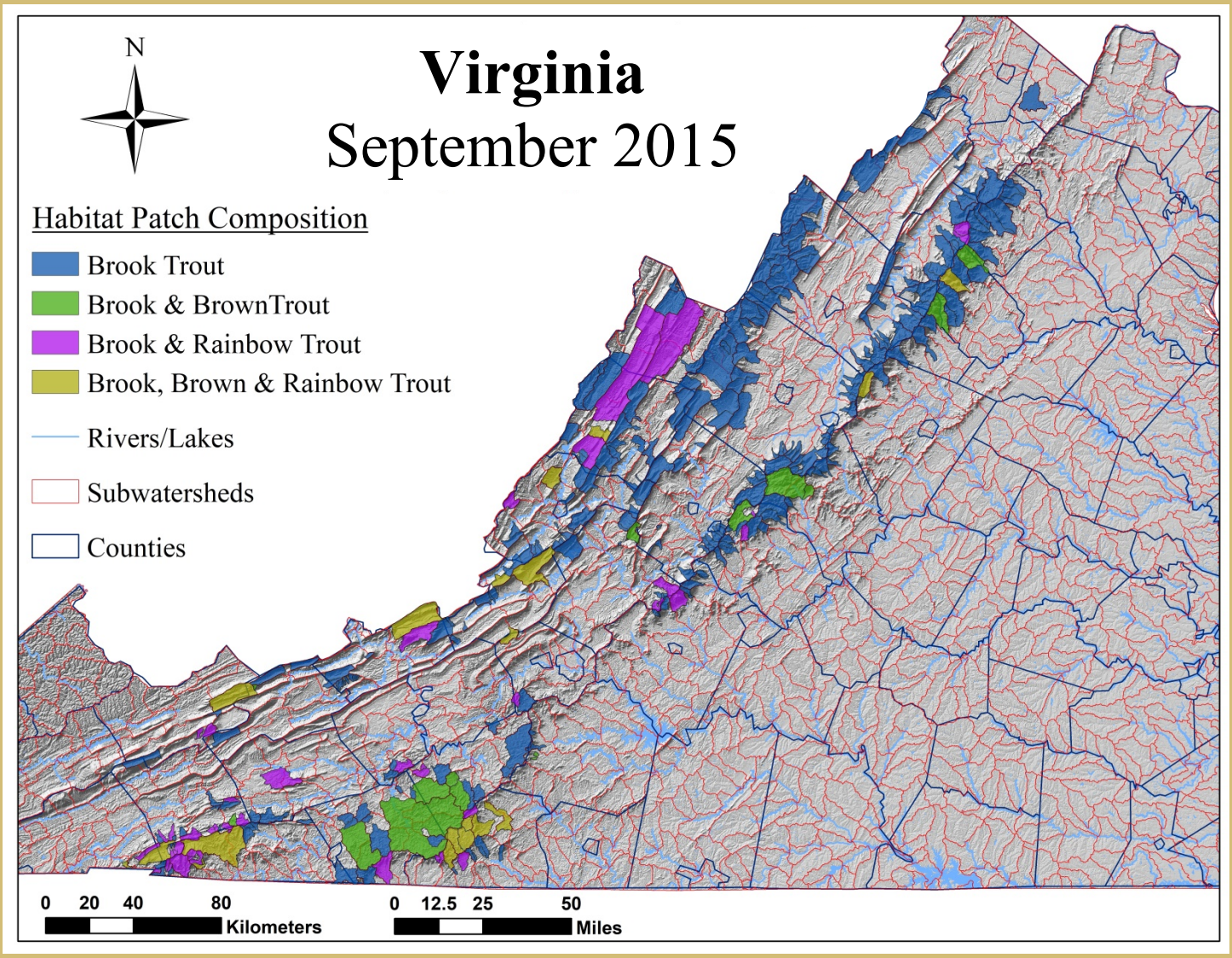
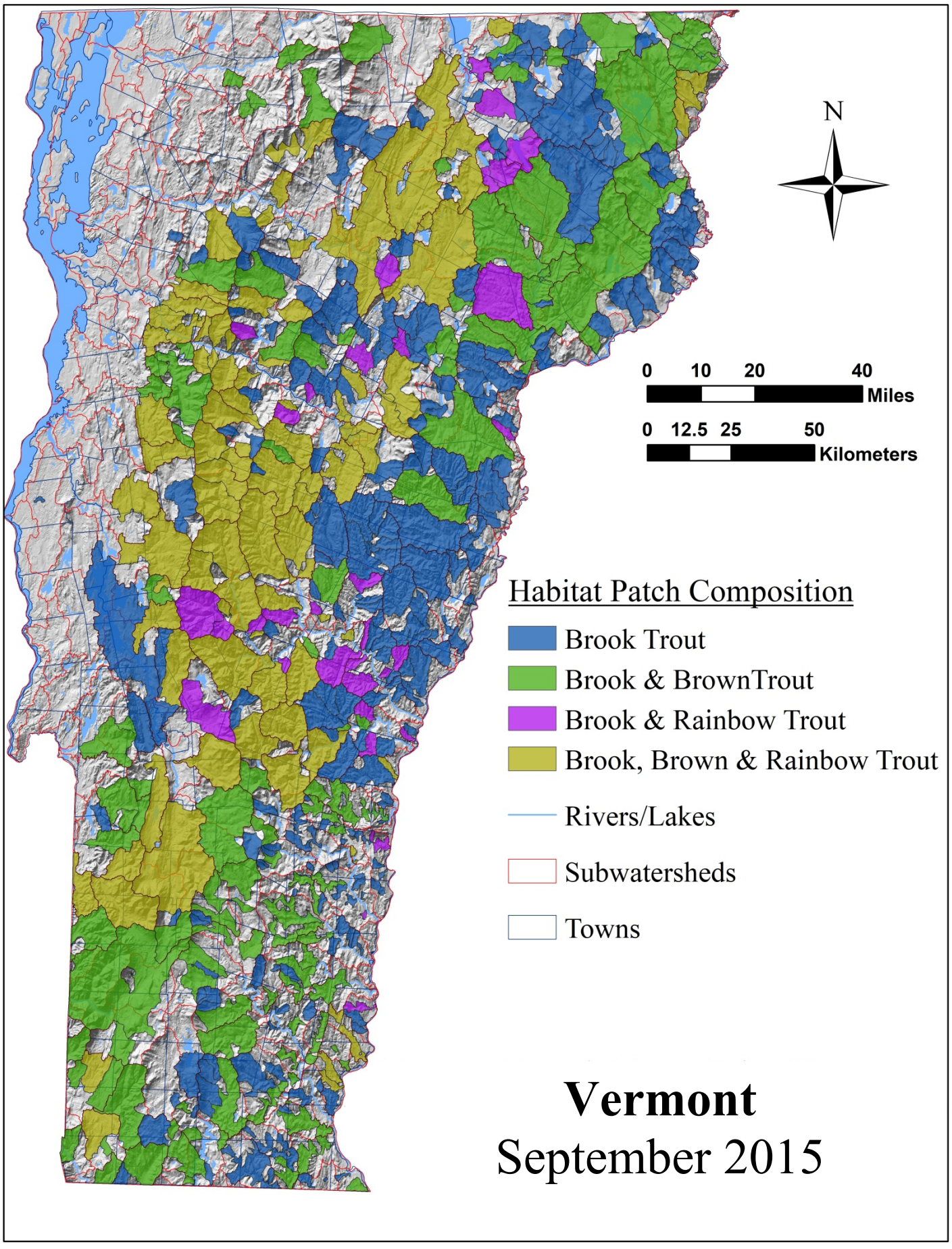
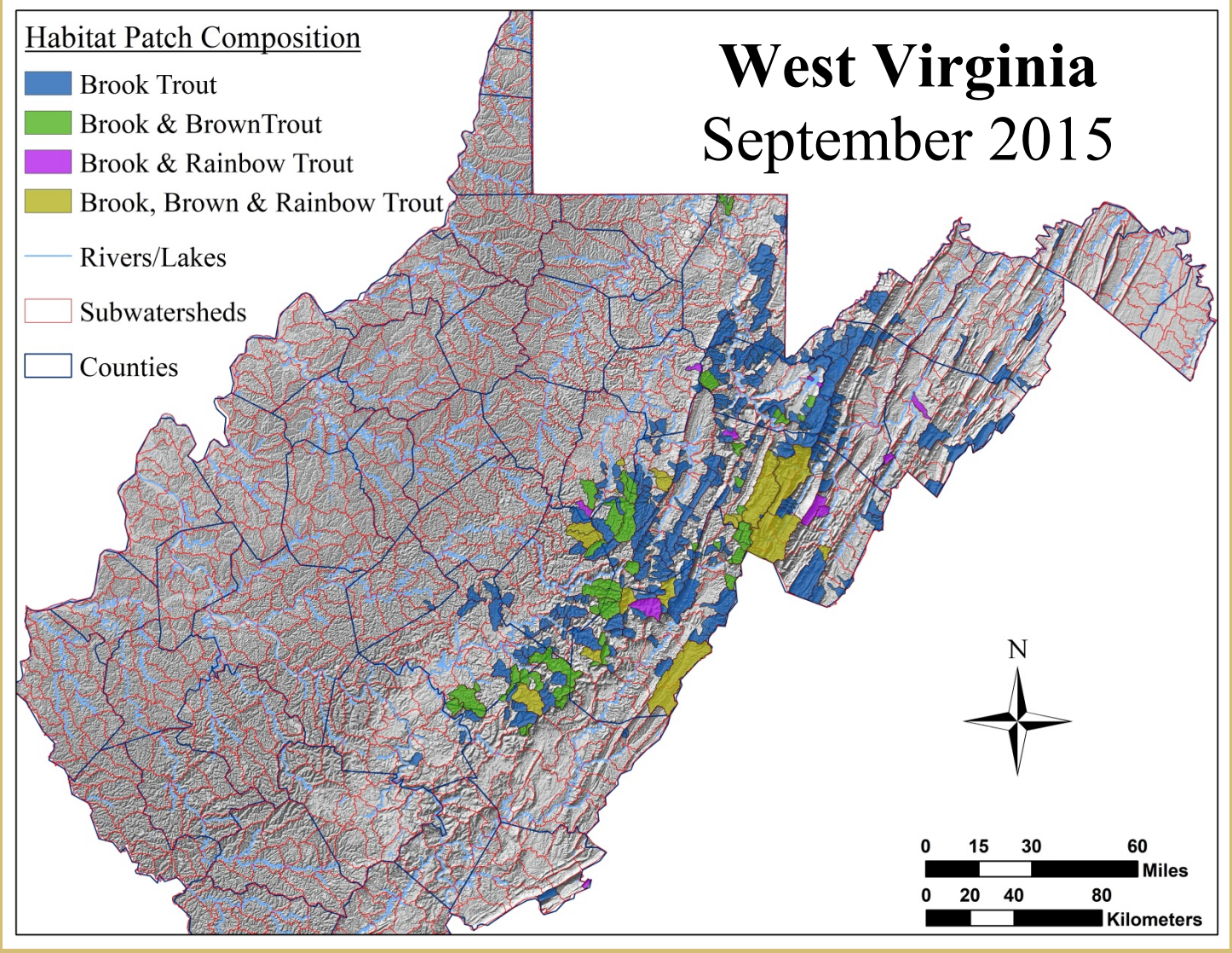
Brook Trout
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Counties
0 2 4 8
Miles
0 3 6 12
Kilometers


N
Tennessee
September 2015
Habitat Patch Composition
Brook Trout
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Counties
0 5 10 20
Miles
0 10 20 40
Kilometers


N
Virginia
September 2015
Habitat Patch Composition
Brook Trout
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Counties
0 20 40 80
Kilometers
0 12.5 25 50
Miles


N
0 10 20 40
Miles
0 12.5 25 50
Kilometers
Habitat Patch Composition
Brook Trout
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Towns
Vermont
September 2015


Habitat Patch Composition
Brook Trout
Brook & BrownTrout
Brook & Rainbow Trout
Brook, Brown & Rainbow Trout
Rivers/Lakes
Subwatersheds
Counties
West Virginia
September 2015
N
0 15 30 60
Miles
0 20 40 80
Kilometers