Restoration of Brook Trout Populations and Supporting Habitats:

Identifying Measures of Success

Objectives

- Identify rationale for change in brook trout outcome objective
  - Correct scale
  - Cost effective
  - Detects meaningful change
  - Allows for project-based accountability of actions
- Foster discussion and seek assistance in identifying appropriate measures for success

Brook Trout Outcome

- 2010 EO Strategy: Restore 58 sub-watersheds from 'reduced' (10-50% habitat loss) to 'healthy' (less than 10% habitat loss) classification by 2025.
  - Crafted with input from Habitat GIT and EBTJV
- February 24, 2012 the EBTJV recommended the outcome be revised to reflect new science conducted at finer catchment-scale
  - Sub-watersheds are HUC 6, catchments are finer scale

Patch Metrics: A cost effective method for short and long term monitoring of Chesapeake Bay wild brook trout populations?

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Introduction

Case History: Eastern Brook Trout Joint Venture

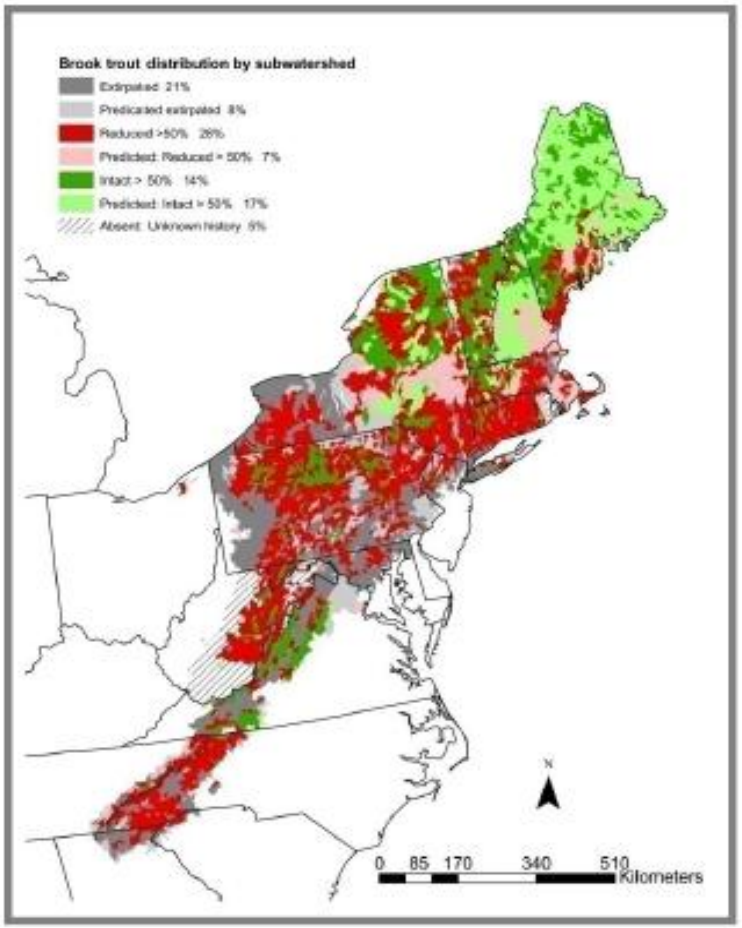
1. Evaluate the distribution of brook trout for the 2005 EBTJV assessment.

2. Context:

   -lots of states

   -inconsistent fine scale data

3. Hudy et al. 2008 NAJFM 28:1069-1085



Eastern Brook Trout
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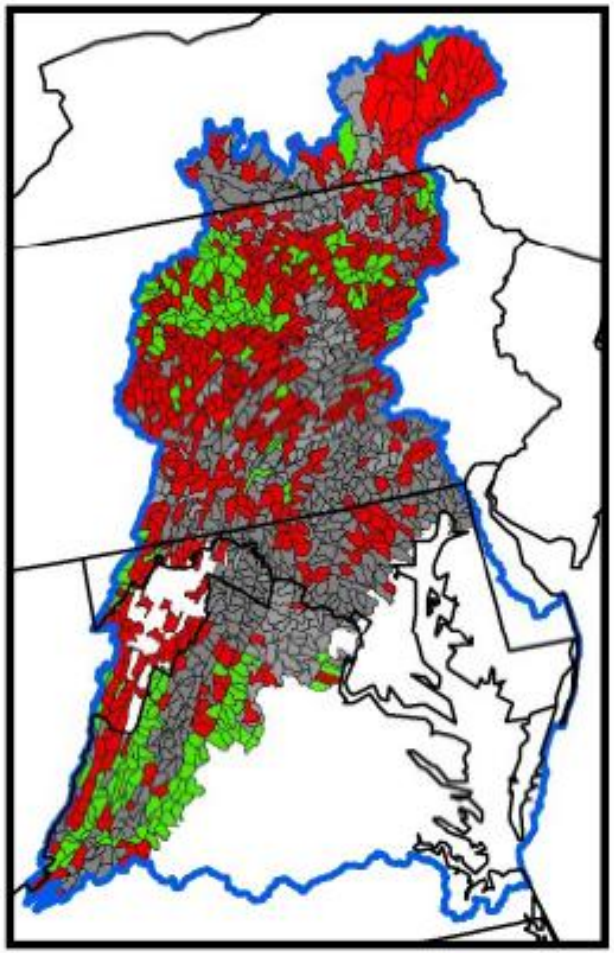
Brook Trout Range

- 1,433 subwatersheds
  - 226 intact (green)
  - 542 reduced (red)
  - 595 extirpated (gray)



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While many extirpations and losses occurred at the turn of the century, many documented losses have occurred in the last ten years.

Threats:

- Dams
- Roads
- People
- Exotics
- Land use
- Genetic integrity
- Climate Change

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Scale

Assessment Scales

Sub-basins (4th HUC; 8 digit)

53 (avg size= 254,172 ha)

Watersheds (5th HUC;
10 digit)

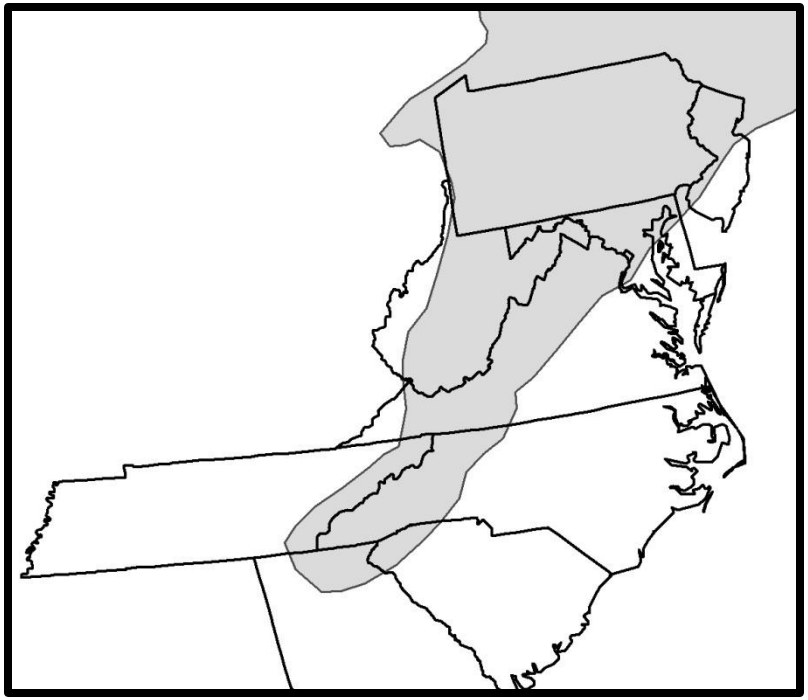
690 (avg size = 41,201 ha)

Subwatersheds (6th HUC;
12 digit)

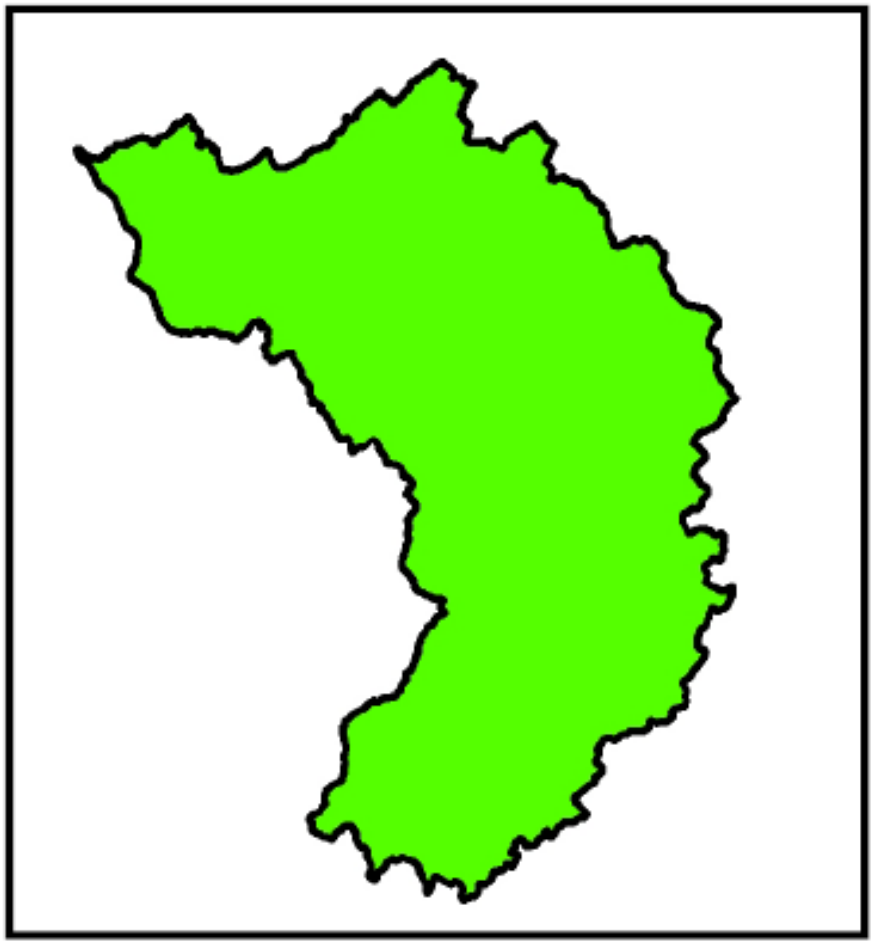
3,079 (avg size = 8,879 ha)

Catchments (14 digit ?)

124,688 (avg size = 237 ha)



Sub-basins (4th HUC)
100%



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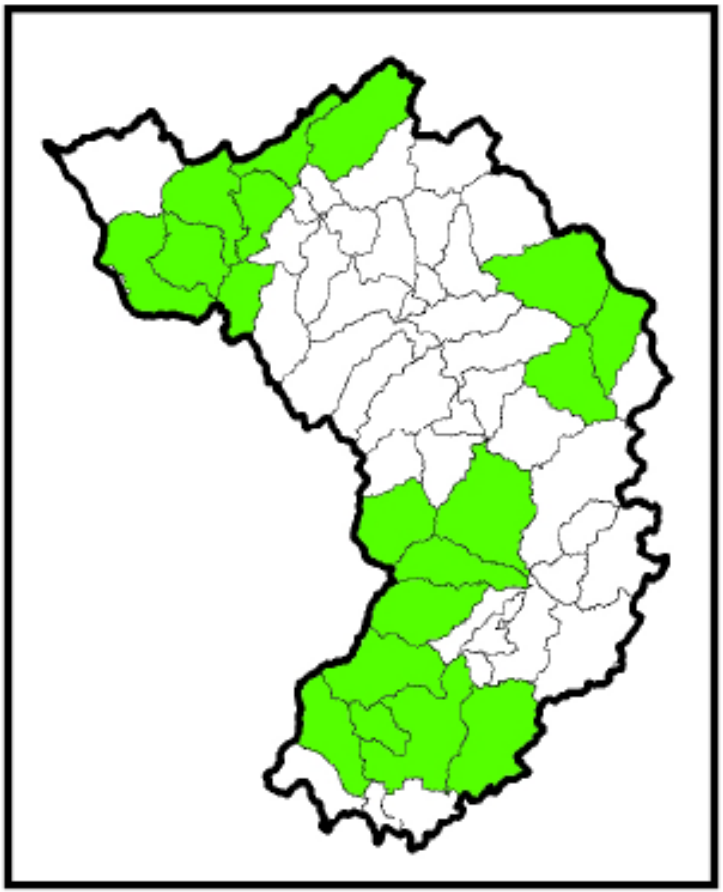
Subwatersheds (6th HUC)
33%



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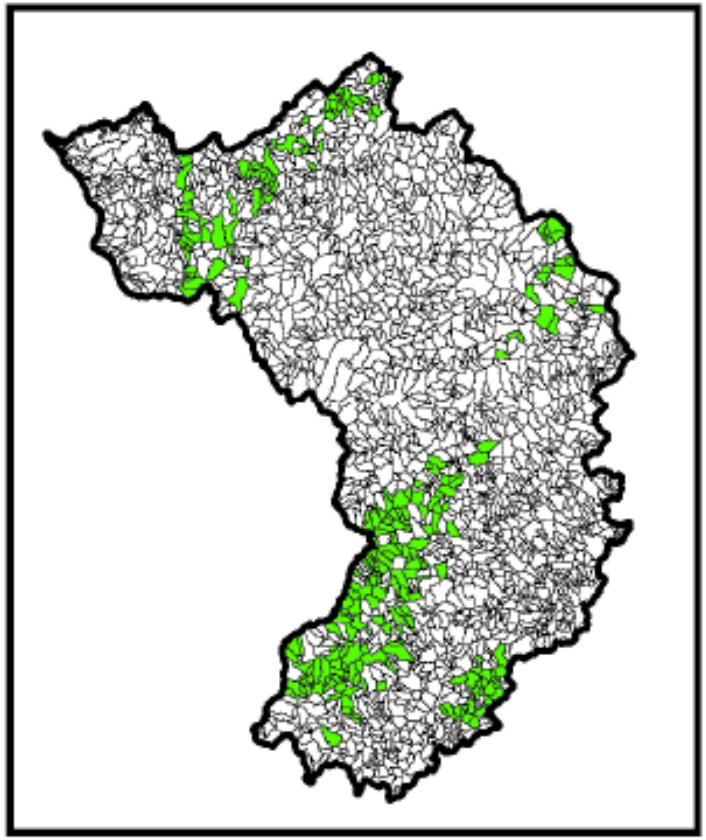
Catchments
11%



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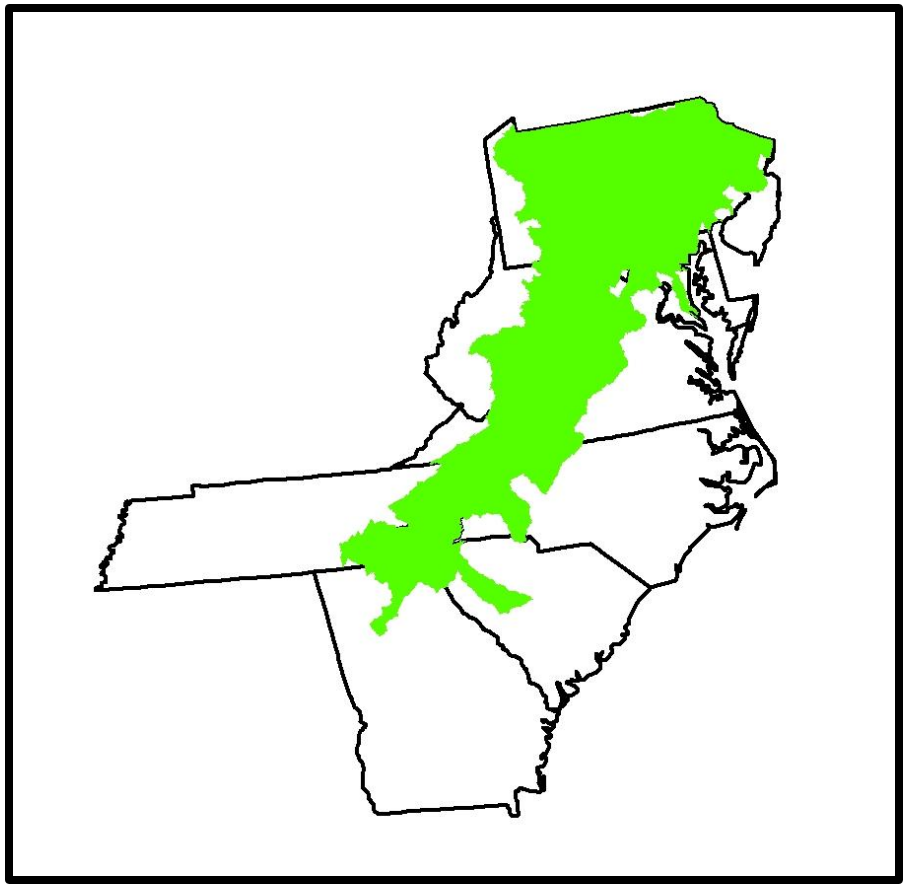
Brook Trout Distribution: Sub-basin (4th HUC)

88% of 85 sub-basins

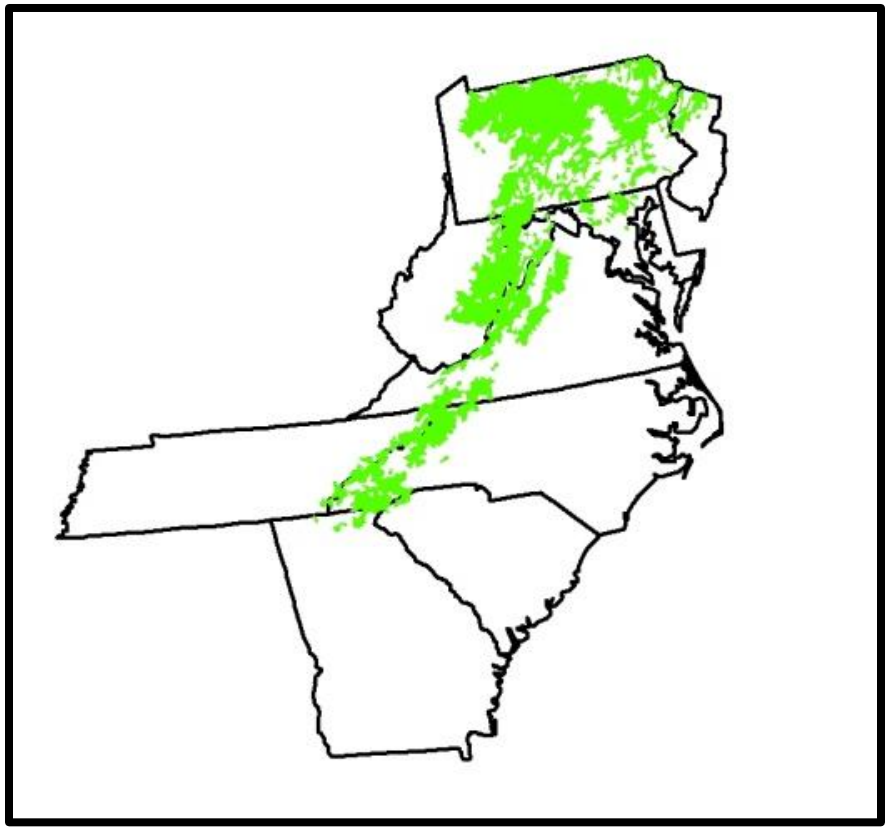
"Brook trout are well distributed throughout their native range".



Brook Trout Distribution: Watershed (5th HUC)

72% of 690 watersheds

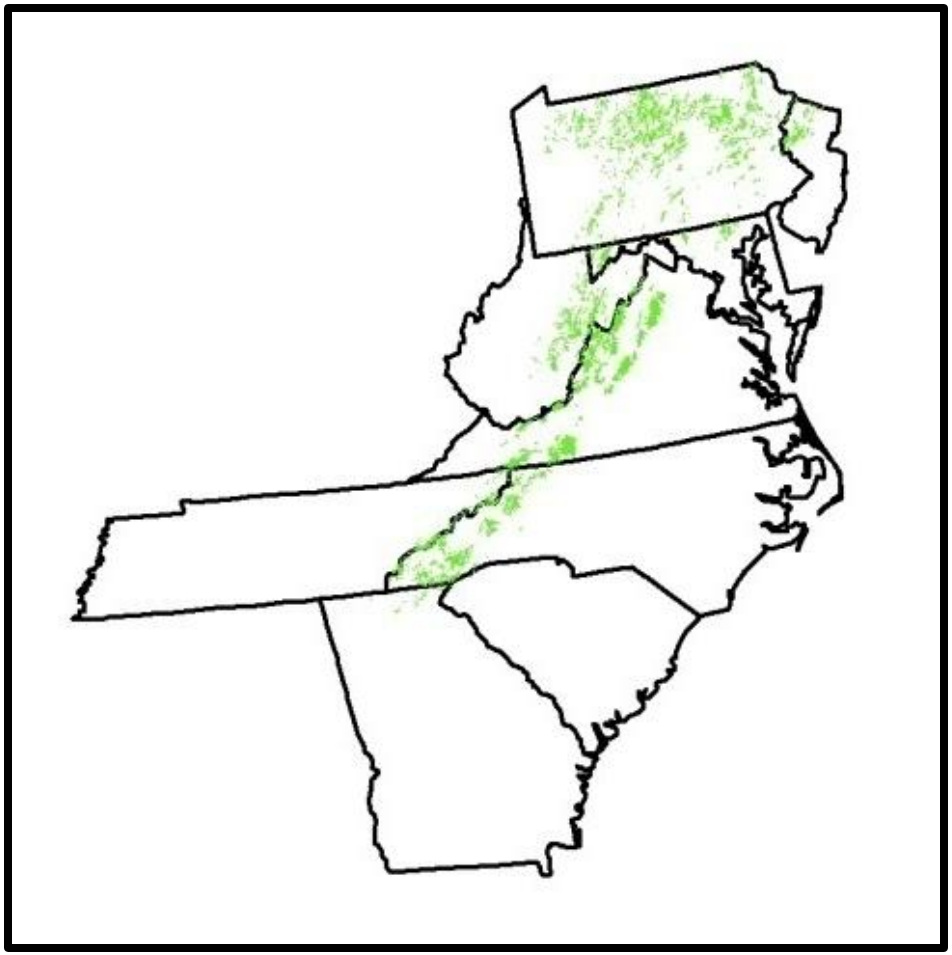
“There have been some losses of brook trout but they are still found in approximately 75% of their range”.



Brook Trout Distribution: Subwatershed (6th HUC)

47 % of 3,079 subwatersheds

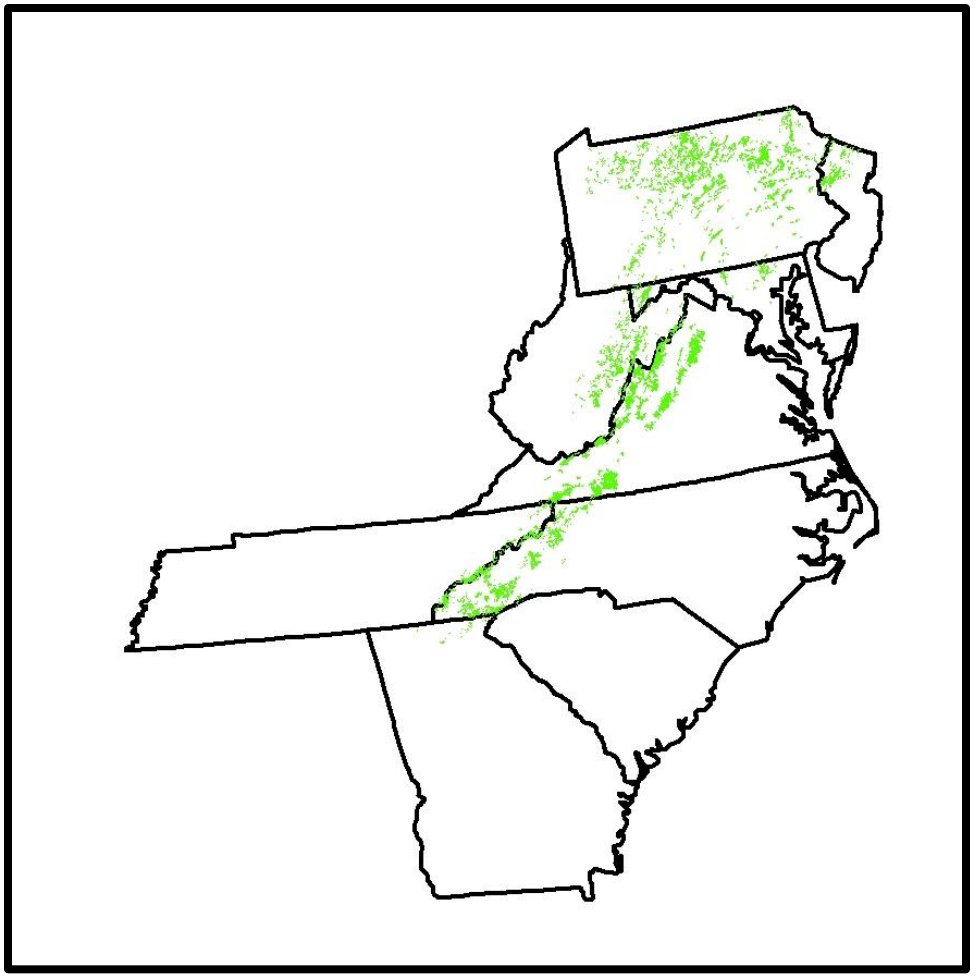
“Brook trout have been extirpated from over half of their historic subwatersheds”.



Brook Trout Distribution: Catchments

11 % of 124,688 catchments

“Brook trout do not occupy 90% of their historic catchments”



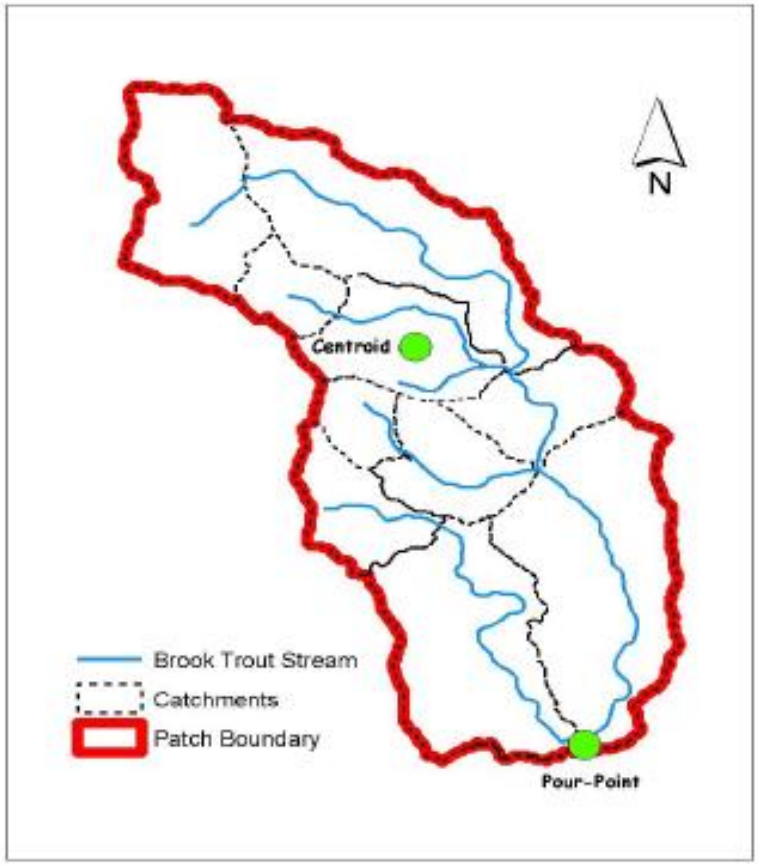
Fine Scale Occupancy Assessment

- In Chesapeake Bay Watershed*:
  - 3,003 catchments: Allopatric Brook Trout Populations
  - 1,716 catchments: Sympatric Populations (with Brown or Rainbow Trout)
  - 1,966 catchments: Only Exotic Trout Species

* excluding NY

Identification of Brook Trout "Patches"

- "Patch"= a group of contiguous catchments occupied by wild brook trout.
- Patches not connected physically
  - Dams, warm water habitat, downstream invasive species
- Assumed to be genetically isolated populations



Eastern Brook Trout
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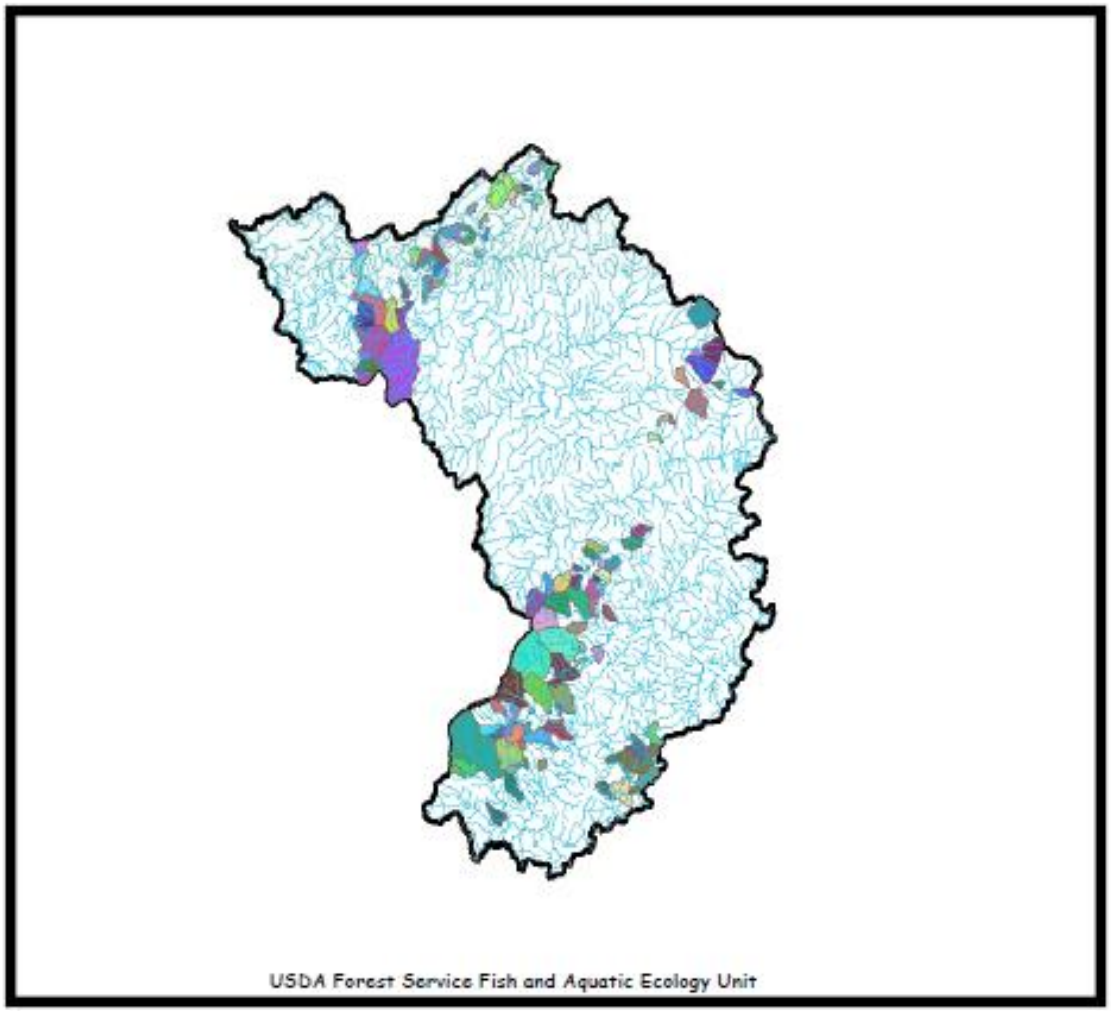
Patches



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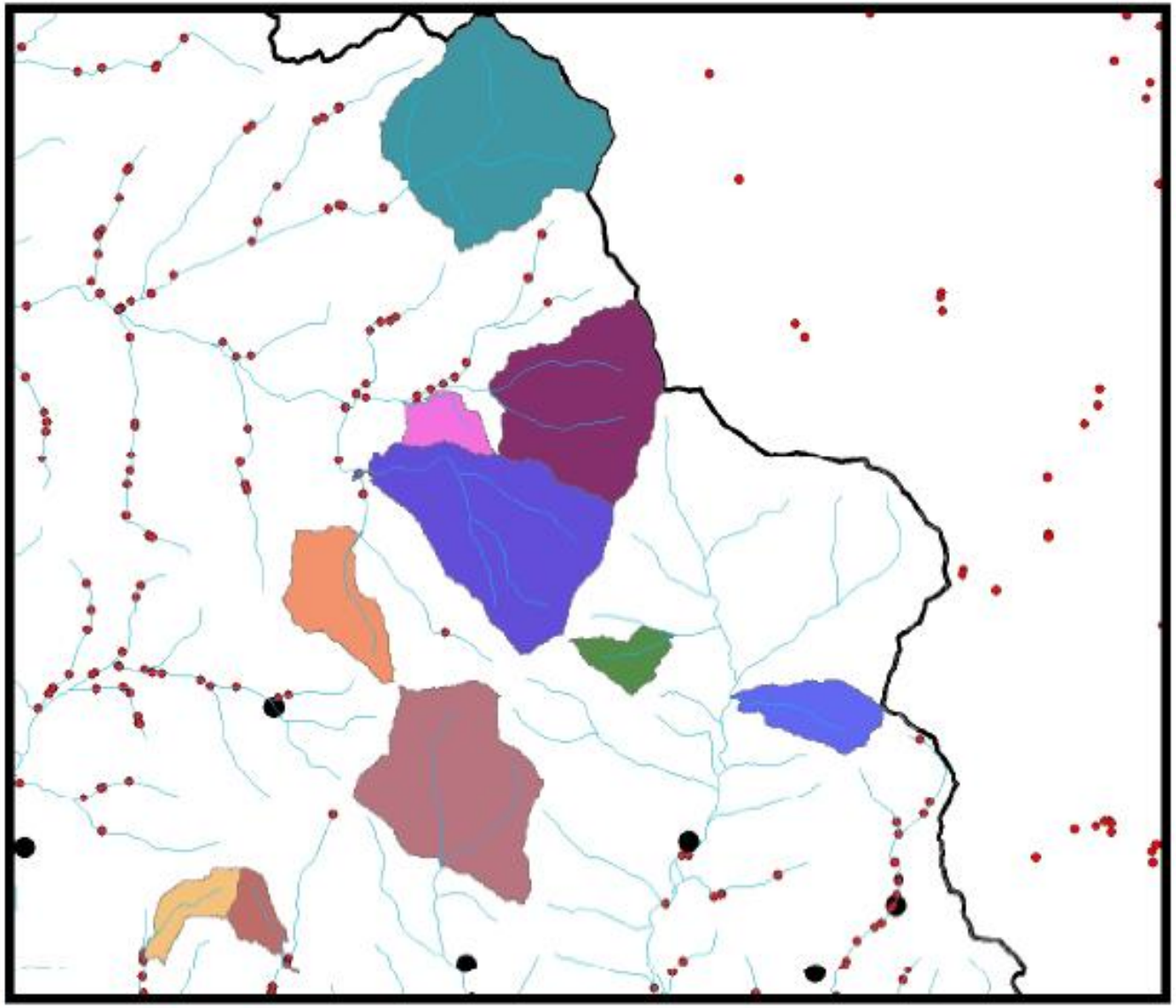

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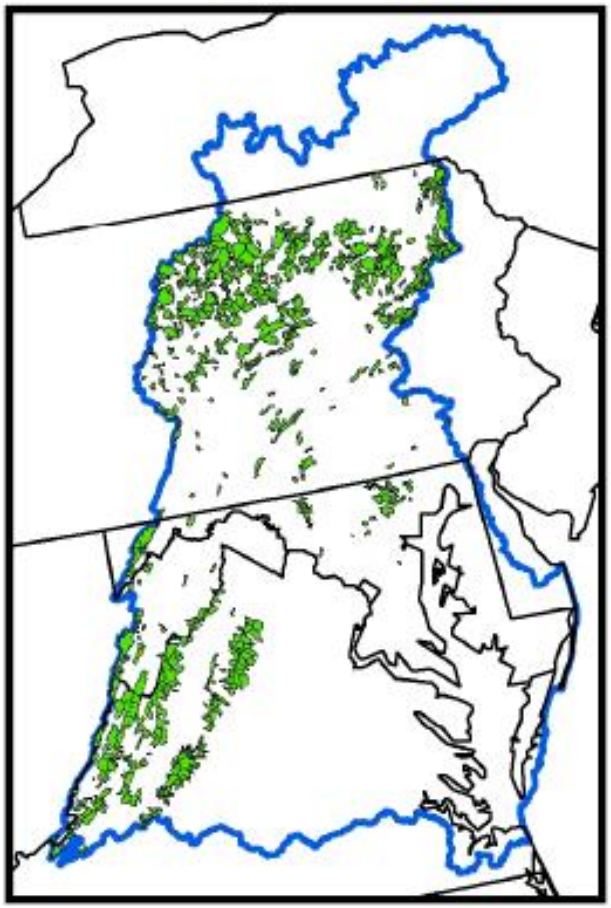
USDA Forest Service Fish and Aquatic Ecology Unit

Chesapeake Bay Brook trout Patches (n=868)



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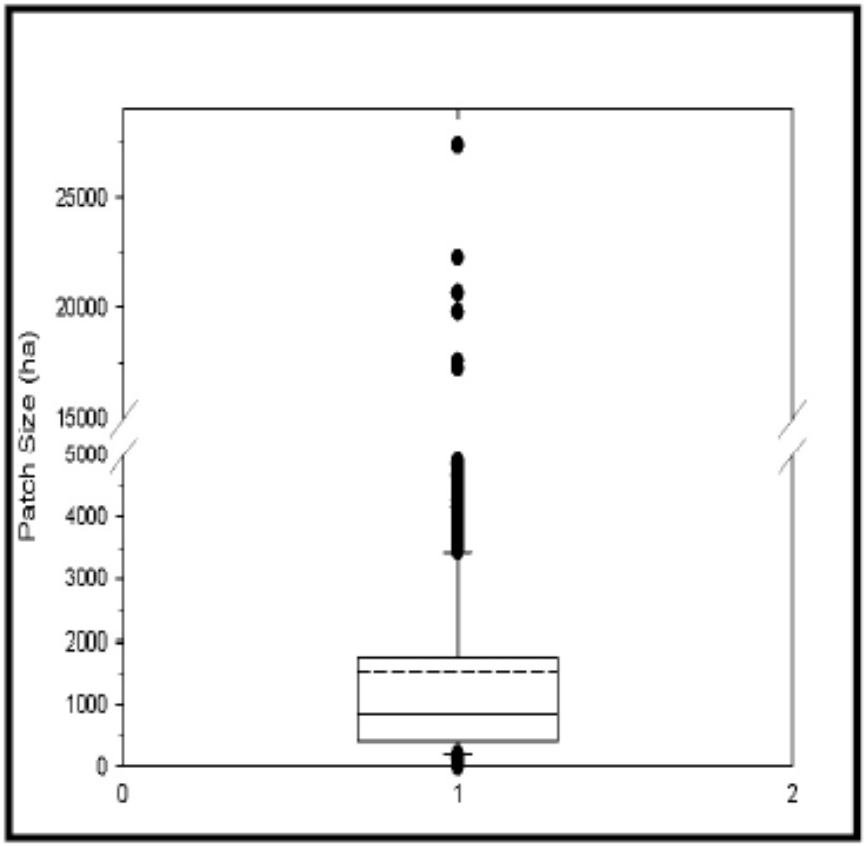
Patch - "Populations"

- Number of patches
  868
- Average size
  1,541 ha
- Median size
  855 ha



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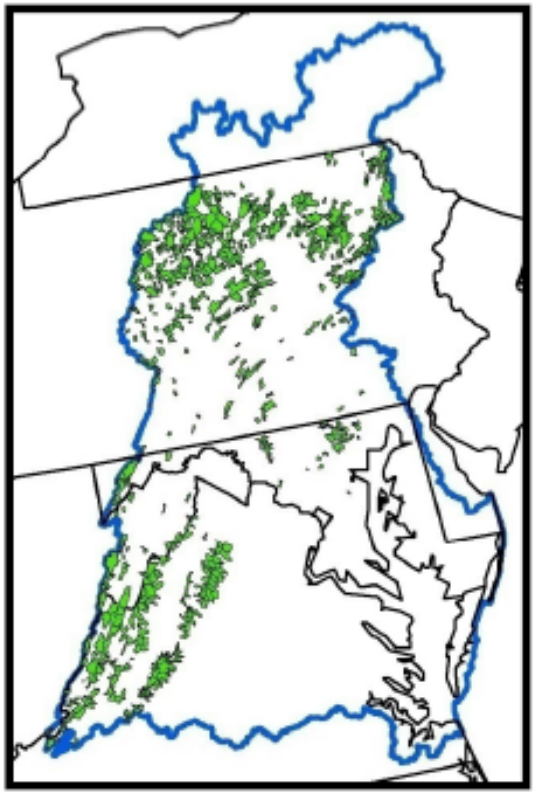
Patch Metrics

Spatial Metrics

A. # of patches
B. # of patches with increasing size/connectivity(additional upstream and downstream catchments with brook trout)
C. # of patches decreasing in size/connectivity(loss of catchments)
D. Average patch size of the entire resource
E. # of patches with allopatric or sympatric(with brown or rainbow) populations



Discussion