Maryland Brook Trout
Past and Present Status

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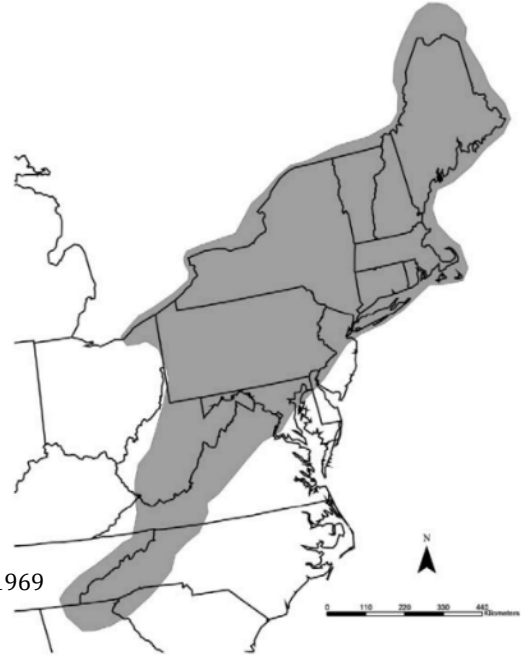
Brook Trout Life History

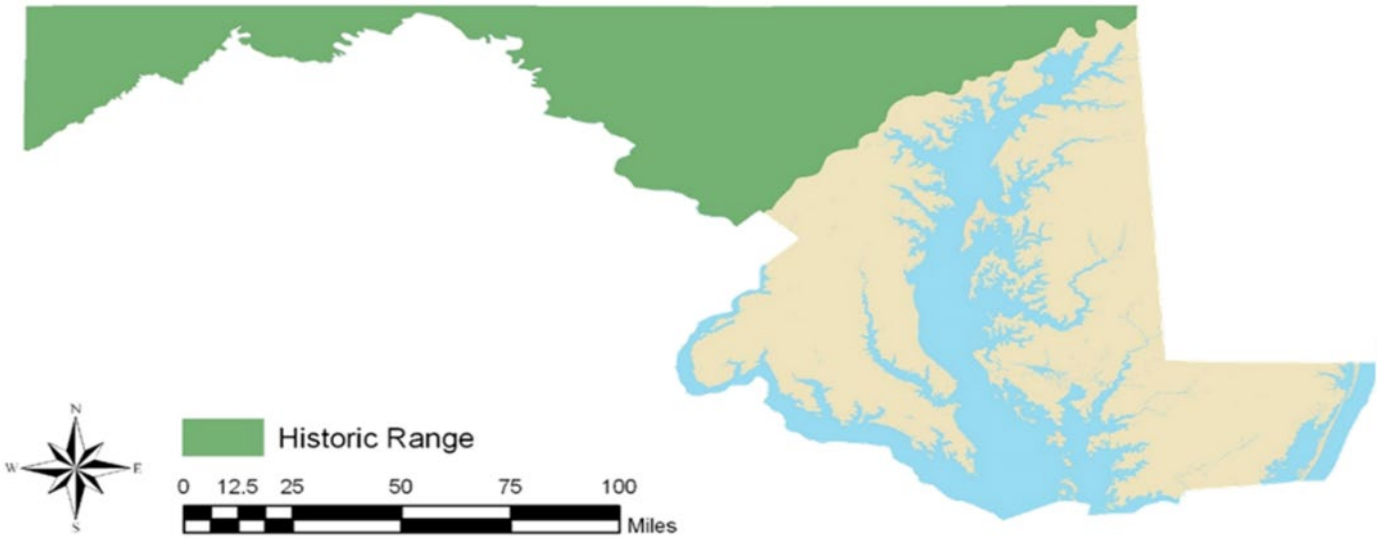
- Maryland's only native member of the Salmonidae
- Despite the name brook trout are a char and are sometimes referred to as brook char
- Typically 4"-10" in length, but may grow to 14"
- Life span is usually 4 - 5 years but may live to ~8
- Strict habitat requirements
  - Water temperatures consistently below 20°C
  - Little to no sedimentation
  - Well oxygenated water
  - Complex stream habitat with some gravel substrate (marble to pea sized) for spawning

Brook Trout Range

- Historical range largely influenced by the last ice age approximately 70,000 years ago
- Range extends from Canada to Georgia
- Historically present in all geographic provinces in Maryland (Appalachian Plateau, Ridge and Valley, Blue Ridge, Piedmont, and Coastal Plain)

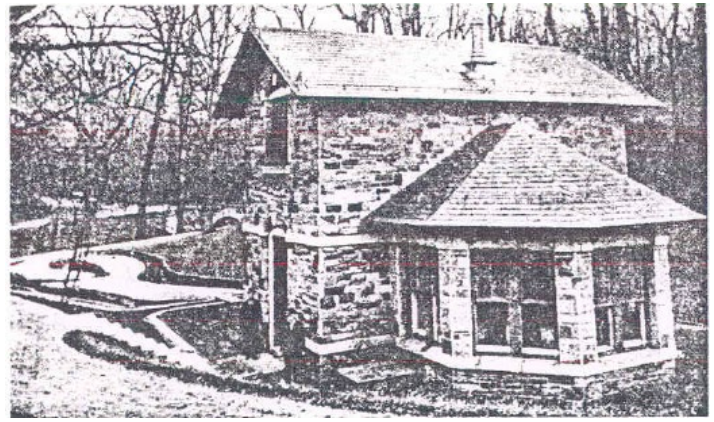


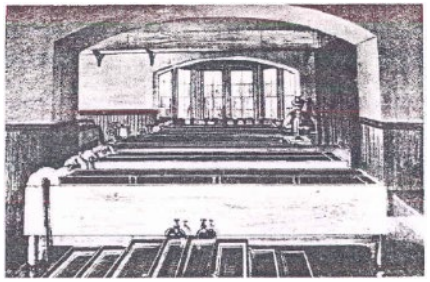
MacCrimmon and Campbell 1969

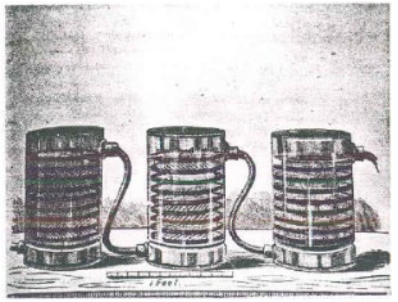


Brook Trout Management History

- Brook trout fishery almost exclusively recreational
- First records in Maryland from early 1800s – Meshach Browning writes of catching brook trout up to 20” long in Youghiogheny River drainage
- 1874 - Maryland legislature establishes a Commissioner of Fisheries **due to observations of declining fish stocks**
- 1876 - first brook trout fishing regulation instituted to establish an open season
- Late 1800s - declines in brook trout populations observed. Hatchery and stocking program established. Eggs sourced from Maine and Rhode Island



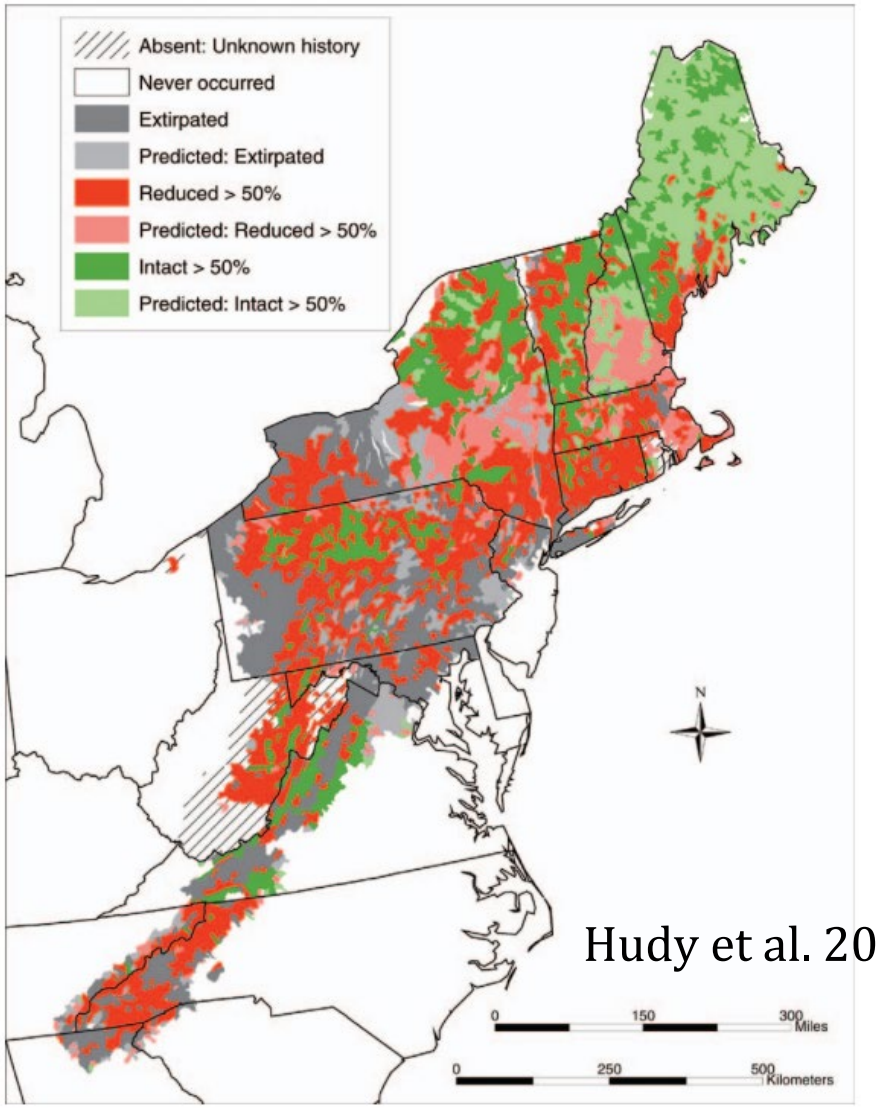




Brook Trout Management History

- Early 1980s - Brook trout stocking program discontinued
- 1970s and 1980s - Efforts to establish new brook trout populations by translocated fish from stable populations to receiving streams
- Receiving streams likely supported brook trout historically but populations were extirpated due to water quality degradation
- Populations established during this time that continue to persist
  - Little Antietam Creek (Washington County)
  - Warner Hollow UT (Washington County)
  - Bear Branch (Frederick County)
  - Bush Cabin Run (Baltimore County)
- Populations established during this time that are likely extirpated
  - Jabez Branch (Anne Arundel County; recent extirpation)
  - Murley Branch (Allegany County)
  - South Branch Patapsco River tribs (Howard County)
- 1986 - Coldwater Fisheries Policy implemented with priorities for protecting and enhancing wild trout populations

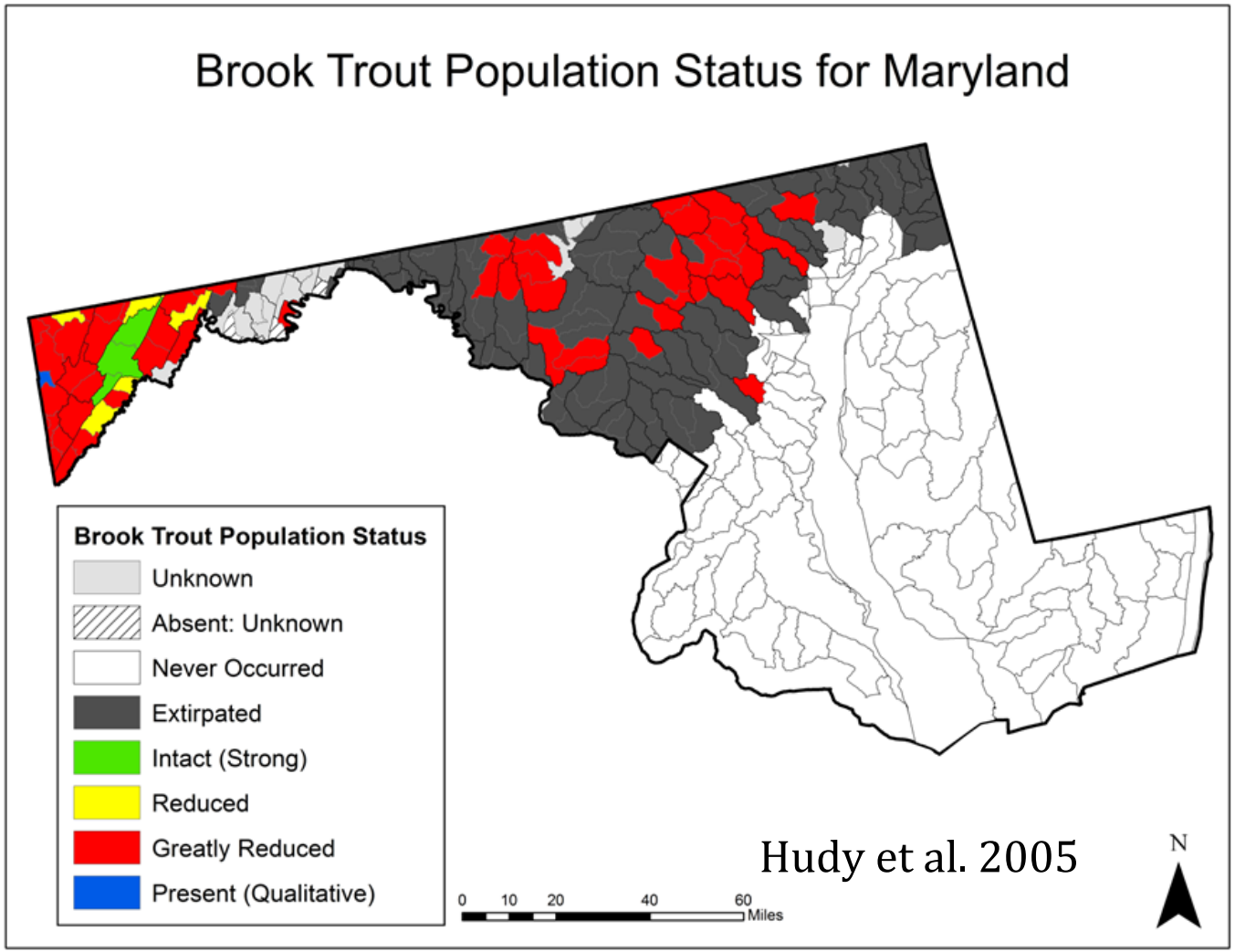
Brook Trout Conservation



Hudy et al. 2005

- Growing concern for declining brook trout occupancy
- Eastern Brook Trout Joint Venture is formed
- Range-wide collaboration that includes academia, government management agencies, and NGOs
- Investigated subwatershed occupancy and abundance in eastern United States (Hudy et al, 2005)
  - Used predicted historical occupancy and current data where available
  - Predicted data used when needed
- Extirpated from 21% of subwatersheds and greatly reduced (>50% of habitat lost) in 27% of subwatersheds

Brook Trout Conservation



- In Maryland: Extirpated in 62% of subwatersheds within the expected range
- Present in 38%
  - ➢ 6% of Maryland subwatersheds considered intact
  - ➢ 84% greatly reduced
- More likely to be extirpated when human land use is >18 percent

Conservation in Maryland and the Chesapeake Bay Watershed

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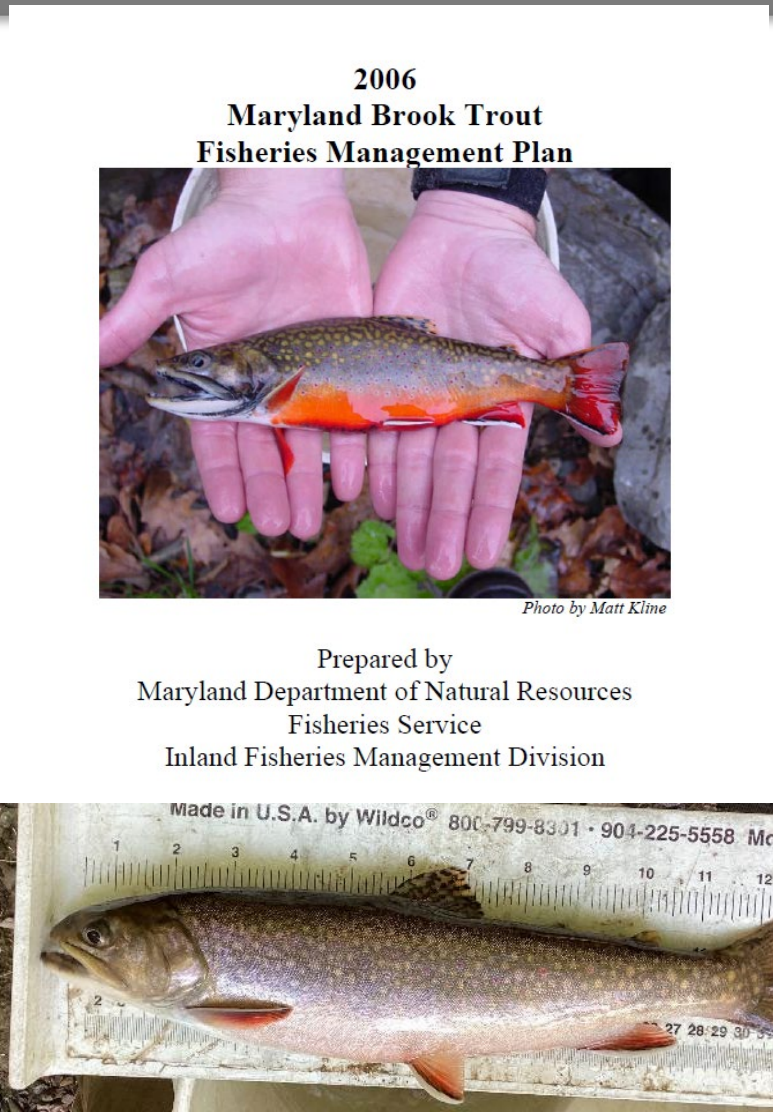
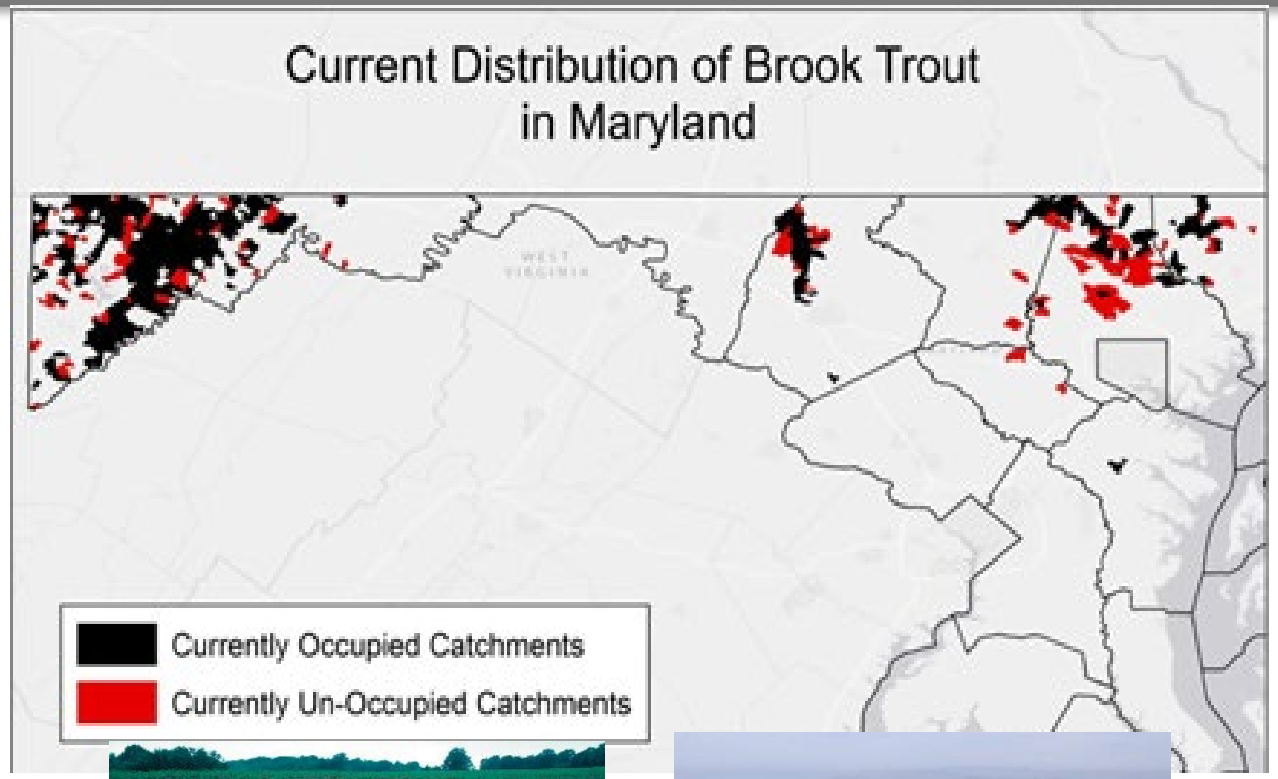
- 2006 - Brook Trout Fishery Management Plan developed and implemented
- 2007 - Changes to Savage River regulations - Limited to artificial lures only and harvest prohibited
- 2015 - listed as a Species of Greatest Conservation Need
- **2015 - Brook trout outcome in Chesapeake Bay Watershed Agreement (CBWA)**
  - Increase brook trout occupancy by 8% by 2025
  - Baseline needed



Brook Trout Population Inventory

- Survey of all Maryland brook trout populations conducted from 2014 - 2018:
  - ~27 percent decline in occupancy statewide
  - ~50 percent decline in the Piedmont
- Declines likely driven by land use changes and warmer temperatures
  - elevated water temperatures
  - sedimentation



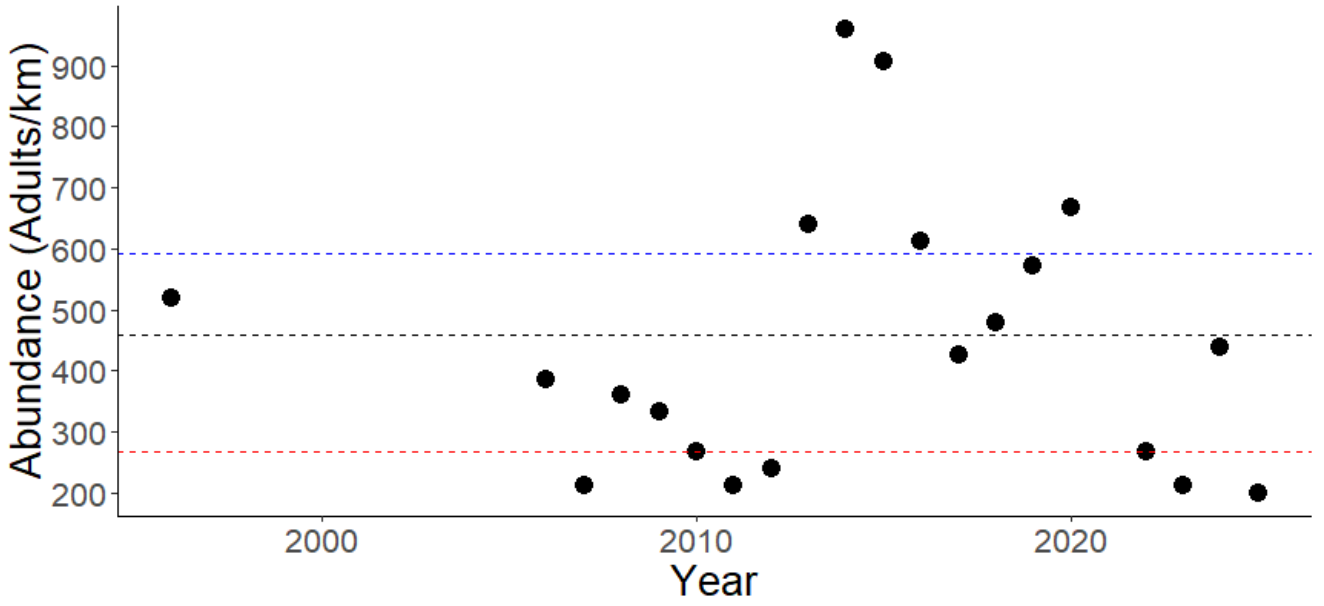
Brook Trout Population Trends

- Developed an annual monitoring network
  - 51 stations across Maryland
  - Represents varying habitat conditions and stressors
  - Annual fish surveys, high resolution temperature data, habitat metrics
  - Will provide long-term trend analysis for populations and temperature

Long-term Brook Trout Abundance (Adults/km) Trends (N ≥ 5)

Brook Trout Population Abundance - 2025

- 2025 brook trout monitoring network survey results
  - Adult abundance (adults/km) was below long-term mean in 97% of stations (76% in 2024)
  - Young-of-Year (YOY) abundance (YOY/km) was below long-term mean in 77% of stations (97% in 2024)
- Several consecutive years of high temperatures and low stream flows have led to cyclically low abundance and poor recruitment

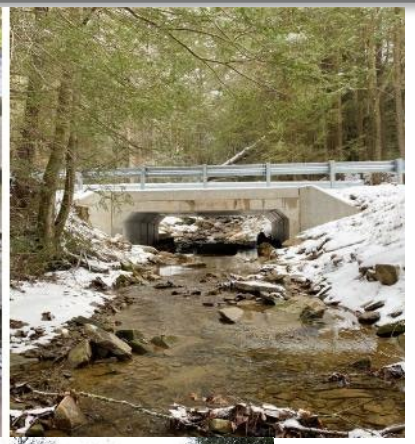


Big Run (Savage River) Annual brook trout abundance collected from electrofishing surveys, 1996 - 2025. Black dashed line = long-term abundance mean, blue dashed line = 75th percentile, red dashed line = 25th percentile.

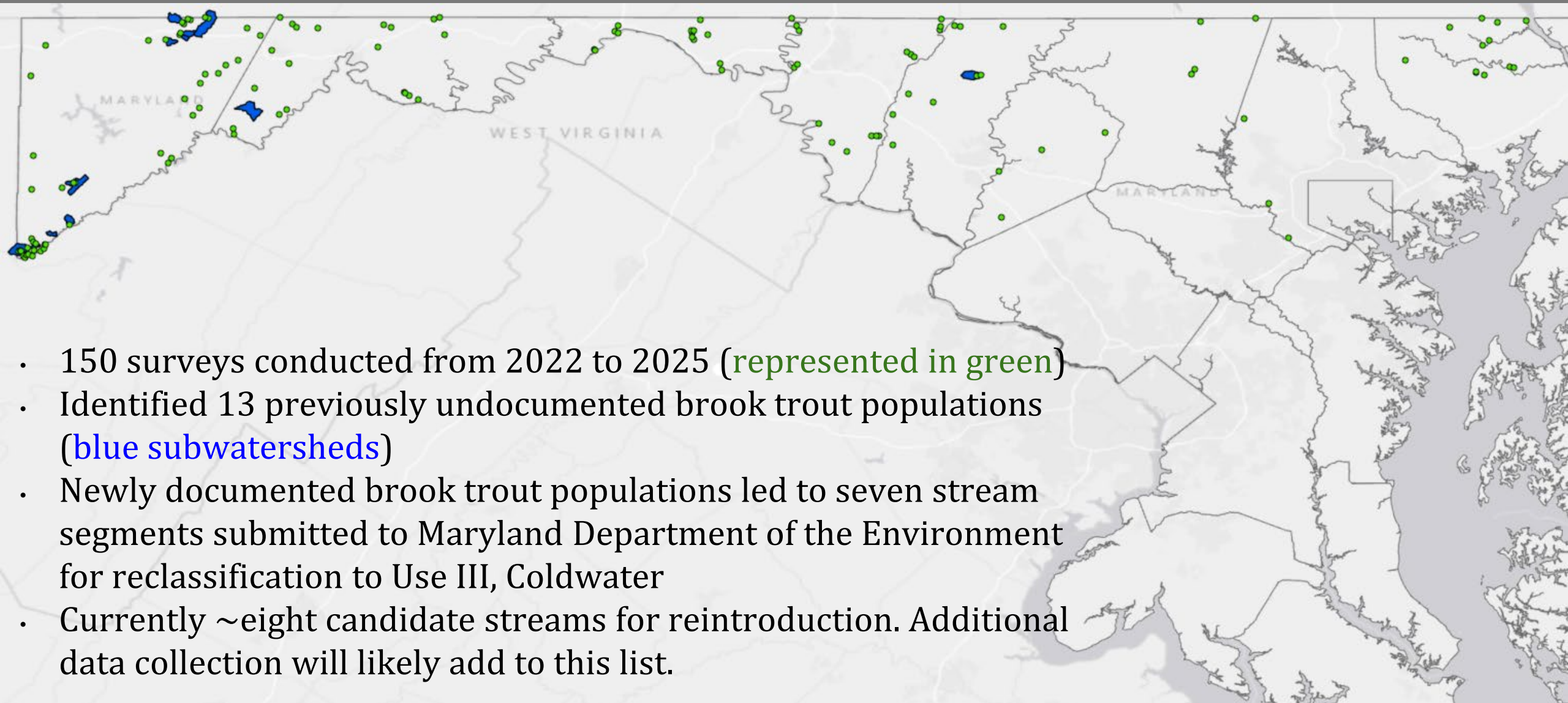
Changes to Management Approach

Updated conservation strategy in 2021:

- **Resiliency** - habitat enhancement and restoration focused on strongholds developing partnerships with local governments and NGOs to achieve habitat goals
- **Protection** - work with other management agencies to protect all brook trout populations
- **Reintroduction** - where habitat is suitable, attempt to re-establish brook trout populations



Brook Trout Reintroduction



- 150 surveys conducted from 2022 to 2025 (represented in green)
- Identified 13 previously undocumented brook trout populations (blue subwatersheds)
- Newly documented brook trout populations led to seven stream segments submitted to Maryland Department of the Environment for reclassification to Use III, Coldwater
- Currently ~eight candidate streams for reintroduction. Additional data collection will likely add to this list.

Brook Trout Reintroduction

- Three reintroduction attempts started in 2024 in Washington County
- Brook trout reintroduced by translocation
  - Source population selected based on brook trout density and genetic health
  - Source and receiving streams: similarity of habitat and close geographic proximity
  - Approximately 100 individuals translocated in initial effort
  - Transferred using coolers - low density maintained and travel distance minimized

Brook Trout Reintroduction

- Translocations completed in September prior to spawn
- Follow-up surveys conducted in summer 2025
  - Single pass electrofishing
  - Observation of translocated adults
  - **Documentation of young-of-year of particular interest**

Brook Trout Reintroduction

- 2025 survey results suggested progress
  - Greater than 10% recovery of translocated adults at all three reintroduction sites
  - Young–of-year observed at all three reintroduction sites. Translocated individuals successfully spawned
  - Source streams were surveyed as well: no clear signals of declines related to translocations




Brook Trout Reintroduction

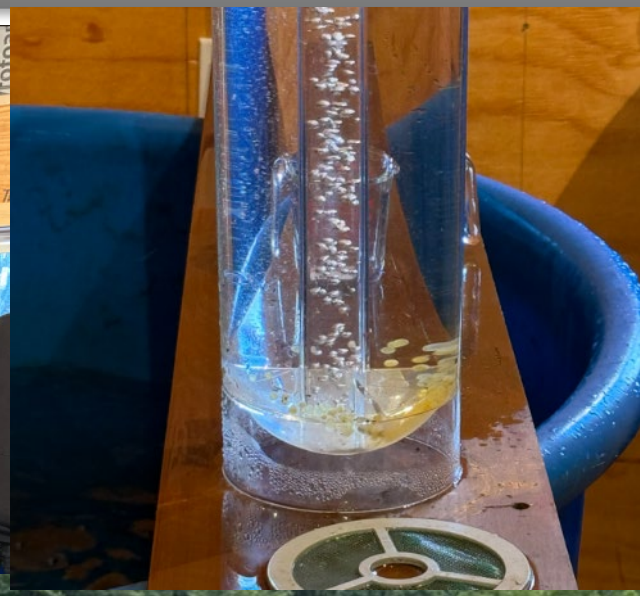
- Translocations continued in September 2025 for all three streams
  - Equipment improvements:

Brook Trout Reintroduction

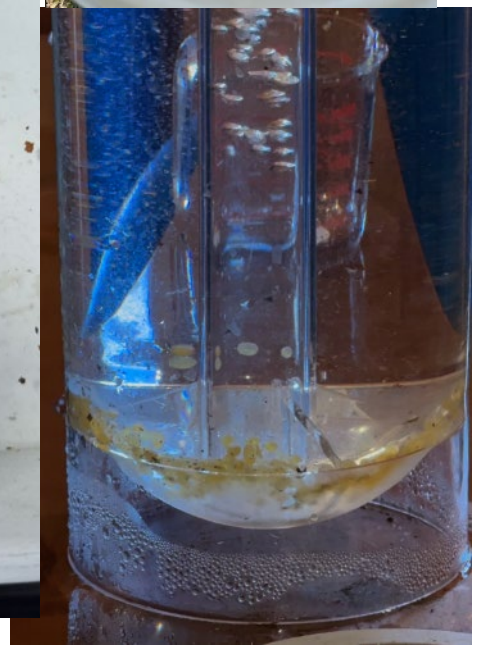
- 2025 translocations moved only 50 individuals to reintroduction streams
- Avoided young-of-year - will look for juvenile fish in 2026
- Surveys will be conducted in 2026:
  - Continued presence of translocated adults
  - Young-of-year
  - Age 1 fish

Brook Trout Propagation

- Translocation is only an option when a source population is available
- Source populations are limited, particularly for Central Maryland
- Bear Creek Isolation Hatchery constructed for wild trout propagation
  - Recirculating System
  - Uses well water
  - Minimal effluent



Brook Trout Propagation



- Method:
  - Capture female and male brook trout (~1:3 ratio) prior to spawn.
  - Strip eggs and milt
  - Captured adults returned to stream unharmed
  - Field fertilize eggs and transfer to an isolation hatchery facility
  - Culture from egg to fingerling (October to ~April)
  - Release fingerlings to targeted stream

Brook Trout Propagation

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- 186 eggs collected and field fertilized in November 2025
- Only three eggs reached eyed stage and one egg hatched
- Eggs were collected about 1 to 2 weeks too late
- Peak spawning activity is influenced by multiple factors, including day length, water temperature, etc
- Scouting for redd construction and other spawning behaviors will be initiated earlier in 2026

Propagation: Next Steps

- 2025 was a learning experience. Field methods will be refined and revisited in 2026
- A successful method will lead to use in areas of the state where source populations are limited
- Possible applications for genetic rescue in the long-term: use propagation to improve genetic diversity of isolated populations
- Propagation and reintroduction may help us reach occupancy goals
- Funding sources:
  - Sport Fish Restoration
  - NFWF Chesapeake WILD: $239,000 grant through 2027

Questions?

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Ongoing and Upcoming Projects

- Brook trout genomics - analysis of genome will help us further define patches and identify unique characters
- Updated statewide brook trout status - will coincide with genomics sample collection
- Environmental DNA (eDNA) - may help with determining if low abundance populations are extirpated
- Chesapeake Bay Watershed Agreement Beyond 2025
  - By 2035: Net zero loss and increase occupancy in strongholds by 1%
  - By 2035: increase brook trout abundance at 10 long-term monitoring sites
  - By 2035: reduce identified threats to increase brook trout resilience in watersheds supporting healthy populations
- Upper Savage River non-native removal project
- Coldwater fisheries habitat projects - barrier removal and replacement with passable structures, improved flood resilience