Use and update to the EBTJV brook trout occupancy database

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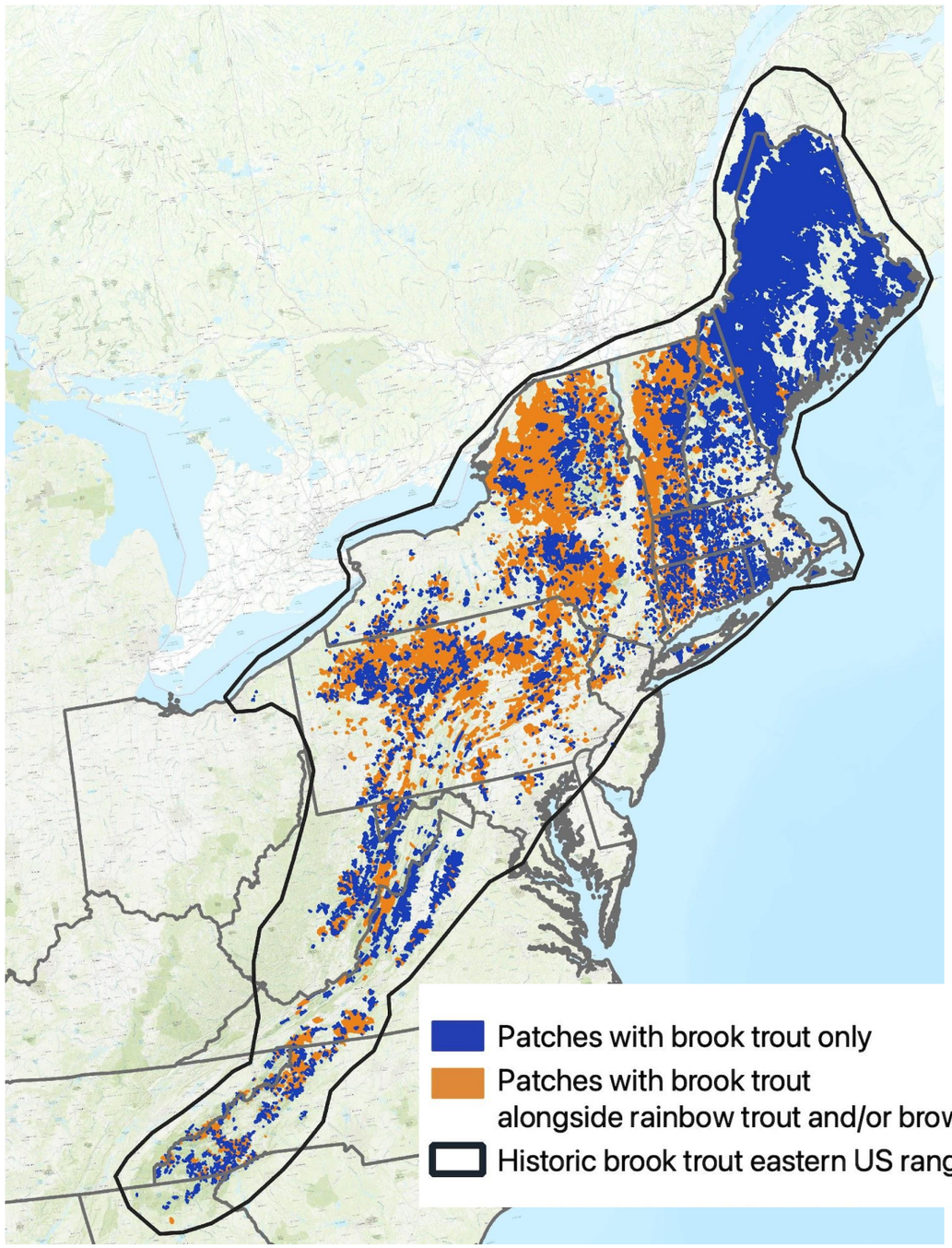

March 28, 2024

Presentation to Chesapeake Bay STAR team


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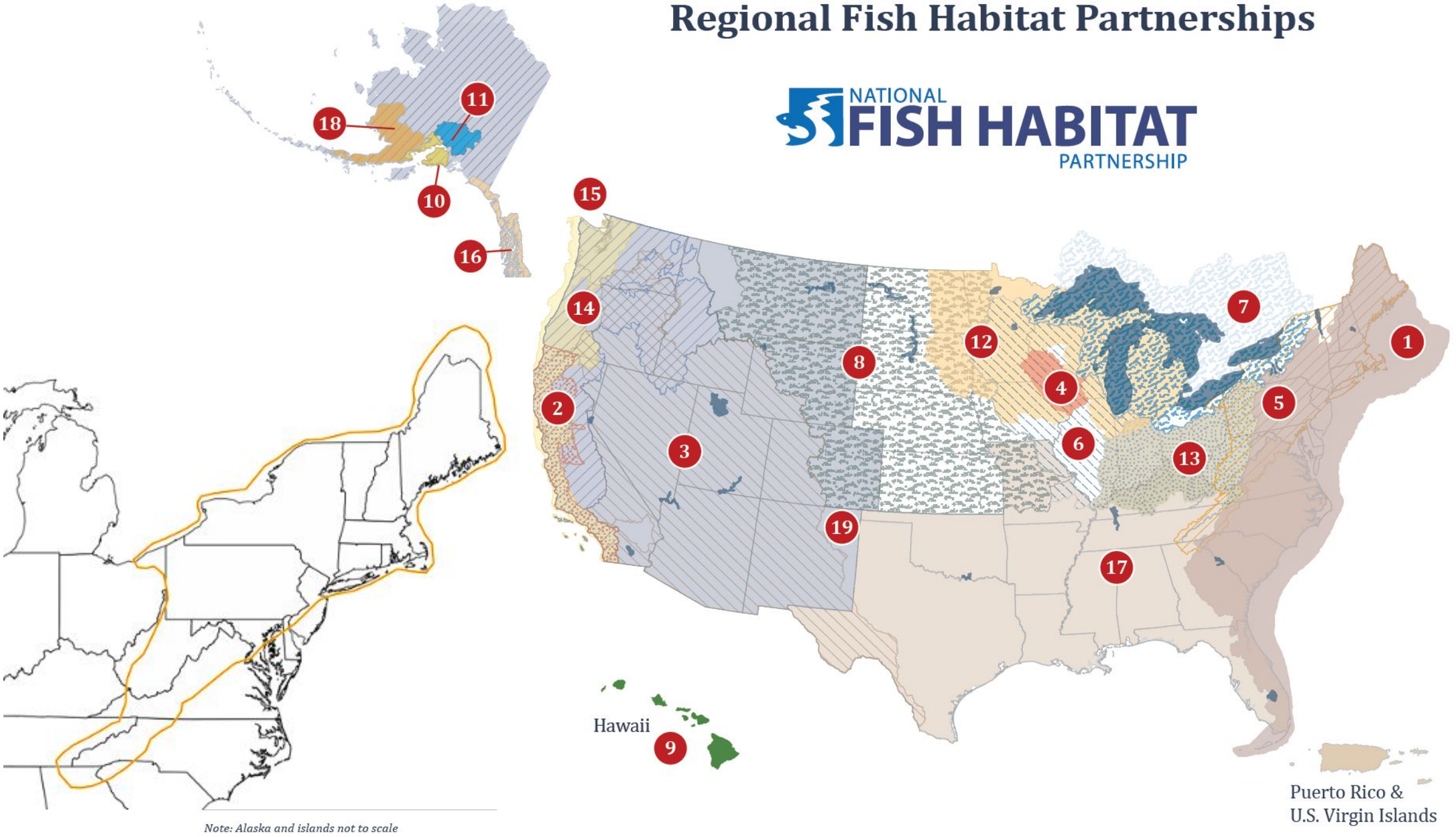
Regional Fish Habitat Partnerships

NATIONAL FISH HABITAT PARTNERSHIP

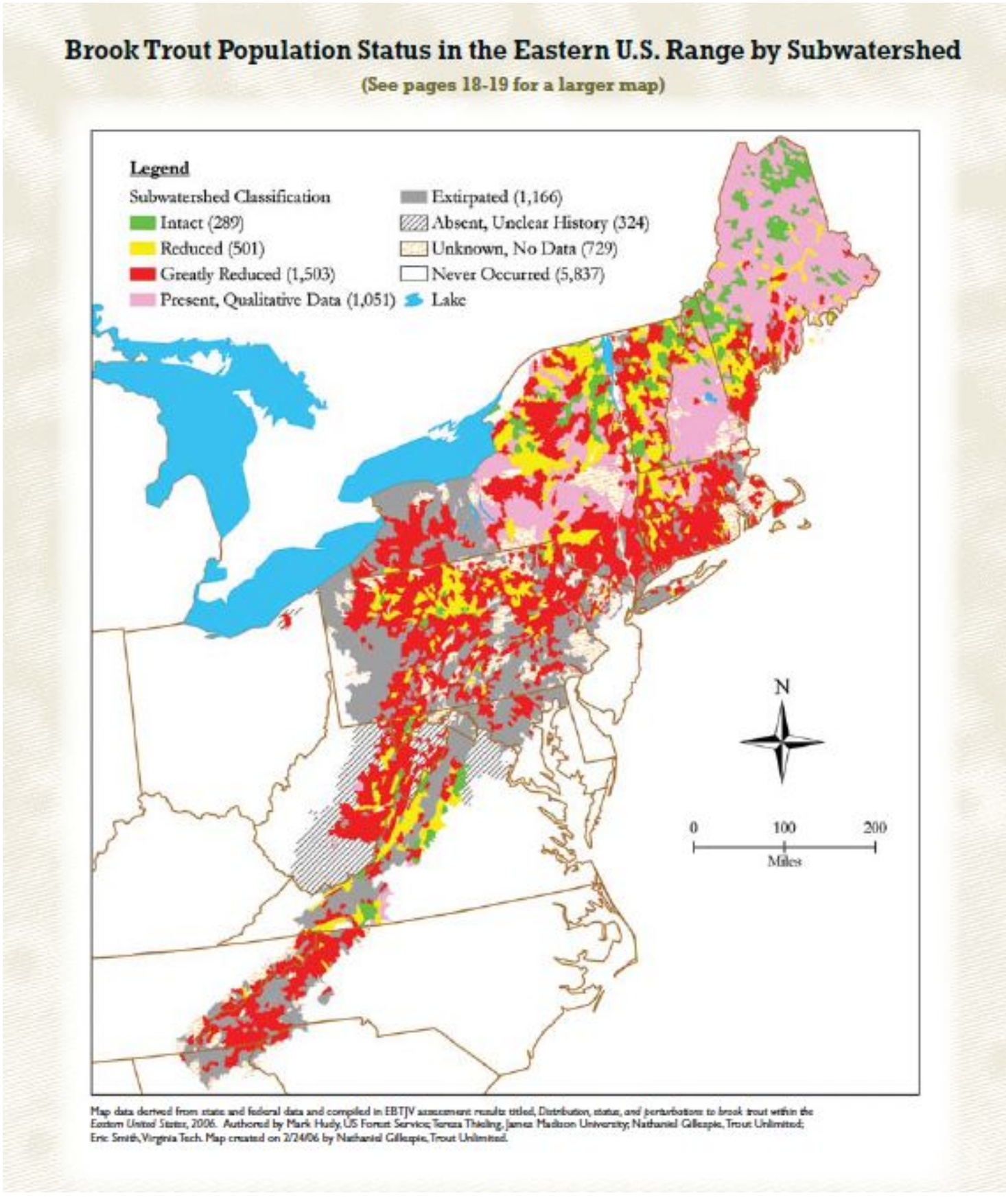


Note: Alaska and islands not to scale

Includes current fish habitat partnerships, approved by the NFHP Board, June 2016.

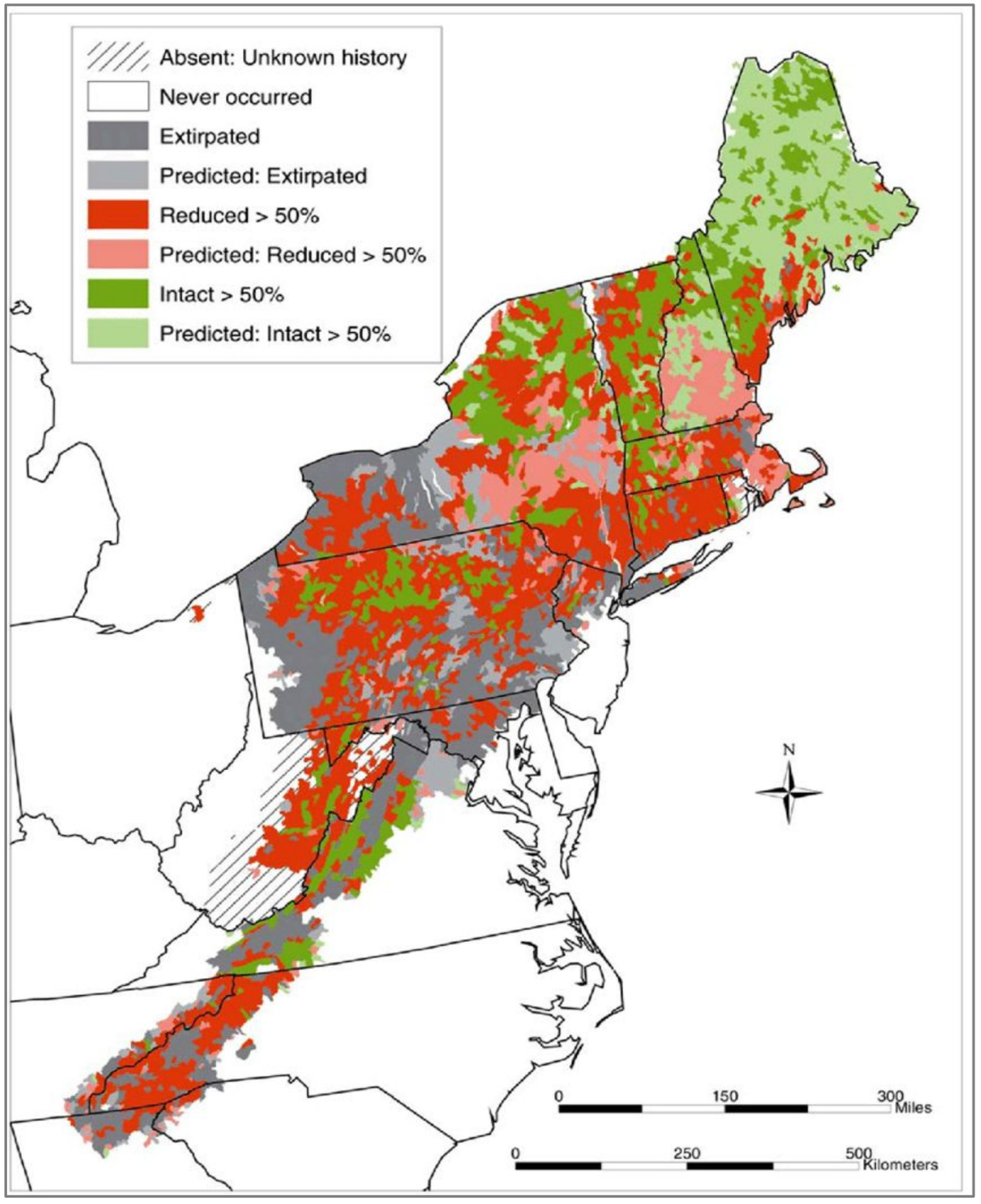
Eastern Rangewide Status Assessment 2006

Subwatershed (12-digit HUC)



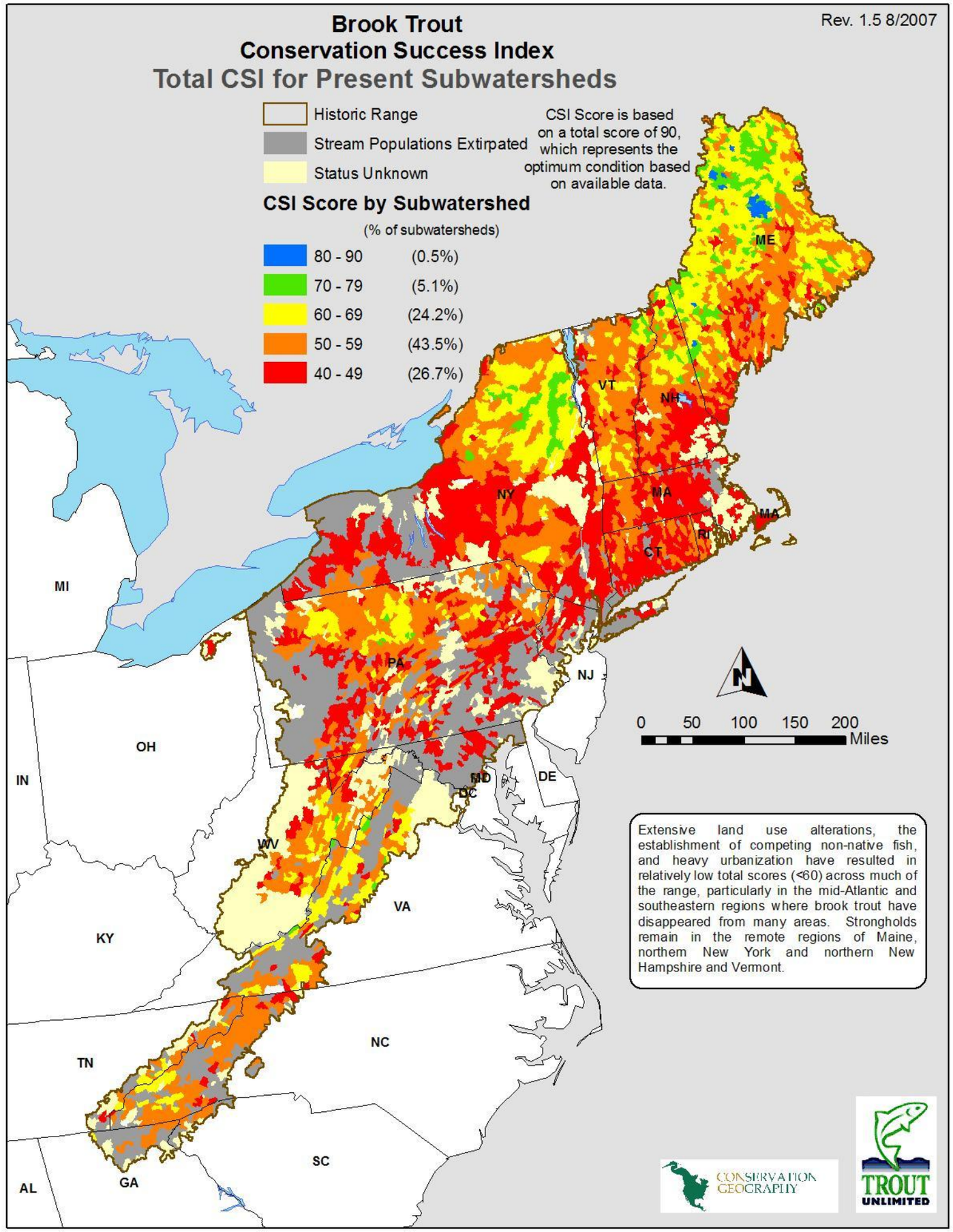
Predicted Rangewide Status Assessment 2008

Modeled predictions for subwatershed occupancy based on various land use metrics and CART classifications trees

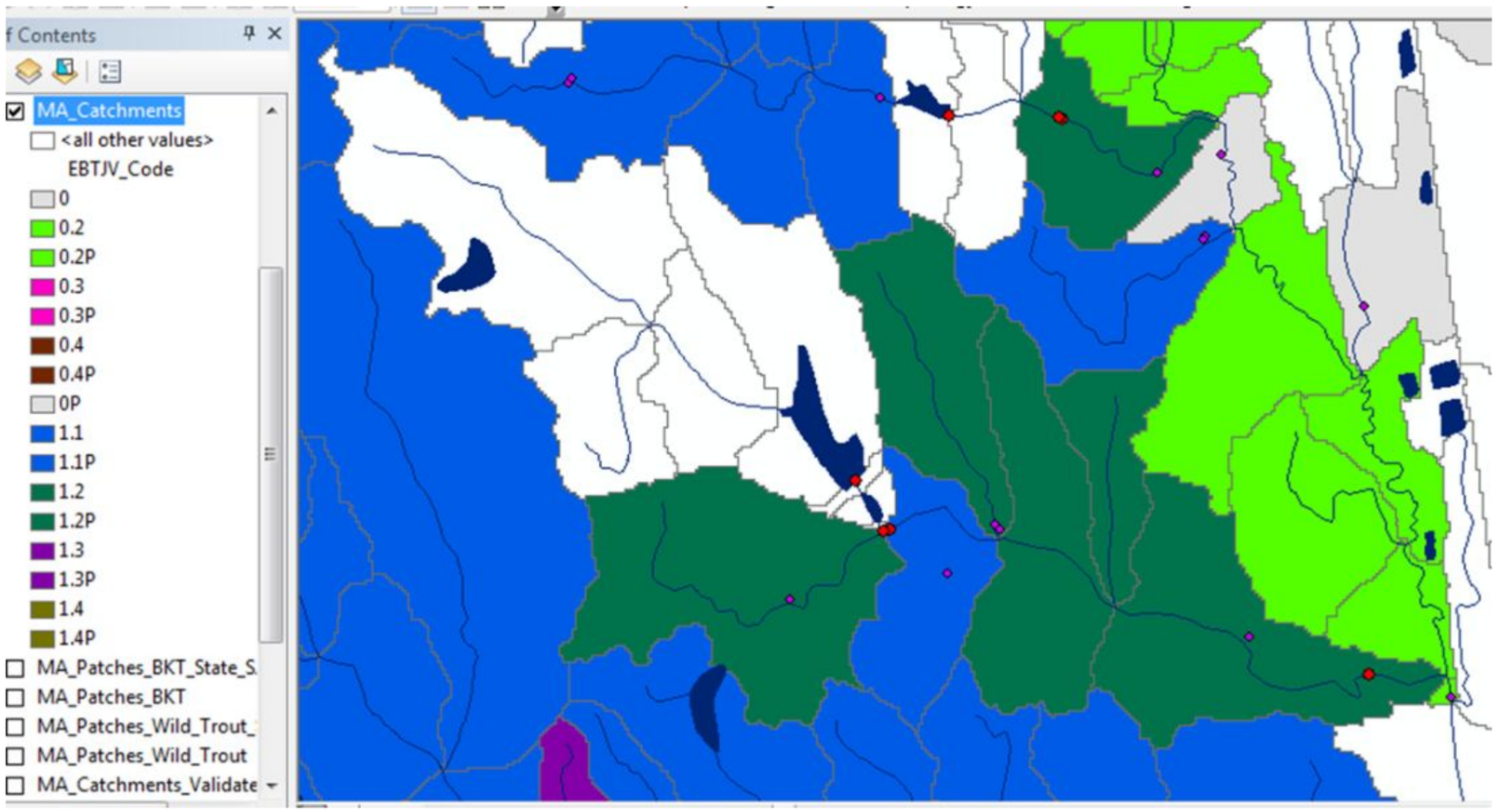


Credit: Eastern Brook Trout Joint Venture

Trout Unlimited's Conservation Success Index



Catchment Scale Assessment of Wild Brook Trout
2016 data and rule set



Allopatric Brook Trout (1.1)

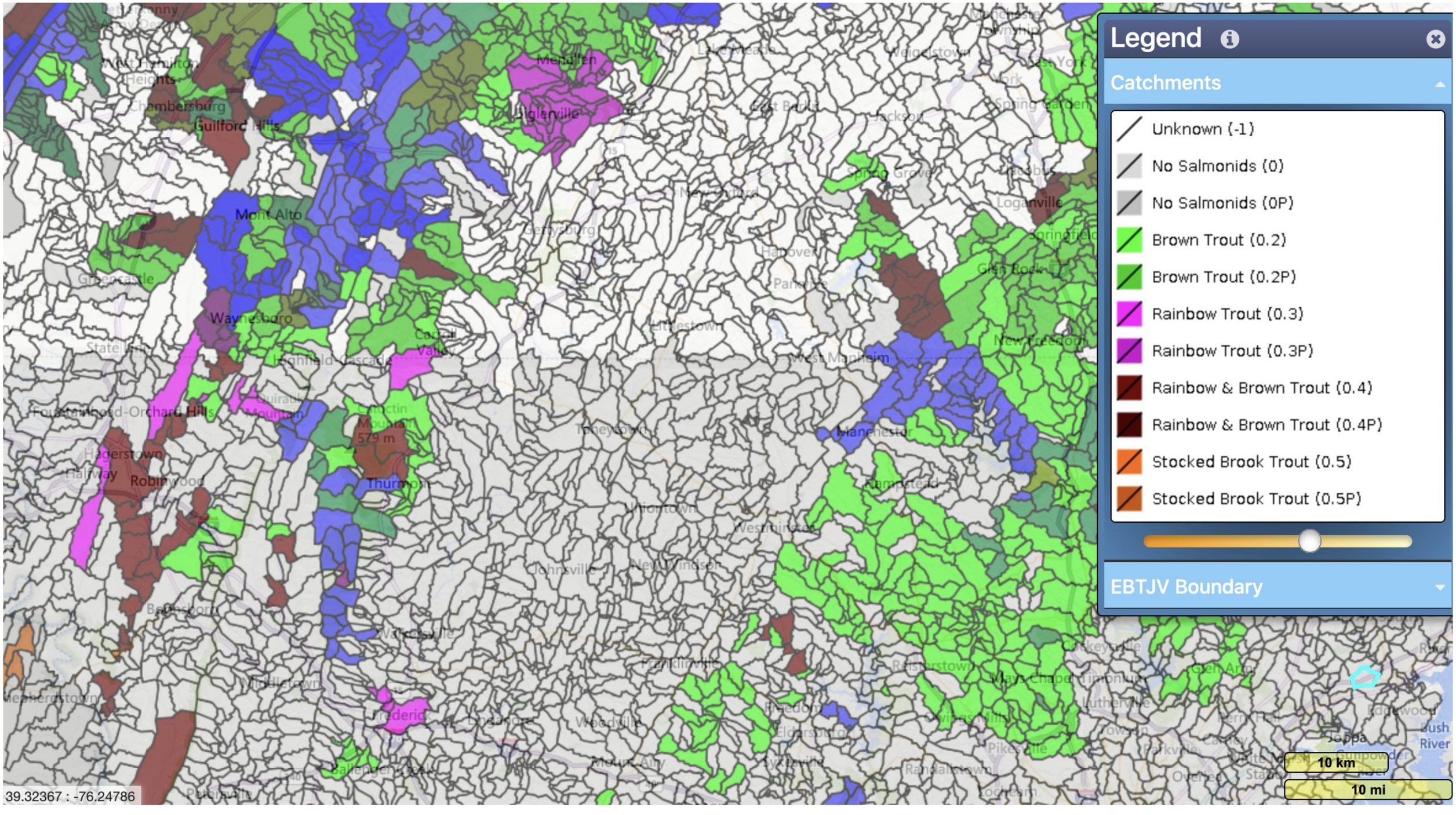
Sympatric w/Brown Trout (1.2)

Sympatric w/Rainbow Trout (1.3)

Sympatric w/Brown Trout & Rainbow Trout (1.4)

No wild Brook Trout Present (0, 0.2, 0.3, 0.4)

Catchment Scale Assessment of Wild Brook Trout



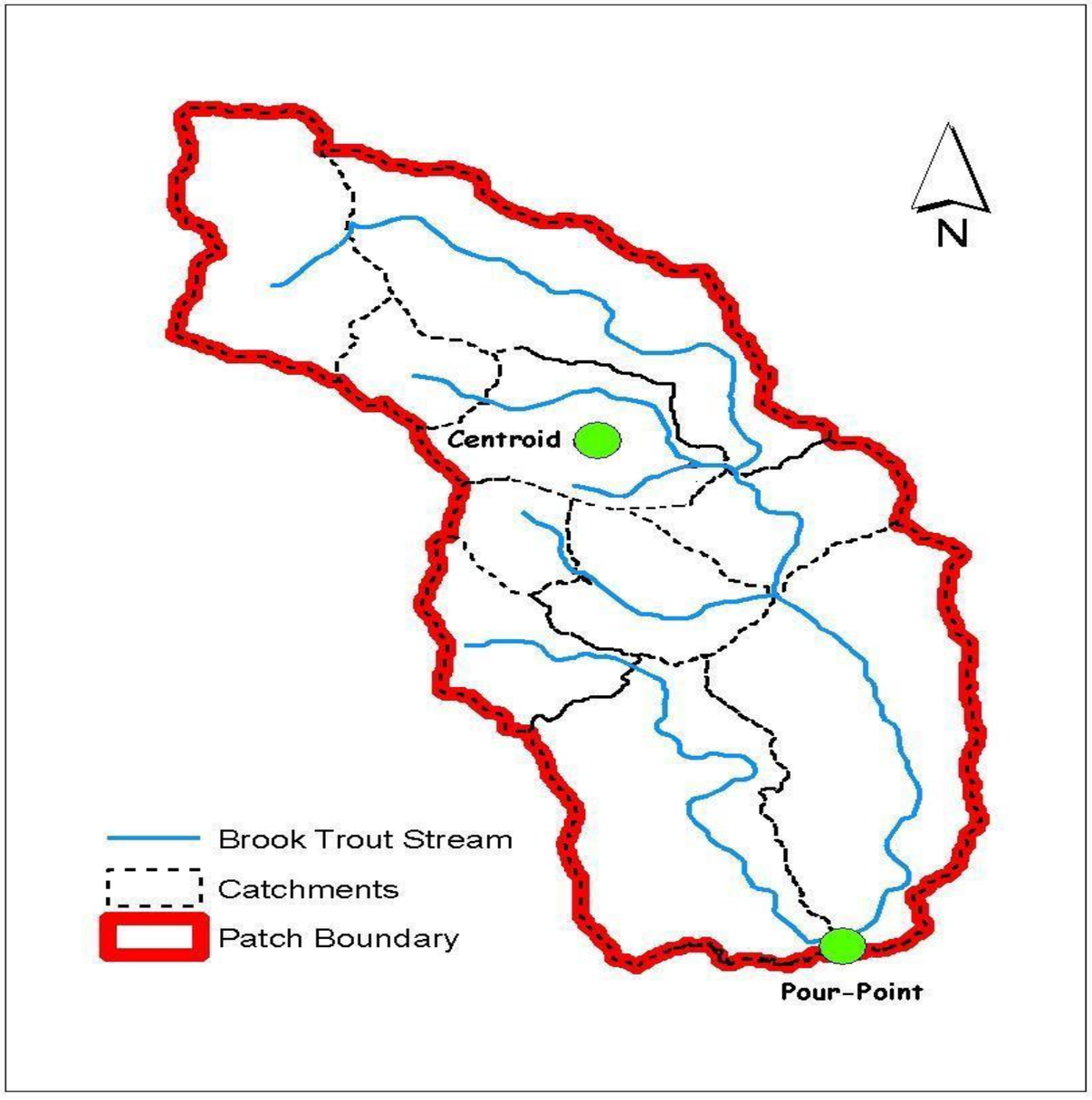
2016 assessment web tool (still publicly available)
https://rpccr.ebtjv.de/

Catchment Scale Assessment of Wild Brook Trout

- **"Patch"= a group of contiguous catchments occupied by wild brook trout.**

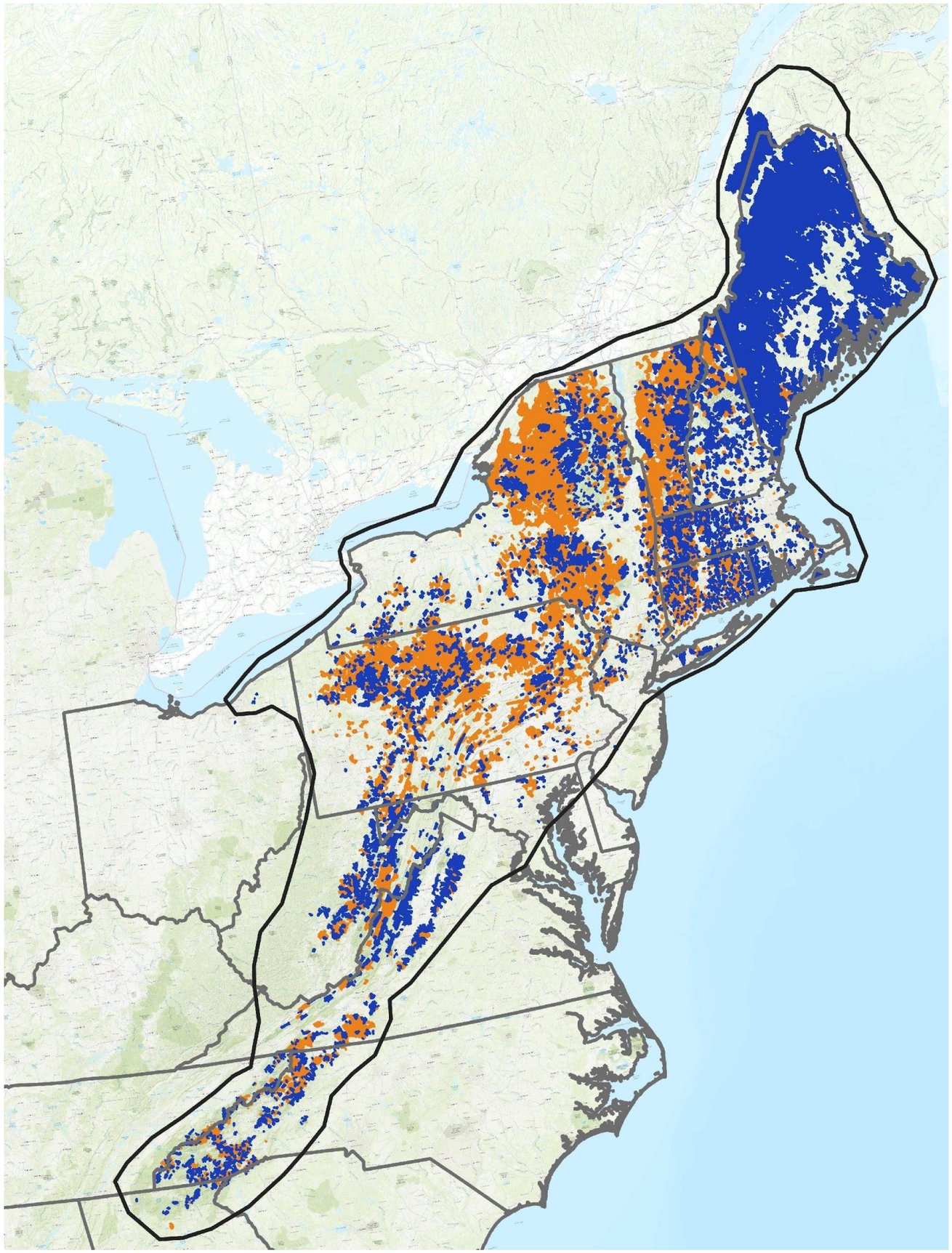
- **Patches are not connected physically because of the presence of dams, warm water habitat, and/or invasive species.**

- **Patches are assumed to be genetically isolated populations.**



Catchment and Patch Level Analyses 2015

Using NHD+, occupancy point data and rulesets



Credit: Eastern Brook Trout Joint Venture

Catchment and Patch Level Analyses 2015

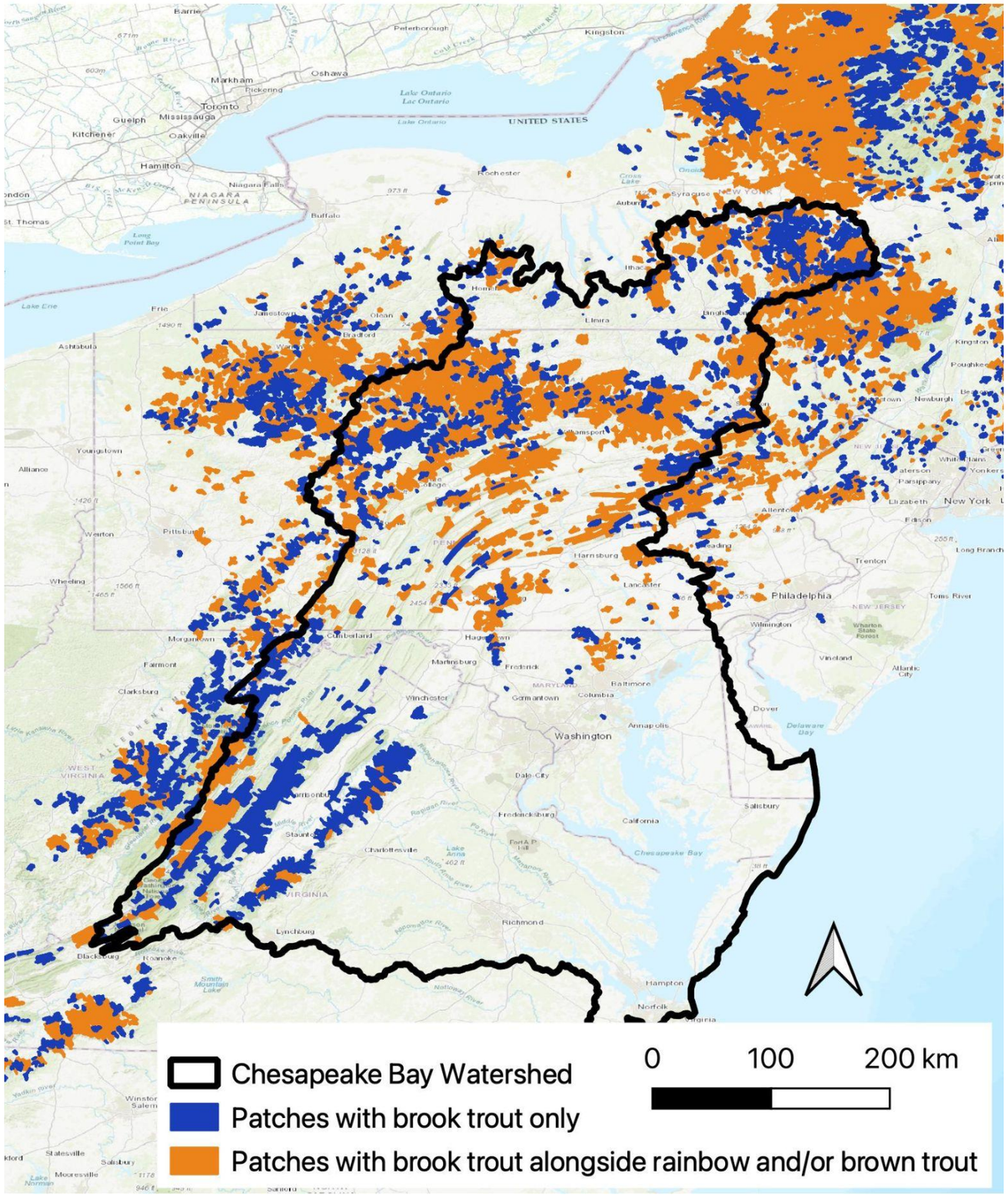
Using NHD+, occupancy point data and rulesets

Patches with brook trout only

Patches with brook trout alongside rainbow trout and/or brown trout

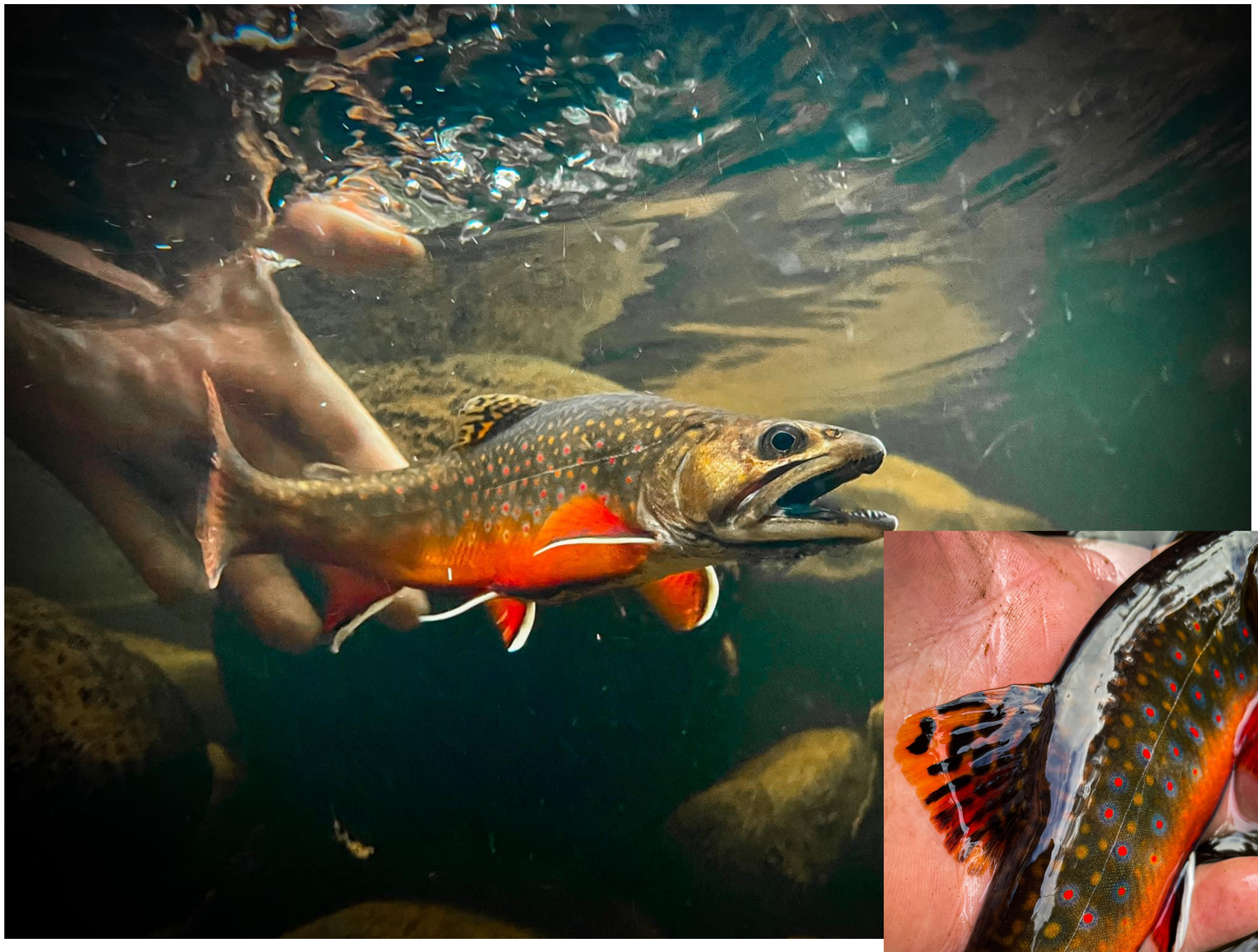
Historic brook trout eastern US range

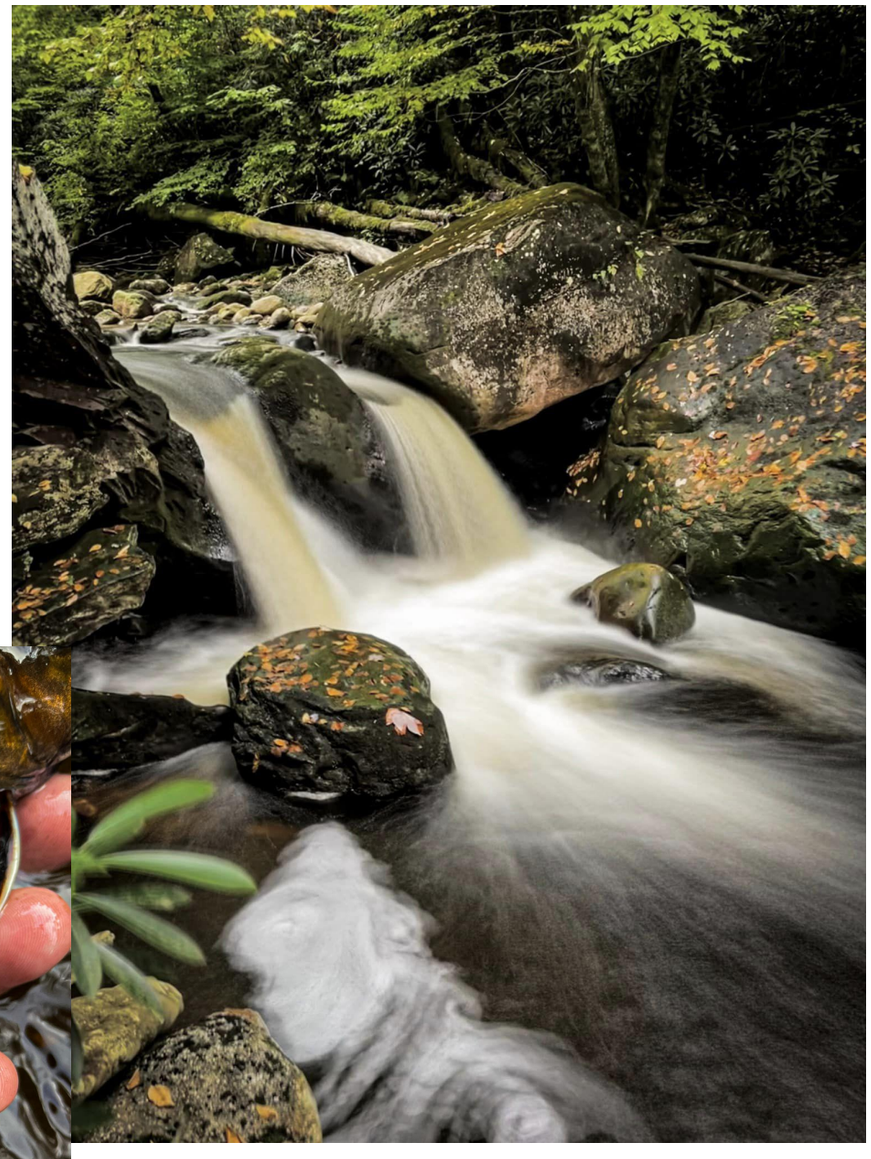
EBTJV wild brook trout patches, 2016
Chesapeake Bay Watershed

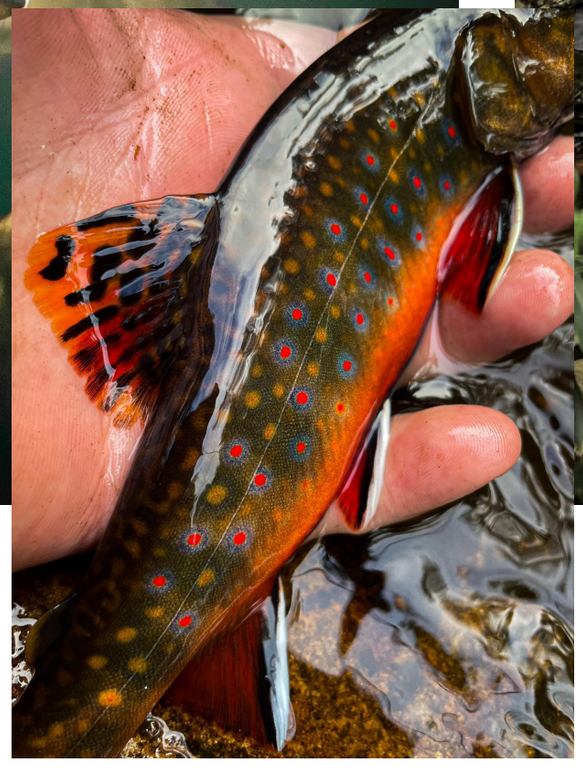


Credit: Eastern Brook Trout Joint Venture

Brook trout as a priority species

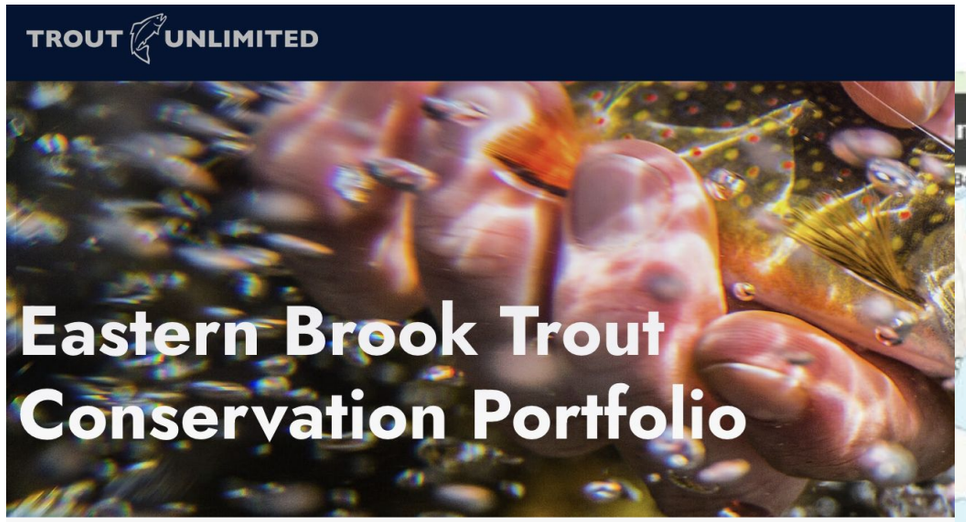


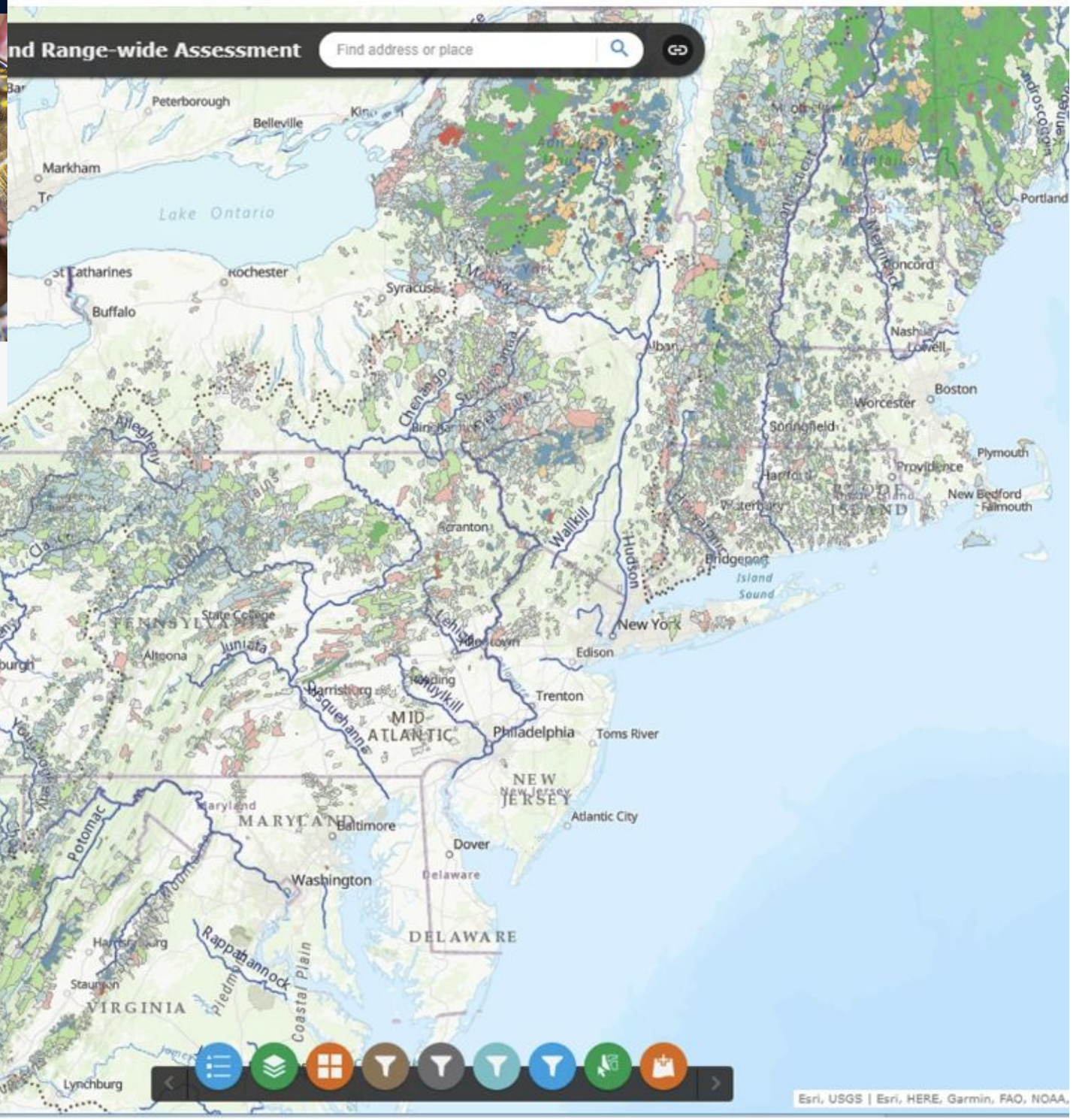




Credi:Ryan Cooper

Brook trout as a priority species





Brook trout as a priority species

Through the Chesapeake Bay Watershed Agreement, *the Chesapeake Bay Program has committed to…*

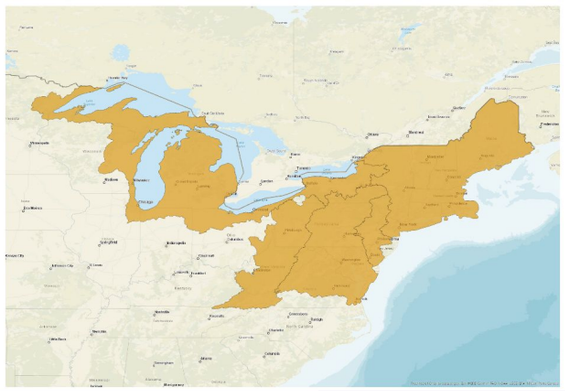
Goal: Vital Habitats - Restore, enhance and protect a network of land and water habitats to support fish and wildlife

Outcome: Restore and sustain naturally reproducing brook trout populations in Chesapeake headwater streams with an eight percent increase in occupied habitat by 2025.

This baseline uses 2016 EBTJV data

Brook trout as a priority species

A History of NFWF's Focus on Brook Trout



NATIONAL FISH AND WILDLIFE FOUNDATION NFWF

Combined Business Plan Strategies and Outcomes

Priority	Strategies	Performance Metrics	Species Outcomes
 Aquatic Connectivity	Replace failing culverts Remove derelict and under-utilized dams	362 barriers removed 4,255 upstream miles opened	82 brook trout population patches sustained or improved
 In-Stream Habitat	Enhance habitat with large wood additions Reconnect streams to floodplains	1,650 miles improved	
 Upland Stressors	Reforest riparian buffers Reduce erosion and polluted runoff	2,320 miles of buffer restored	

Brook trout as a priority species

NFPP BIL FY2022 and FY2023

Funding for Brook Trout

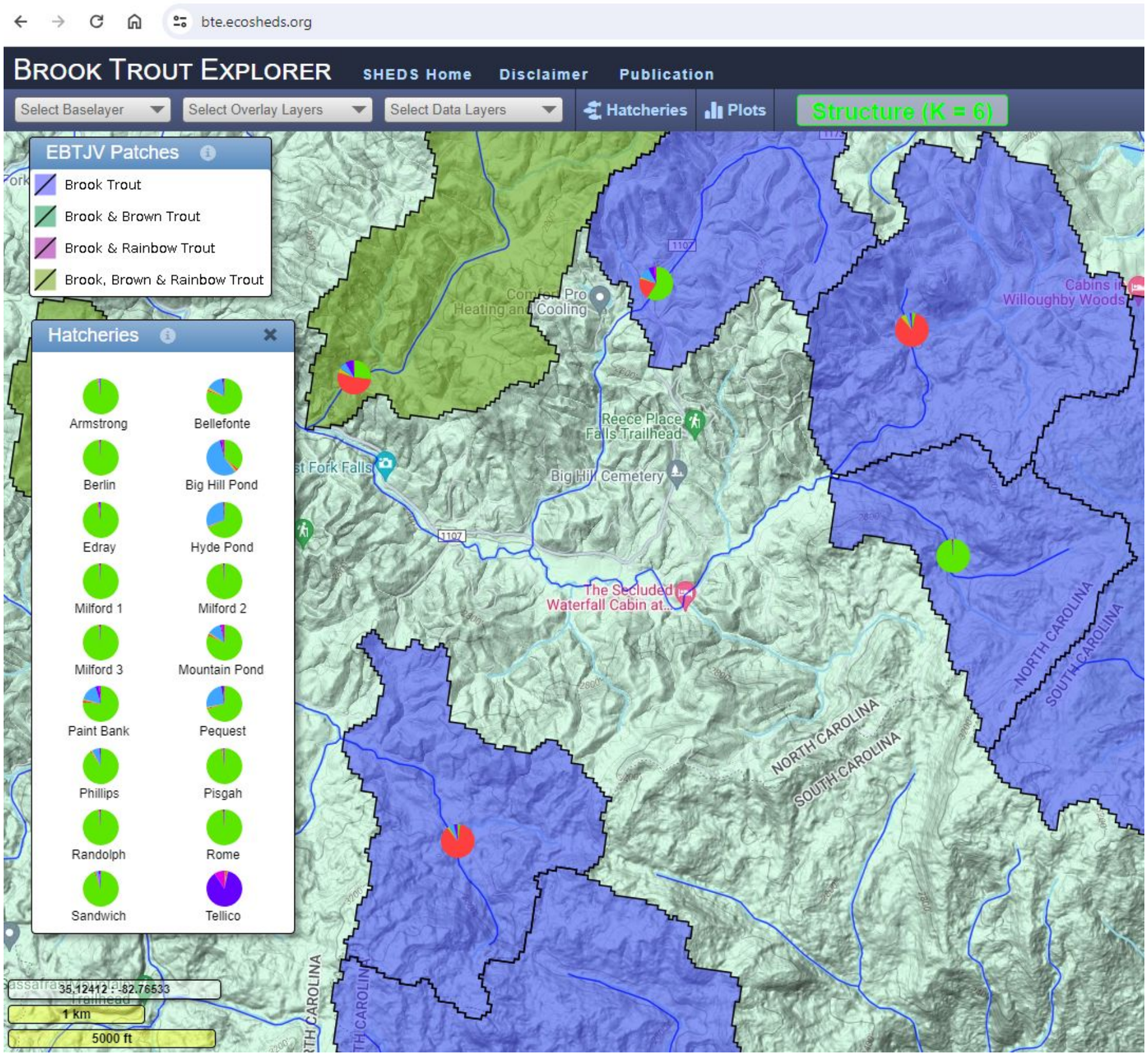
NFPP BIL funded **9 projects** across **6 states** that either directly or indirectly benefitted Brook Trout.

Brook Trout was the target species for 5 of the 9 projects funded.

Total amount awarded was **$8,417,650**, which leveraged **$8,617,281** in partner funding.

When completed, these projects will reopen **568 stream miles**, restore **330 acres** of habitat by removing over **38 instream barriers**.

Brook Trout Explorer



Updating the EBTJV Catchment Data

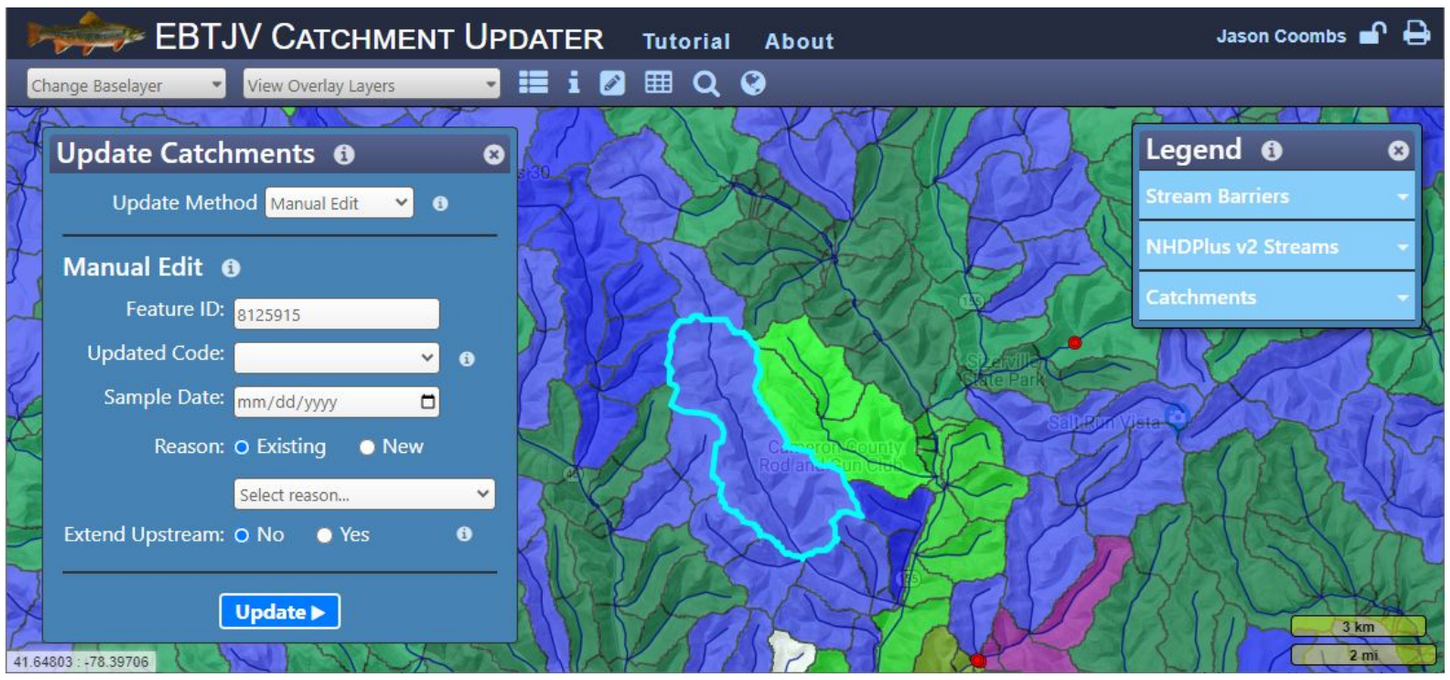
Objectives

- Create an online application
- Train states/federal resource agency staff to upload and QAQC catchment definitions remotely
- Update catchment classifications (species and occupancy) for newer data based on field samples
- Re-patch the data, assess metrics

Updating the EBTJV Catchment Data

Why an online portal?

- Eliminate ‘outsourcing’
- Give resource managers more control and ownership
- No specialized software required
- Flexibility in update timing



Updating the EBTJV Catchment Data

Methods – Cloud resources

- Amazon Web Services (AWS)
  - EC2 Instance
    - Flexible - Easily changed to meet needs
    - m6a.xlarge
      - 4 vCPUs
      - 3.6 GHz
      - 16 GiB RAM
      - $0.1728 per hour

Updating the EBTJV Catchment Data

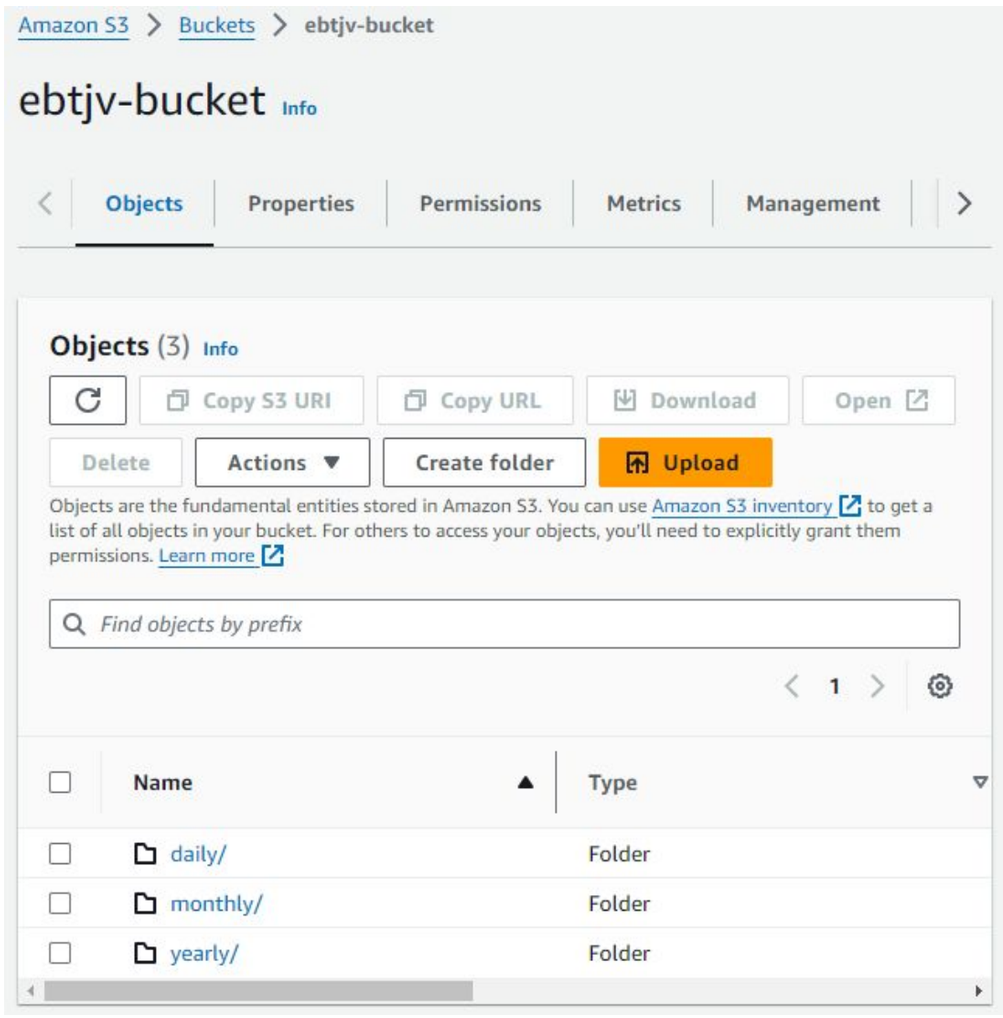
Methods – Open Source Software

- PostgreSQL & PostGIS
  - Backend spatial database
- GeoServer
  - Spatial data server
- Leaflet
  - Javascript library for interactive mapping
- Node.js
  - Server side scripting language
- D3
  - Javascript library for data visualization

Updating the EBTJV Catchment Data

Methods – Data Backup

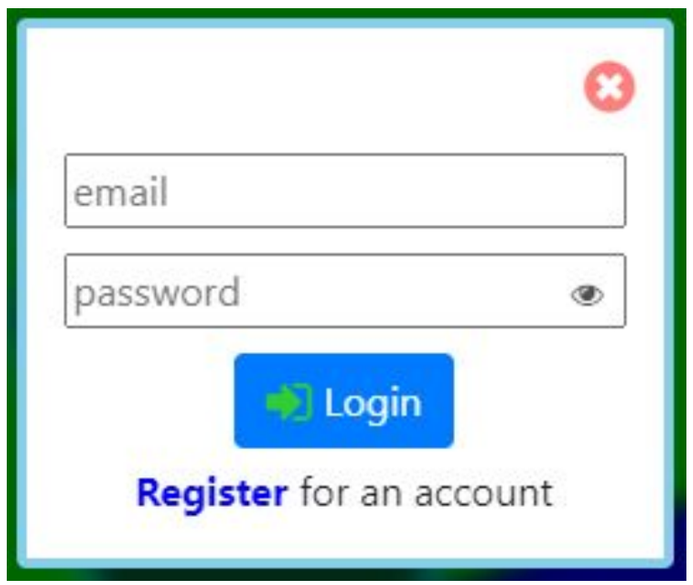
- AWS S3 Glacier Flexible Retrieval
  - $0.0036 per GB/month
- Cron automated tasks
  - Daily
    - Current catchment table
    - Retain for one year
  - Monthly
    - Complete PostgreSQL database
    - Retain for two years
  - Annually
    - Complete PostgreSQL database
    - Retain indefinitely



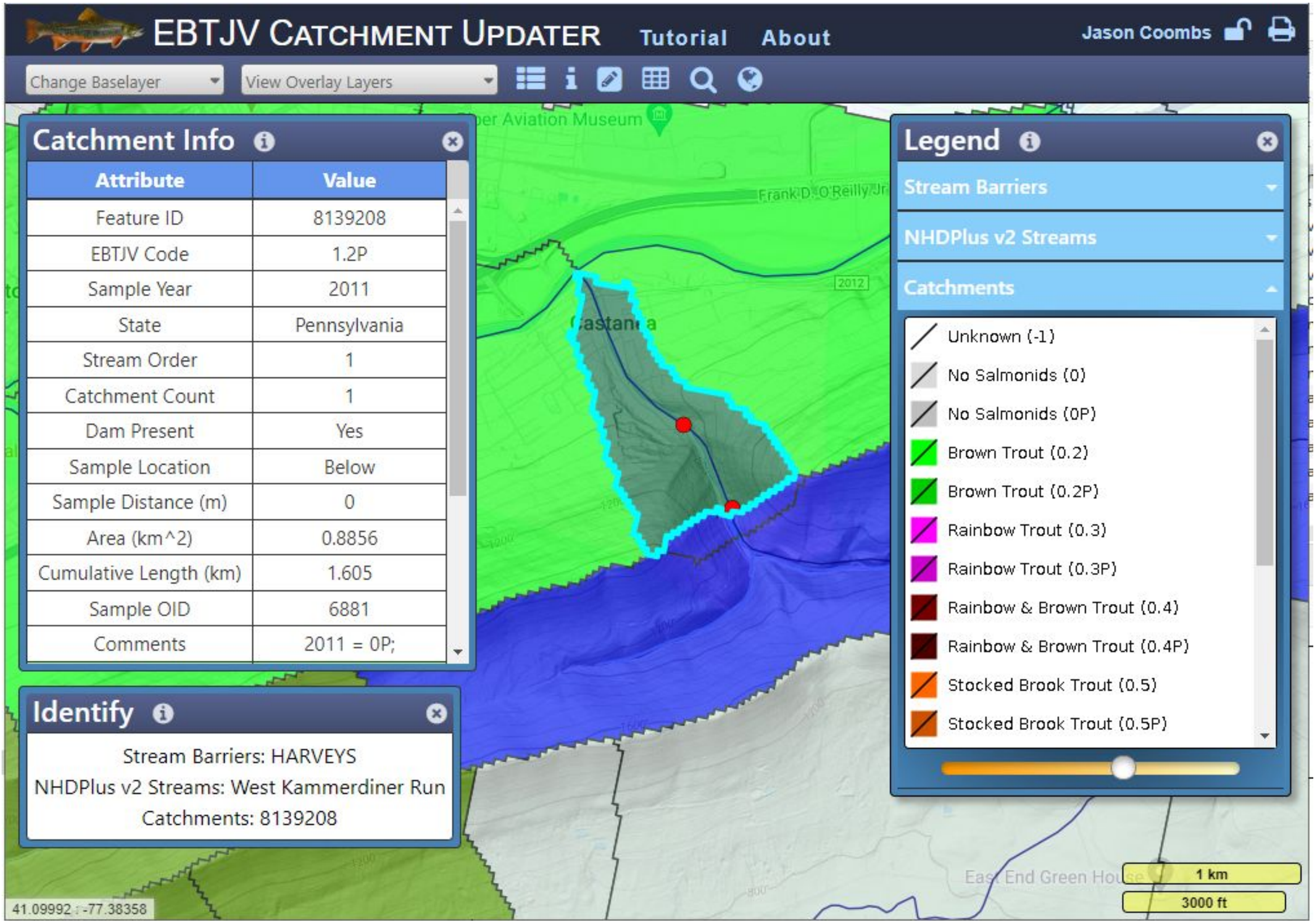
Updating the EBTJV Catchment Data

Methods – Accounts

- Self-registration
  - Email verification
- Three account types
  - Registrant
    - Registered but not approved, can’t login
  - Member
    - Can login & view data
  - Admin
    - Can login & edit data
      - State specific editing privileges



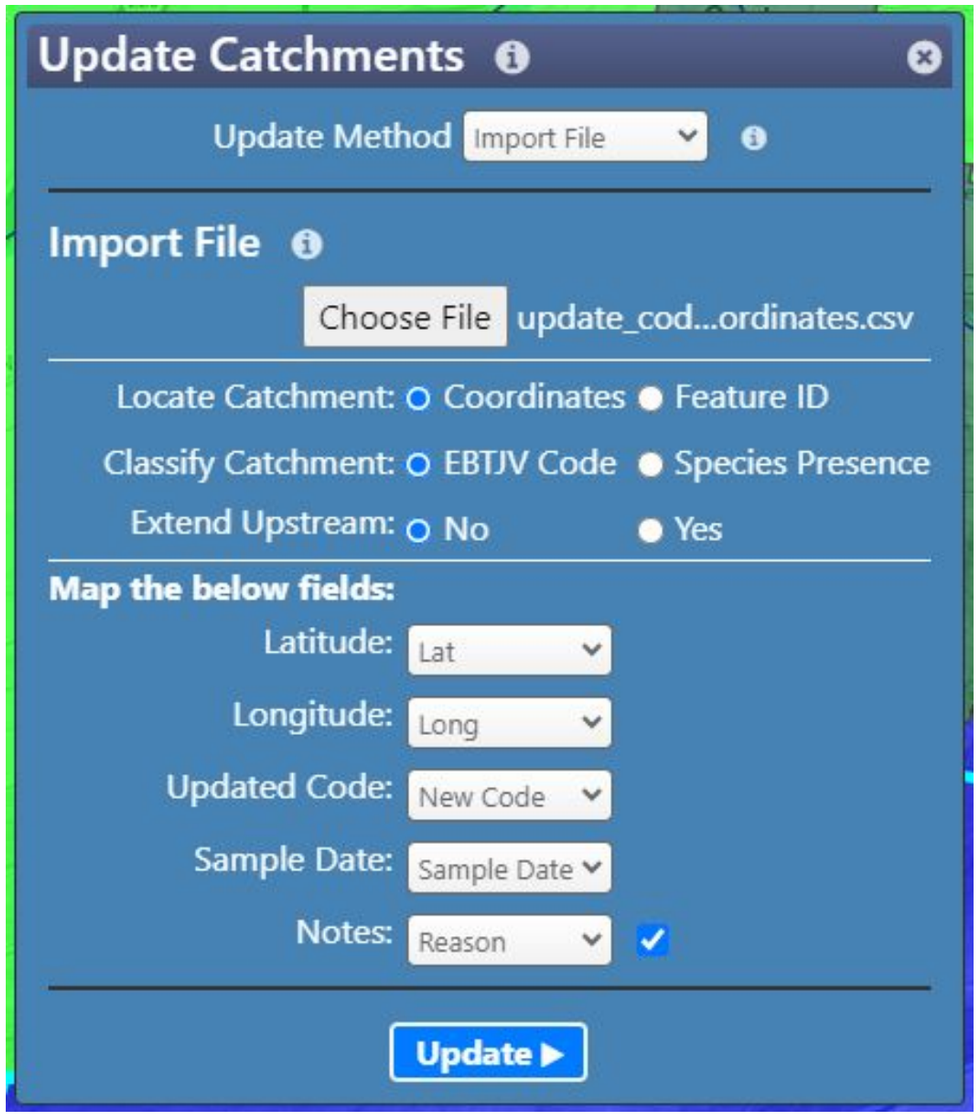
Updating the EBTJV Catchment Data

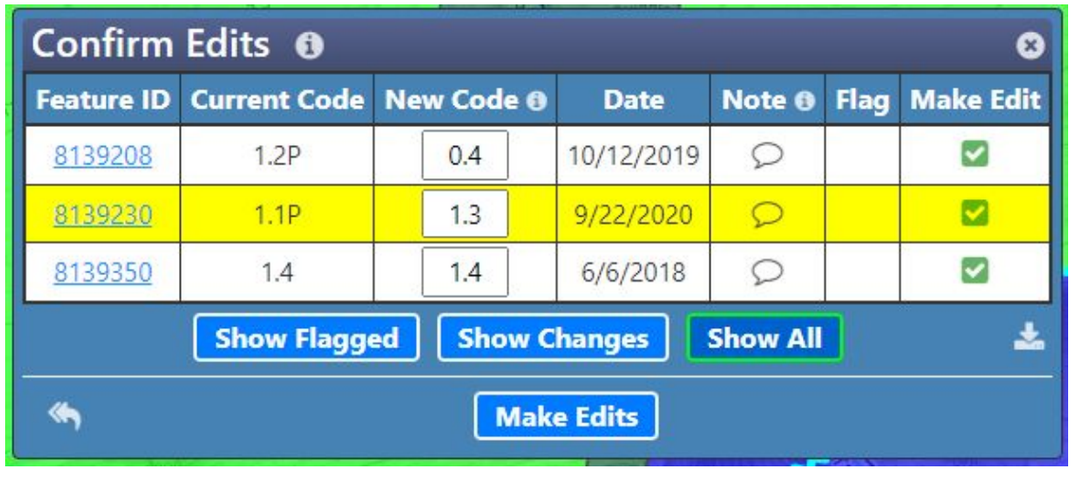


Updating the EBTJV Catchment Data

Methods – Making Edits

- Format Data
  - Multiple options
  - Accepts CSV or Excel files
- Map fields
- Upload records
- Confirm edits
- Verify
- Manual edits
- Description of manual override (biologist best judgement, etc)





Updating the EBTJV Catchment Data

Future capabilities of the application

- Edit ‘Undo’ button
- Enhanced edit search
  - Search by date or editor
  - Zoom to catchment
- Improve ‘Upstream’ extension
- Create account management page

EBTJV Catchment Data - What analyses are possible?

First:

- 2023 v. 2016 catchment and patch metrics
- Progress towards numeric goals for occupancy
- Geographical summary by state or broader region

Range-wide Goals and Objectives, supported by EBTJV assessment.

GOALS	**OBJECTIVES (** by 2022)
Increase the average size (km^2) of wild brook trout patches, which is currently 19 km^2	Increase the size (km^2) of 30 wild brook trout patches.
Restore wild brook trout to catchments where they were extirpated	Establish wild brook trout in 15 extirpated catchments.
Maintain the current number of wild brook trout patches (i.e. no net loss)	-Retain at least 6,022 allopatric wild brook trout patches (1.1) across the EBTJV geographic range. -Retain at least 3,838 sympatric wild brook trout patches (1.2, 1.3, and 1.4) across the EBTJV geographic range.
Increase connectivity within and among wild brook trout catchments	Complete Aquatic Organism Passage projects within 45 wild brook trout catchments.

EBTJV Catchment Data - What analyses are possible?

Future:

- ‘Address the ‘why’ - explain the changes we see
- Layer other habitat data such as landuse or temperature
- Comparisons in focal areas with abundance data (Yoichiro Kanno)
- Reflect on multi-state collaboration and conservation efforts. Can we assemble data on projects done ‘for brook trout’ at the catchment scale?
- Highlight Chesapekae Bay region and work by TU/EBTJV for CBP in classifying projects done

FUNDING FROM

DATA AND COLLABORATION FROM

Great Smoky Mountains National Park
US Forest Service
Connecticut DEEP
Eastern Band of Cherokee Indians
Georgia DNR
Massachusetts DFW
Maine IFW
Maryland DNR
New Jersey DEP DFW
New York DEC
New Hampshire F&G
North Carolina WRC
Ohio DNR
Pennsylvania FBC
Rhode Island DEM
South Carolina DNR
Tennessee WRA
Vermont FWD
Virginia DWR
West Virginia DNR
Trout Unlimited
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