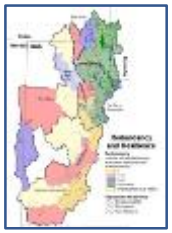
Conservation Planning and TU:
Brook Trout Conservation Portfolio Assessment and Tools

Kurt Fesenmyer, Amy Haak, Shawn Rummel, Matt Mayfield, Sean McFall, and Jack Williams

How TU Uses Conservation Planning Tools

Evaluate conservation value & landscape context @ regional scale

TU planning tools (CSI, Conservation Portfolio), recovery plans, etc.

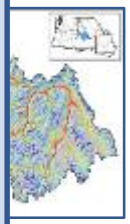


Priority watersheds

The Conservation Success Index evolves…

- Conservation Portfolio
- Multi-species perspectives
- Integration of finer-scale information
- Data delivery with web-based tools focused on specific protection, restoration themes
- Simplified versions for broader audience

Watershed plans,
cision support tools, etc.

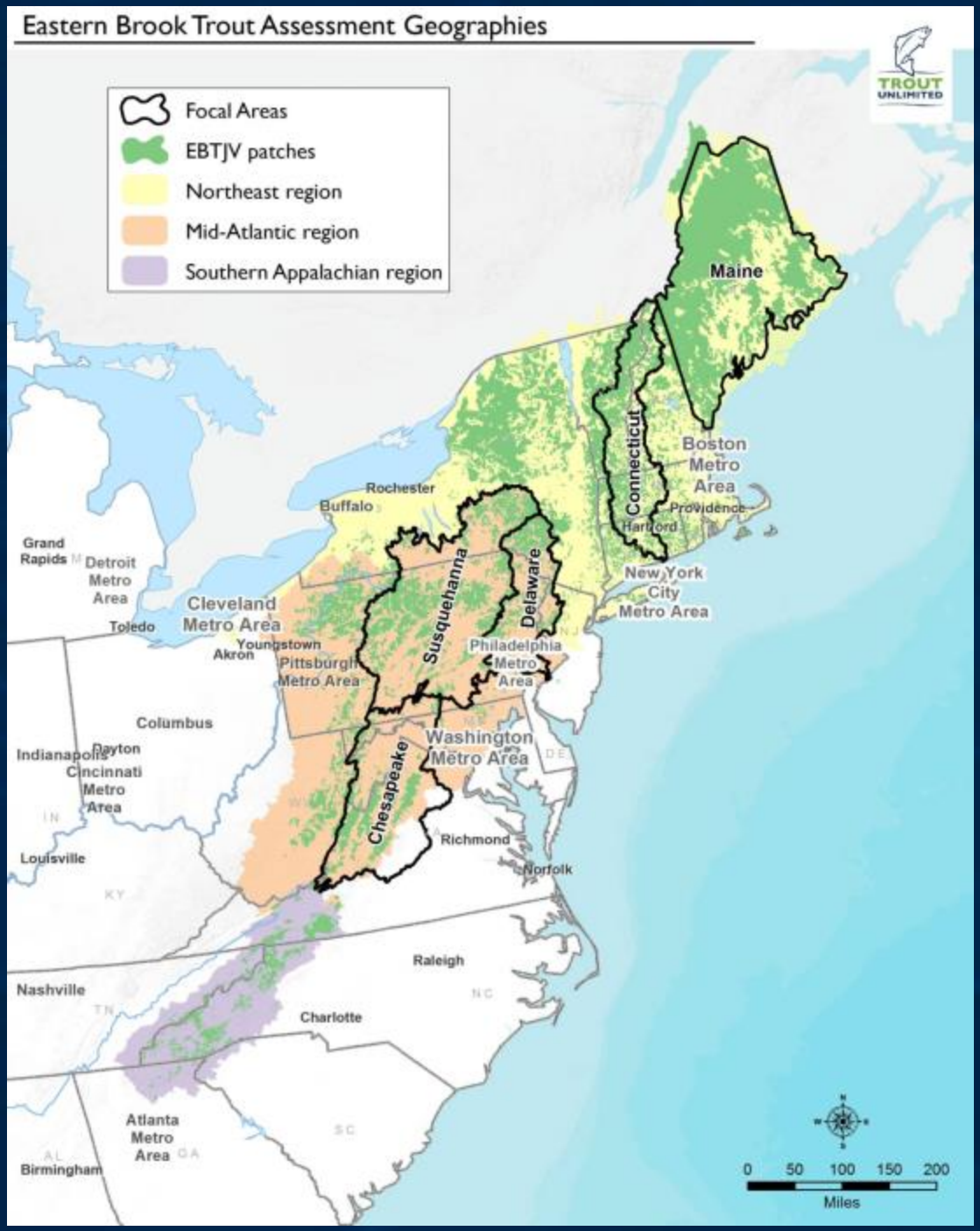


t, local
ner input

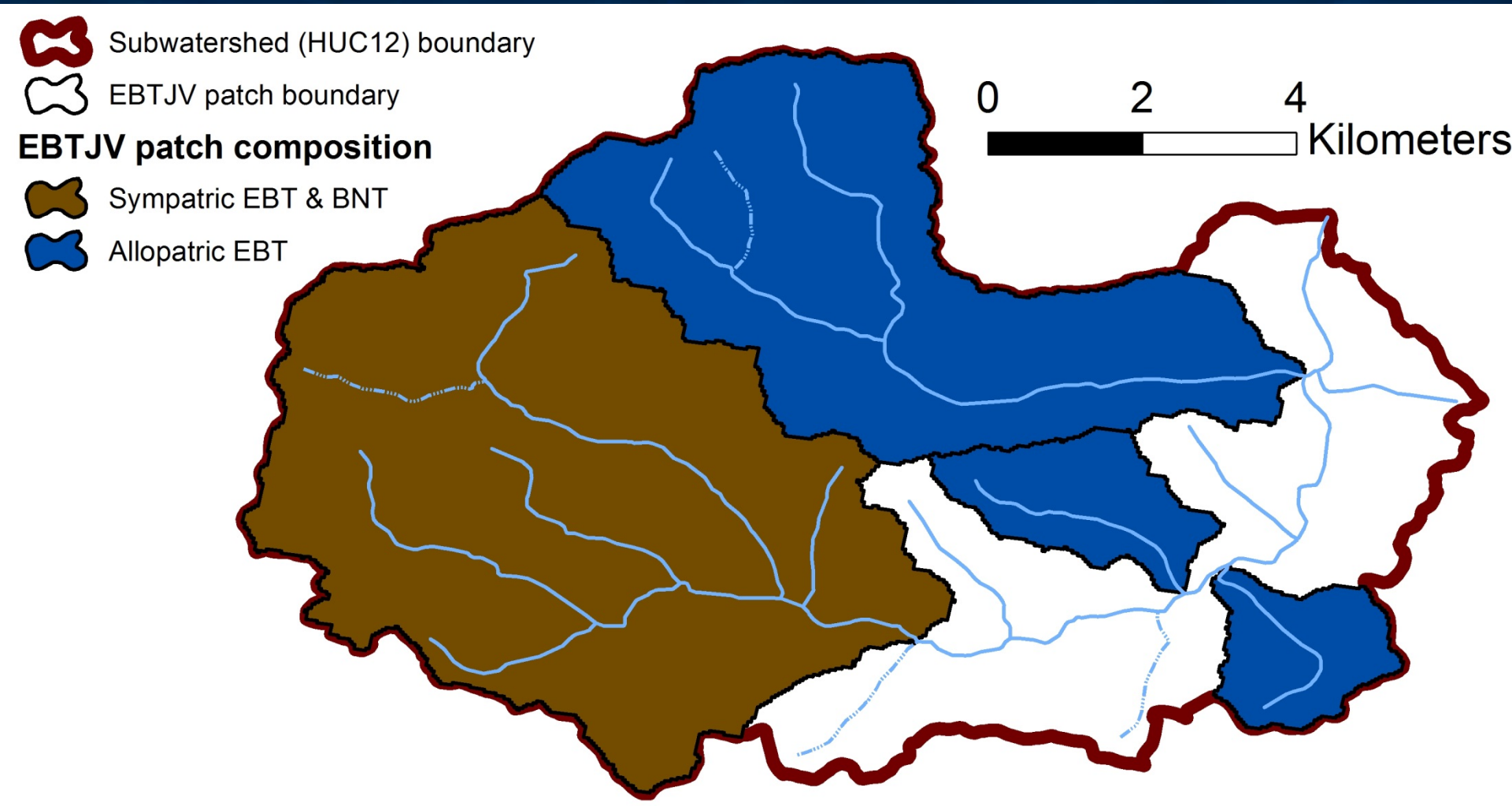
… and has plenty of company

- National Fish Habitat Action Plan
- USFS Watershed Condition Framework
- Landscape-specific tools

TU Brook Trout Assessments: Scales



EBT Portfolio: Scales



BT Portfolio, Range-wide, and Focal Area Assessments

Conservation portfolio

Identify BT strongholds, persistent populations, and unique life histories based on EBTJV data, stream habitat diversity, and BT habitat suitability

→ Identify critical and missing elements

Range-wide assessment

Characterize habitat integrity and future security of patches using widely available GIS datasets

→ Determine conservation value and strategies

Focal area assessment

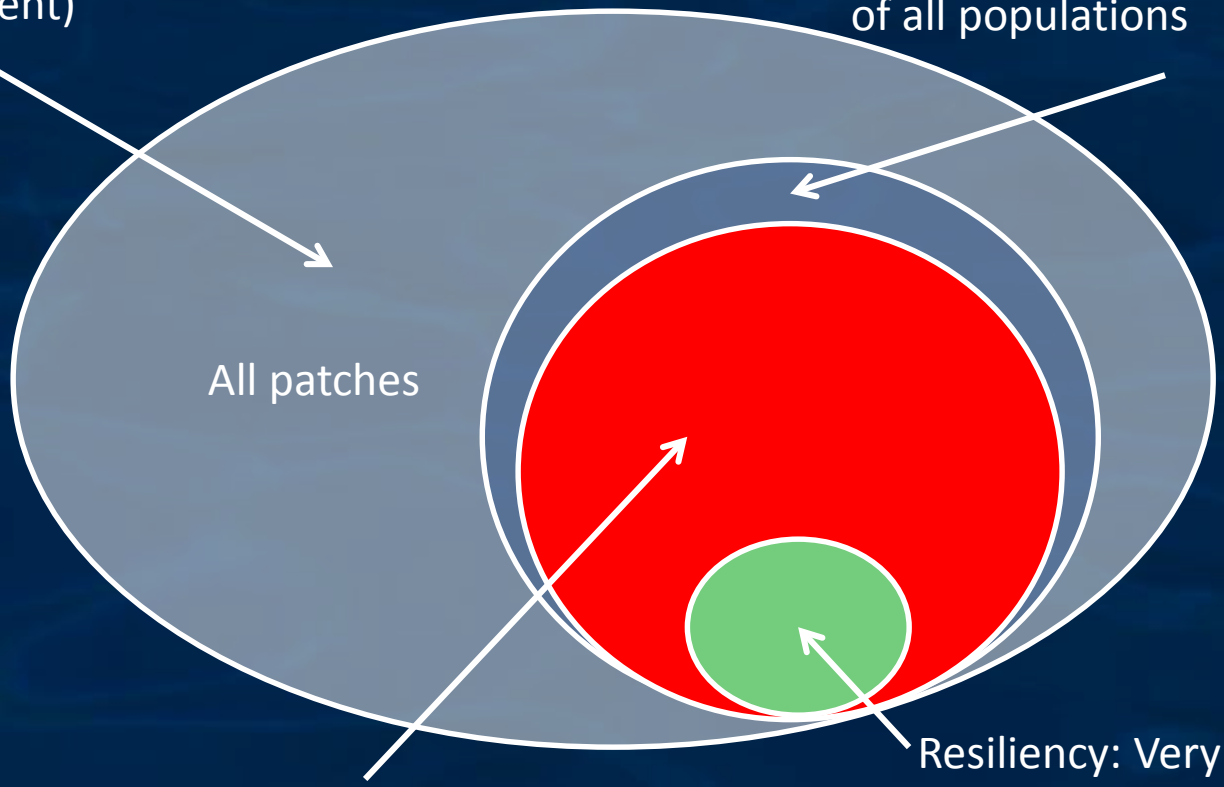
Characterize BT populations, habitat integrity, and future security of patches using focal area-specific GIS datasets + other data or plans

→ Refine conservation needs and strategies

"3-R" Framework: Diversity confers long-term viability in face of disturbances and environmental variability (Haak and Williams 2012)

(Other populations – small, resident)

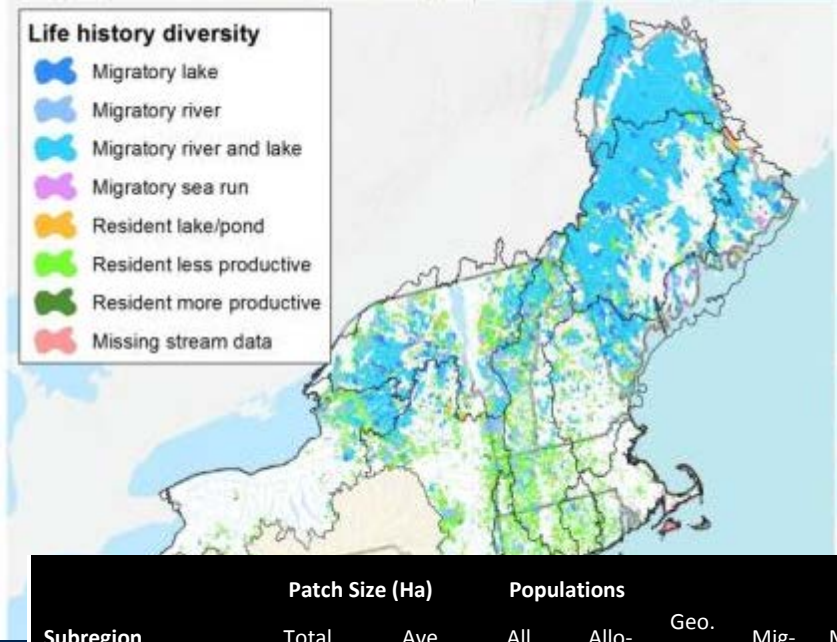
Representation: Unique life histories (river, lake, sea-run migratory; small ponds in ME; alkaline streams) – 40% of all populations

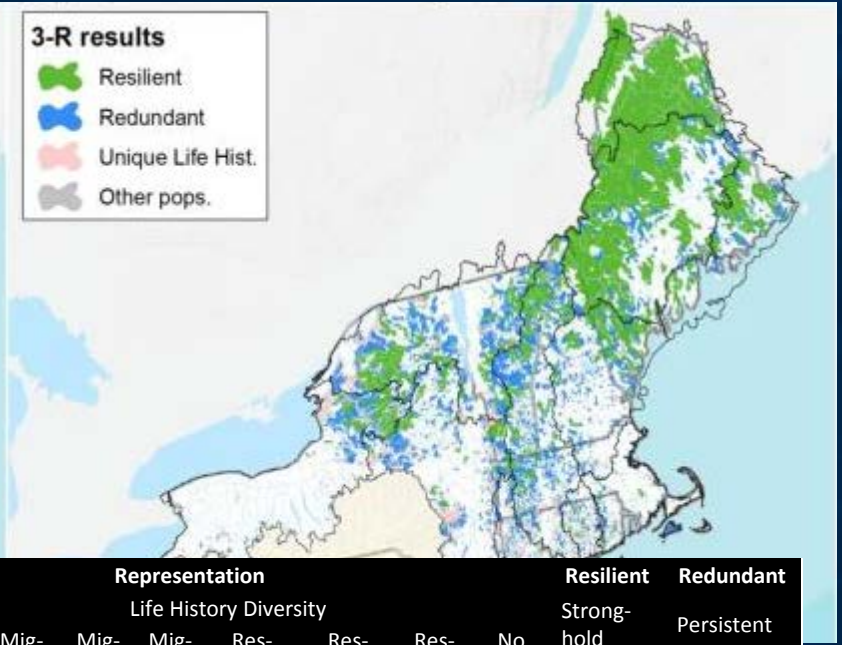


Redundancy: Populations large enough to have demographic persistence - 35% of populations

Resiliency: Very large stronghold populations likely able to withstand environmental disturbance - 5% of populations

Portfolio Results – Northeast Region





Subregion	Patch Size (Ha)		Populations		Representation									Resilient	Redundant
						Life History Diversity									
	Total	Ave.	All	Allo-patric	Geo. Div.	Mig-Lake	Mig-River	Mig-R&L	Mig-Sea	Res-↑Prod	Res-↓Prod	Res-Pond	No Data	Strong-hold pops.	Persistent pops.
Cape Cod	164,410	694	237	213	91	1	3	0	16	0	204	2	11	5	60
Saco-Merrimack	897,080	1,400	641	601	145	112	14	35	1	0	441	33	5	37	310
Total Coastal RI/MA/NH	1,061,490	-	878	814	236	113	17	35	17	0	645	35	16	42	370
Connecticut River	1,547,743	1,540	1,005	698	73	60	50	34	0	16	810	28	7	68	480
Total Connecticut River	1,547,743	-	1,005	698	73	60	50	34	0	16	810	28	7	68	480
Hudson River	1,152,275	1,419	812	385	0	75	24	17	0	18	615	50	13	23	236
Long Island Sound	515,502	863	597	380	149	17	13	2	7	1	530	7	20	8	130
Total Hudson/L.I. Sound	1,667,777	-	1,409	765	149	92	37	19	7	19	1145	57	33	31	366
Coastal Maine	761,195	3,368	226	226	147	63	6	23	16	0	90	20	8	37	150
Interior Maine	3,041,108	6,058	502	491	45	137	10	84	1	2	224	40	4	112	360
Northern Maine	1,783,679	17,660	101	100	0	23	4	28	0	1	26	7	12	37	68
Total Maine	5,585,982	-	829	817	192	223	20	135	17	3	340	67	24	186	578
Great Lakes	806,412	1,133	712	164	712	56	22	26	0	21	558	12	17	20	160
Saint Lawrence	1,769,823	2,493	710	249	0	125	38	53	0	14	409	66	5	54	303
Total St. Lawrence	2,576,234	-	1,422	413	712	181	60	79	0	35	967	78	22	74	463

Range-wide Assessment: Habitat Integrity

Primary factors (non-correlated, high data quality)

- Land use (% riparian forest, % agricultural land use)
- Fragmentation (Road-stream crossing density, overall road density
- Water quality (Acid deposition)

Secondary factors

- Include % forested watershed, dams, mines, oil/gas wells

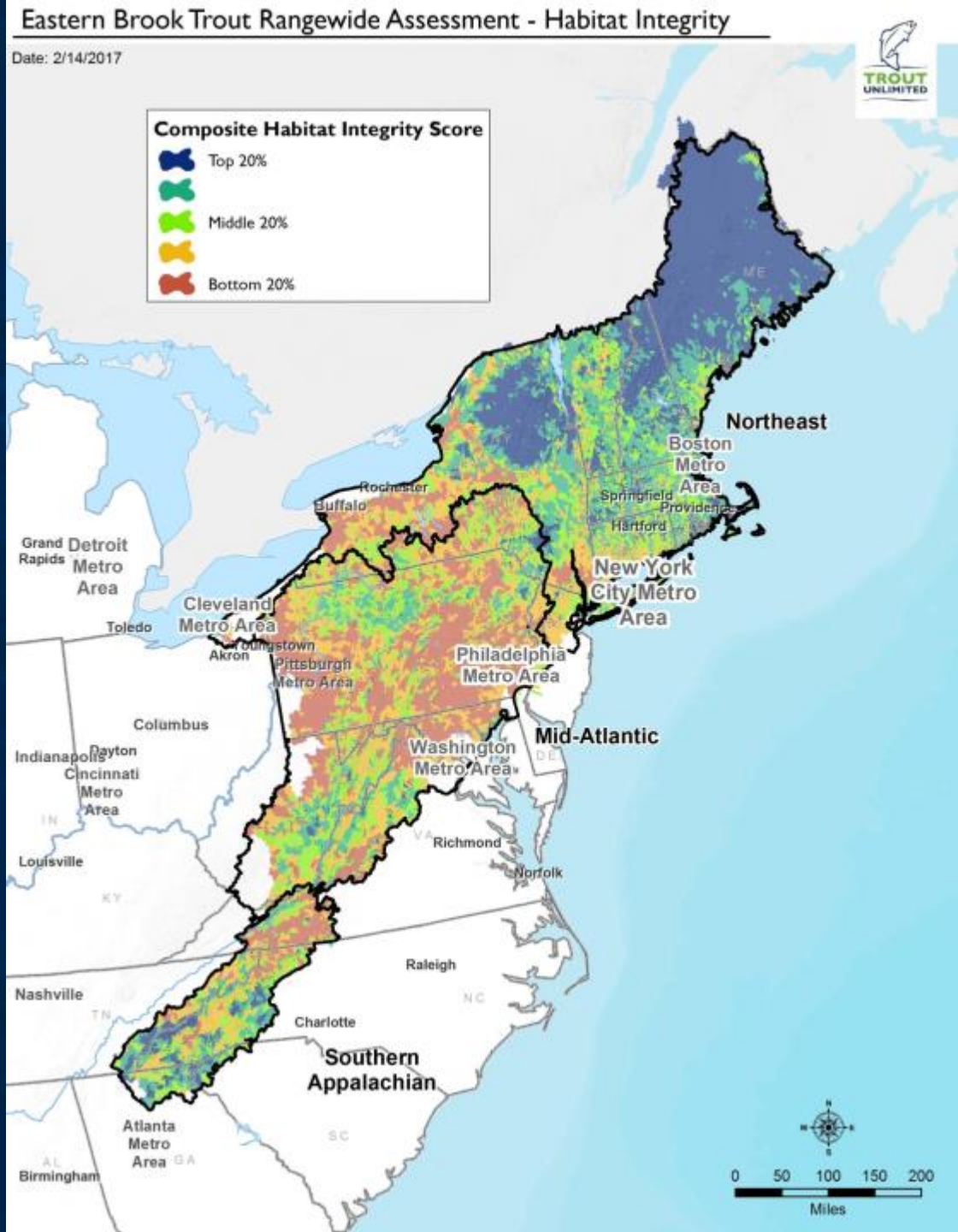
All factors scored as percentile, composite score is average of primary factor percentile scores

Range-wide Assessment: Habitat Integrity

Primary factors (non-correlated, high data quality)

- % riparian forest
- % agricultural land use
- Road-stream crossing density
- Overall road density
- Acid deposition

Reported as percentile scores



Range-wide Assessment: Future Security

Primary factors (non-correlated, high data quality)

- Climate: Stream temperature

Secondary factors

- Include forecast shale gas development, urbanization, karst geology, protected areas

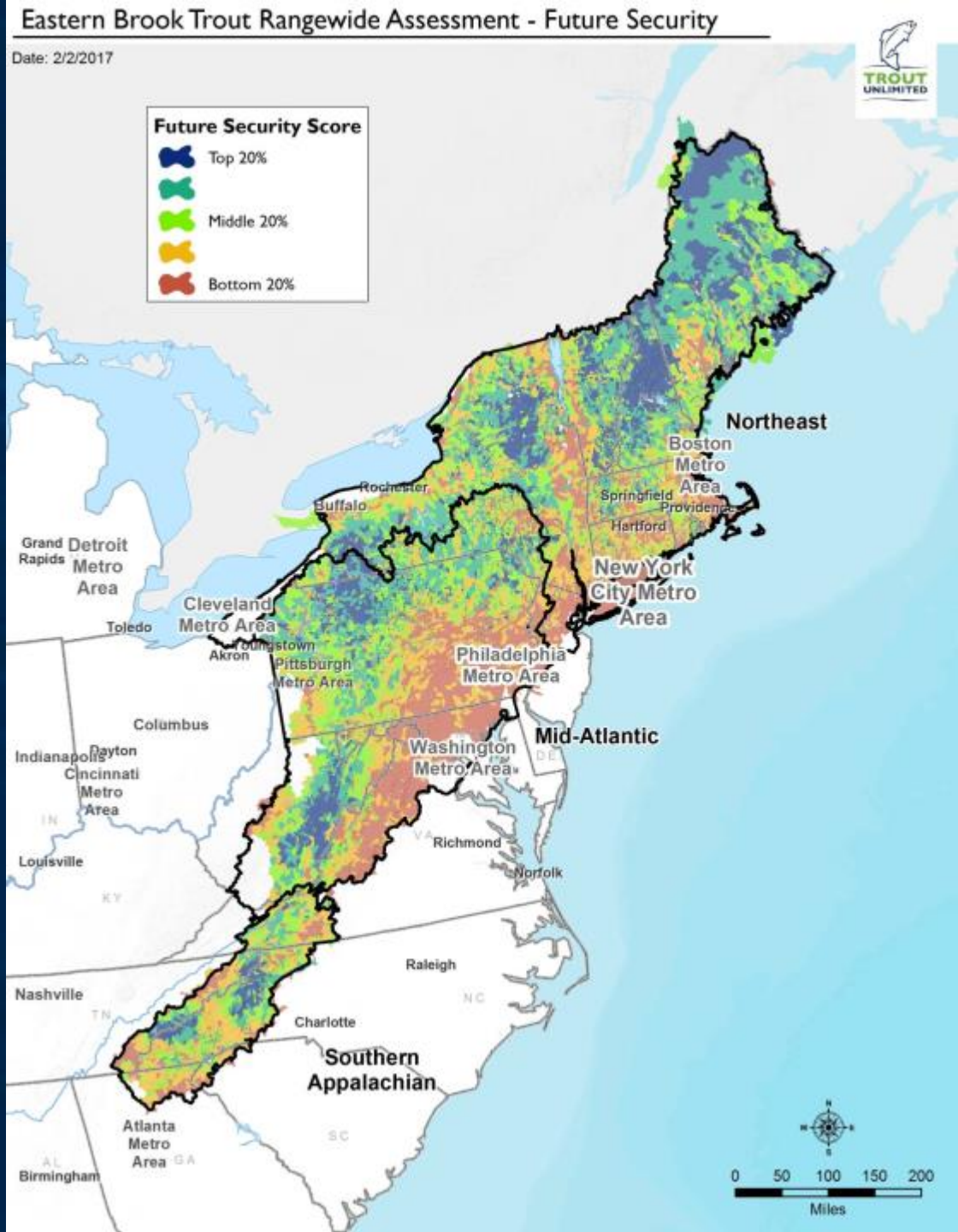
All factors scored as percentile, composite score is average of primary factor percentile scores

Range-wide Assessment: Future Security

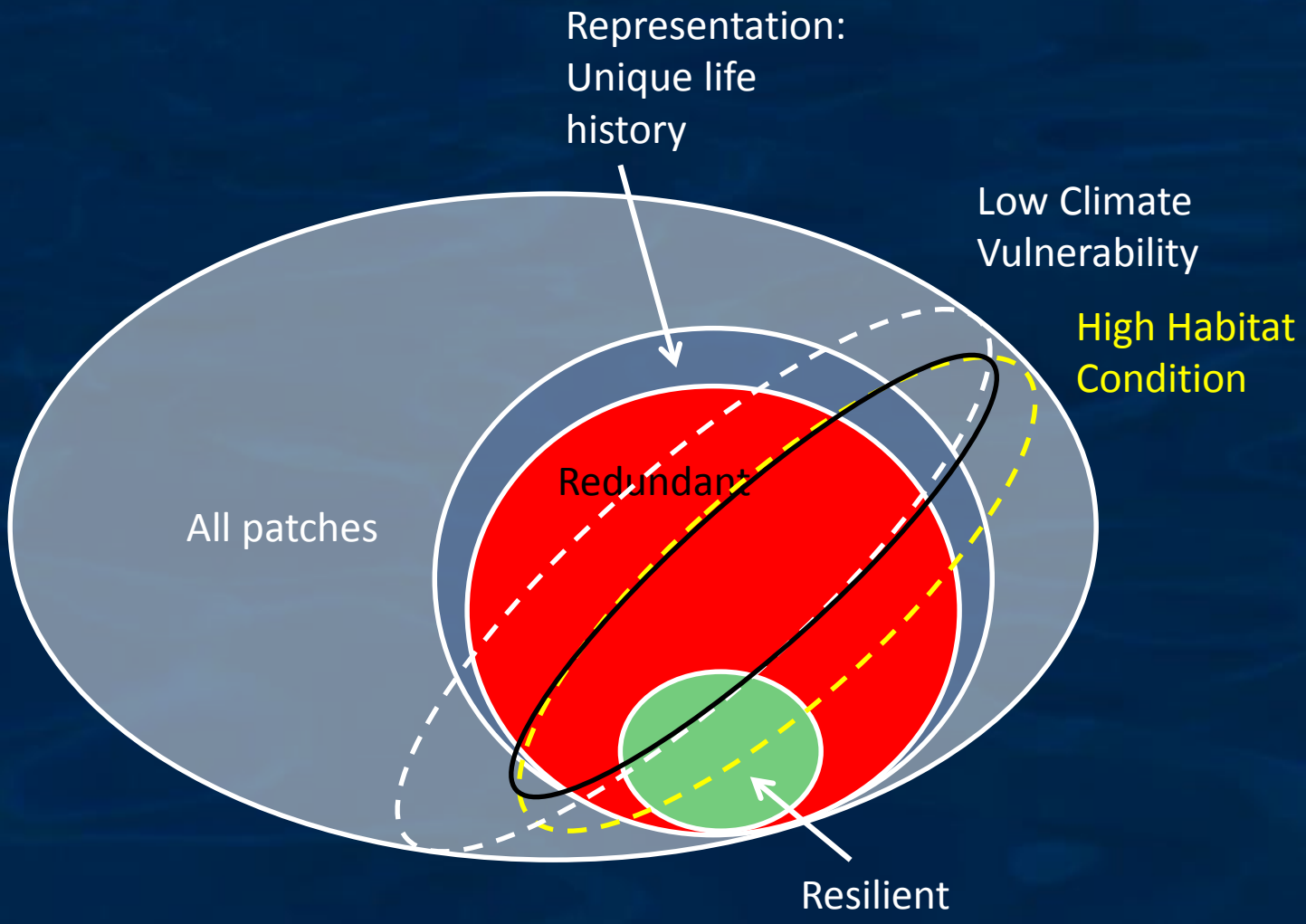
Primary factors (non-correlated, high data quality)

- Stream temperature

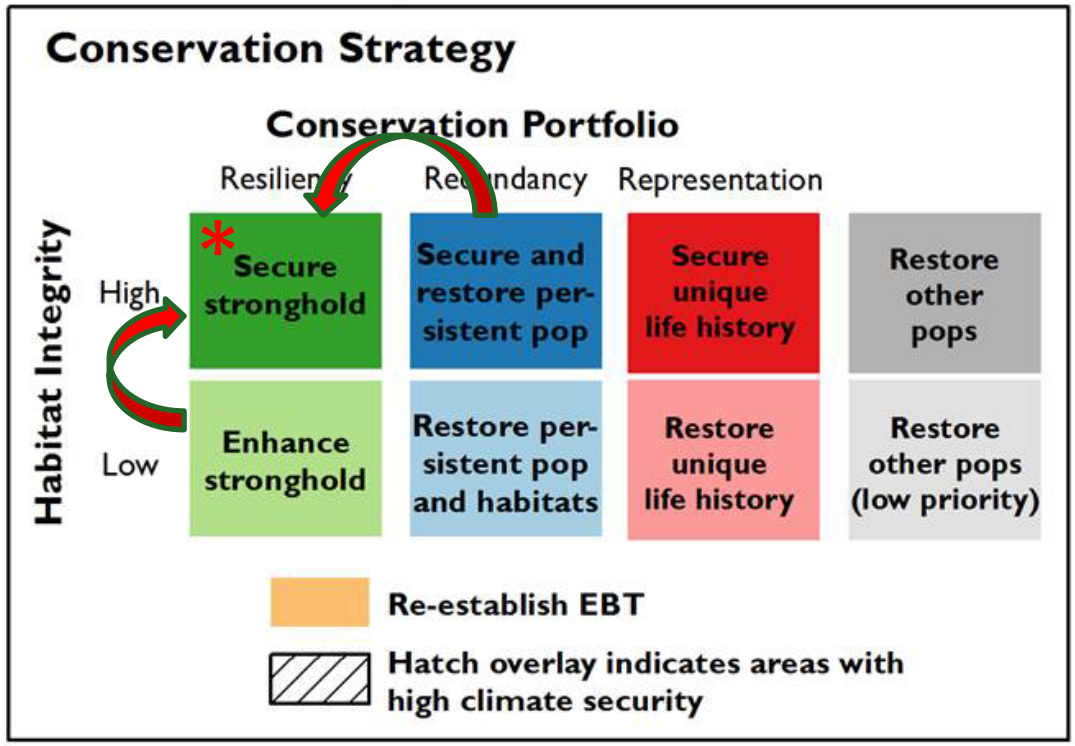
Reported as percentile scores



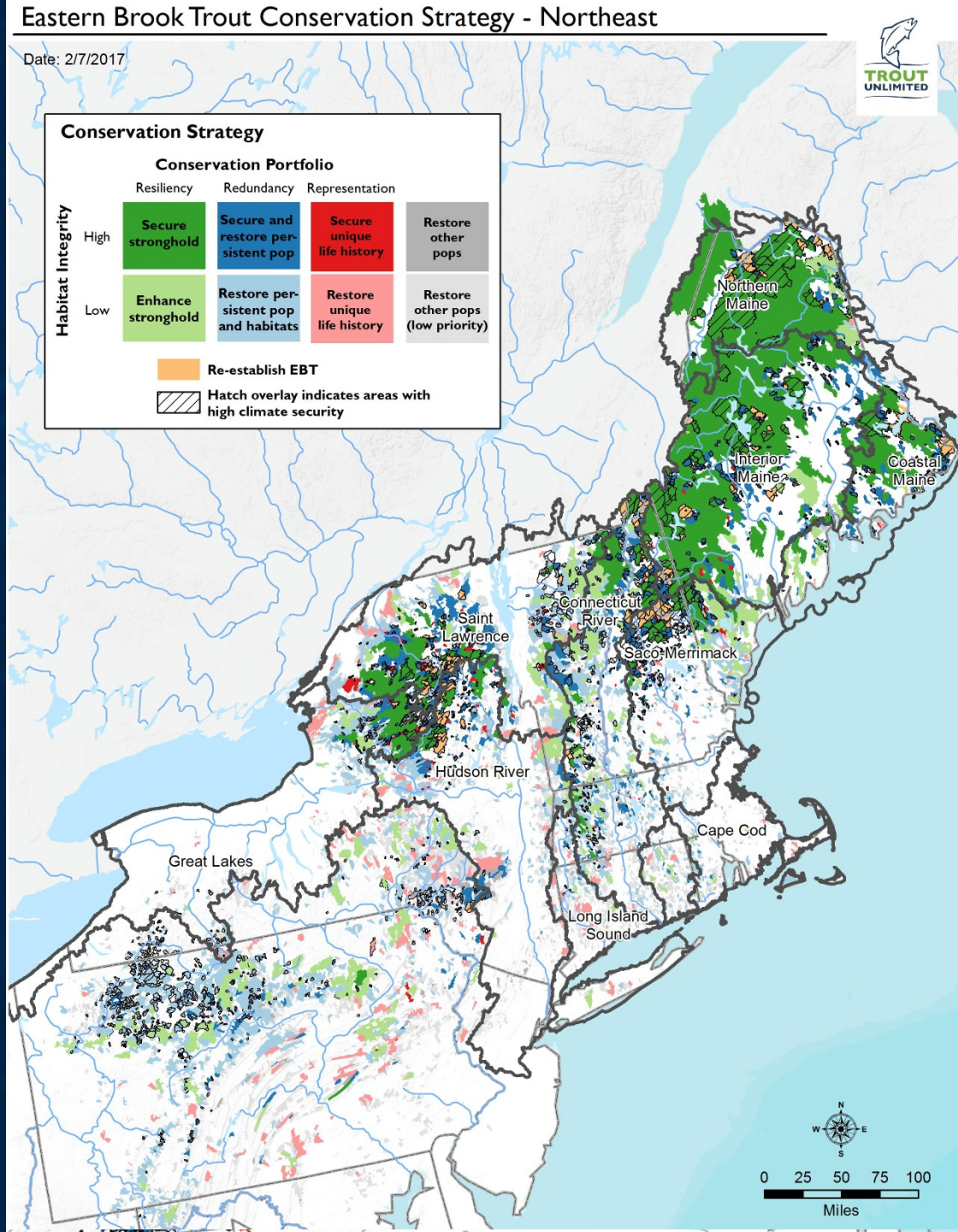
Brook Trout Portfolio and Range-wide Assessment



Conservation Strategies based on Portfolio and Range-wide Assessment



Conservation Strategies based on Portfolio and Range-wide Assessment

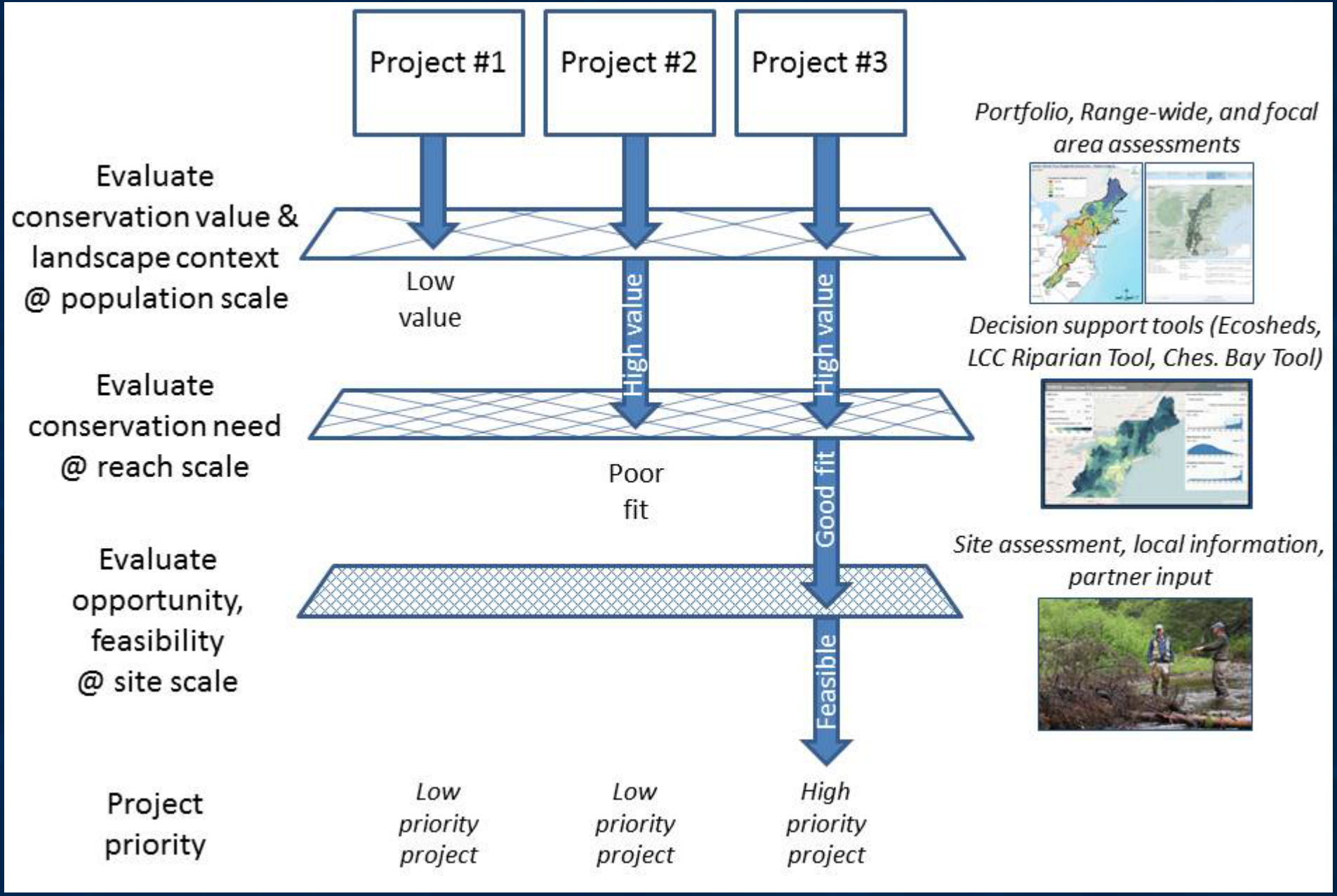


Focal Area Assessments (Upper Connecticut, Delaware, Susquehanna, and Chesapeake Basins)

Goal: Take approach of range-wide assessment, but use regionally available or local datasets and present within a visualization tool with emphasis on restoration strategies

Datasets:

- BT occupancy and stream temperature models
- Regional conservation priorities
- State-specific designations, including exceptional waters and trout water designations.
- Regional tools, including the Riparian Restoration Decision Support Tool (Coombs and Nislow 2014).
- Regional condition and threat datasets, including North Atlantic Aquatic Connectivity Collaborative barriers, abandoned mine lands, proposed natural gas pipelines


Project #1
Project #2
Project #3
Evaluate conservation value & landscape context @ population scale
Low value
High value
High value
Portfolio, Range-wide, and focal area assessments
Evaluate conservation need @ reach scale
Poor fit
Good fit
Decision support tools (Ecosheds, LCC Riparian Tool, Ches. Bay Tool)
Evaluate opportunity, feasibility @ site scale
Feasible
Site assessment, local information, partner input
Project priority
Low priority project
Low priority project
High priority project

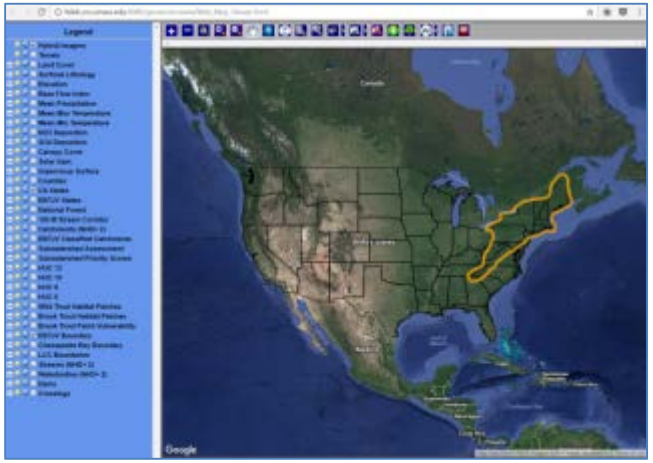
Example 1: Identifying priority BT populations requiring a specific restoration activity within a focal geography

Objective: Identify riparian restoration opportunities in the Delaware Basin

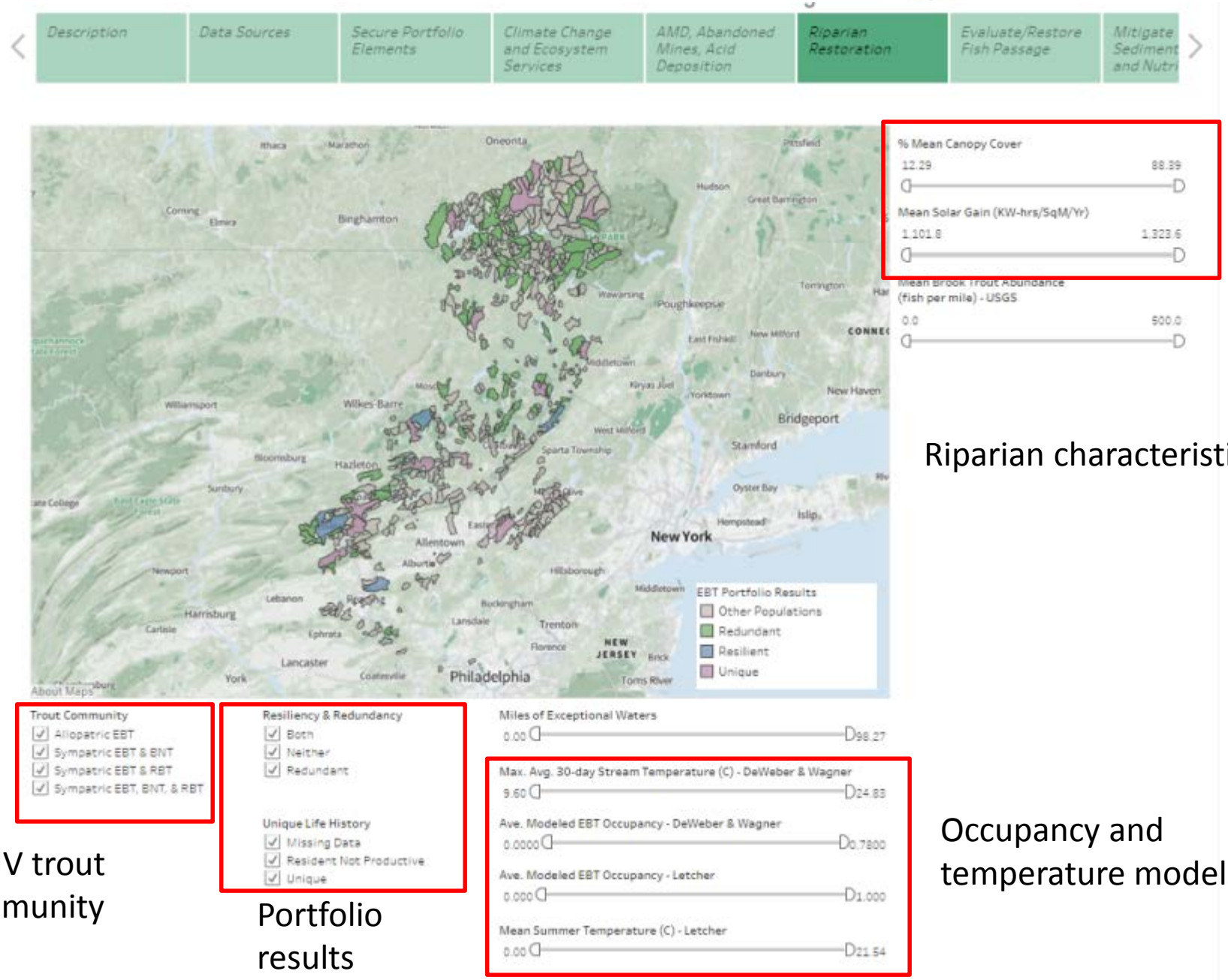
Criteria:

- Patch has coldwater habitat likely to remain viable under future climate scenarios (Mean summer temperature in Letcher (Ecosheds) model < 17°C)
- Patch has some riparian restoration need (% mean canopy cover range is 60-80%)
- Patch is high value brook trout population (is resilient or redundant)

Tools: Delaware Basin focal area tool and Appalachian LCC Riparian Decision Support Tool



Focal Area Data Visualization Tool



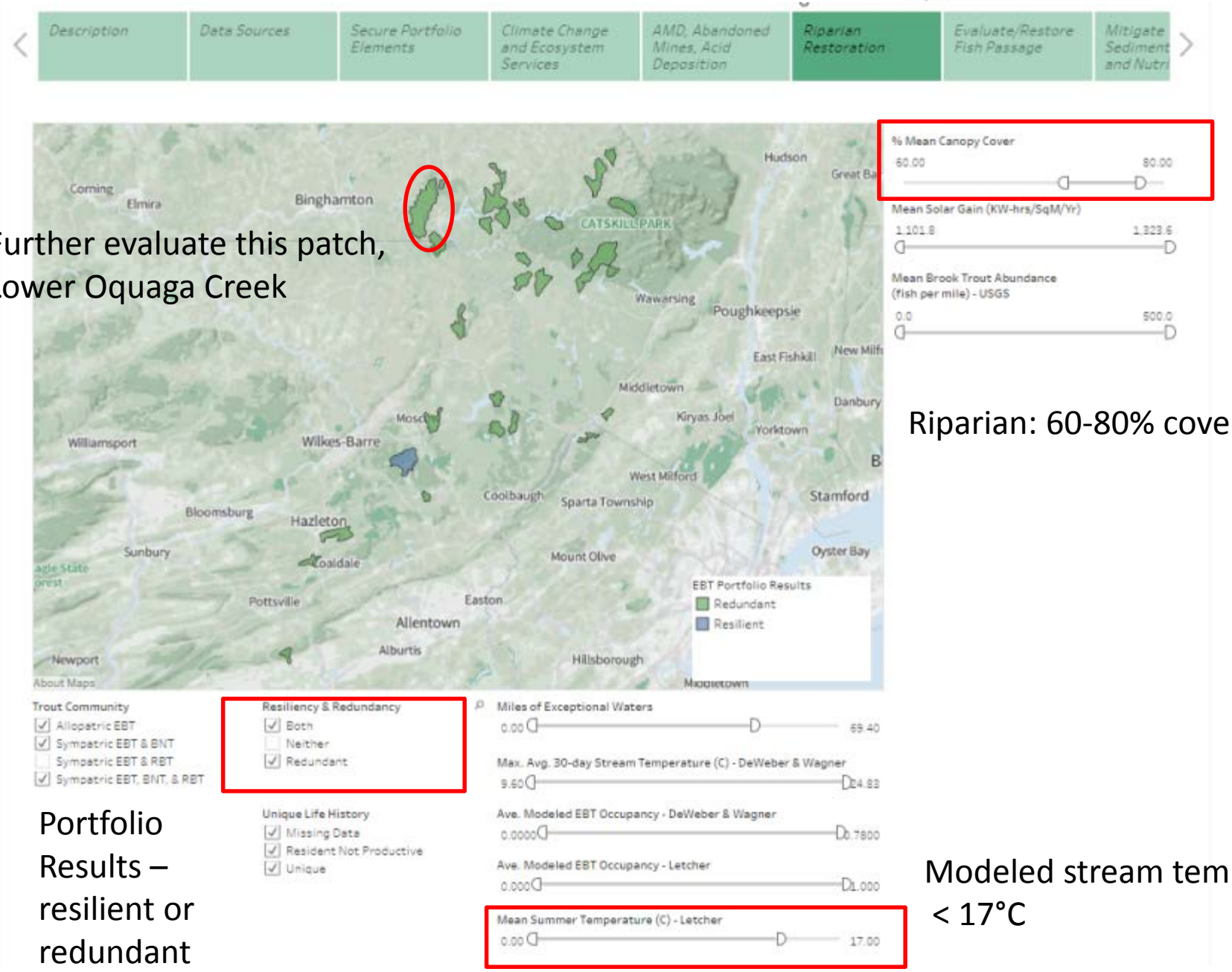
Riparian characteristics

EBTJV trout community

Portfolio results

Occupancy and temperature models

Focal Area Data Visualization Tool



Further evaluate this patch, Lower Oquaga Creek

Riparian: 60-80% cover

Portfolio Results – resilient or redundant

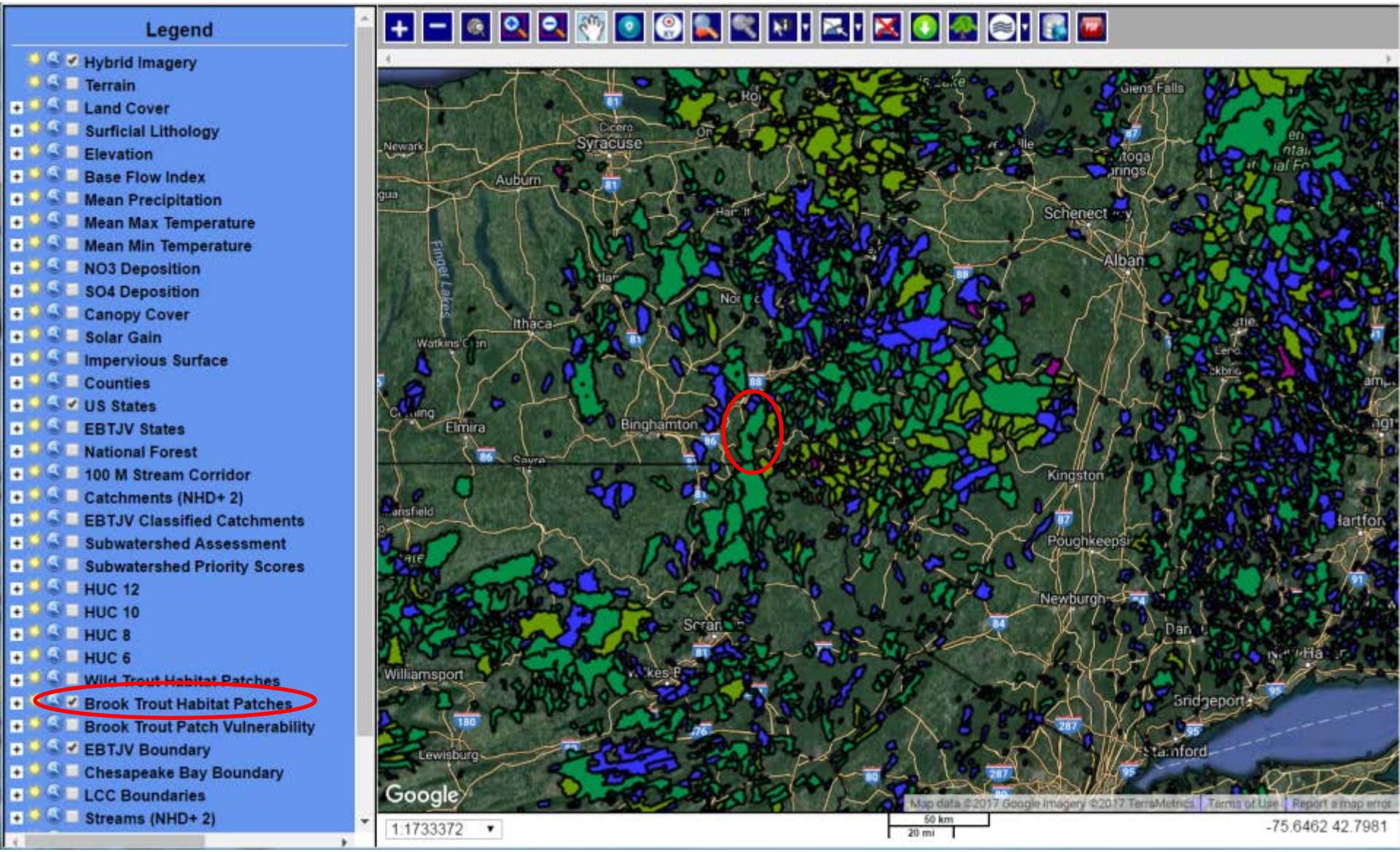
Modeled stream temps < 17°C

Focal Area Data Visualization Tool

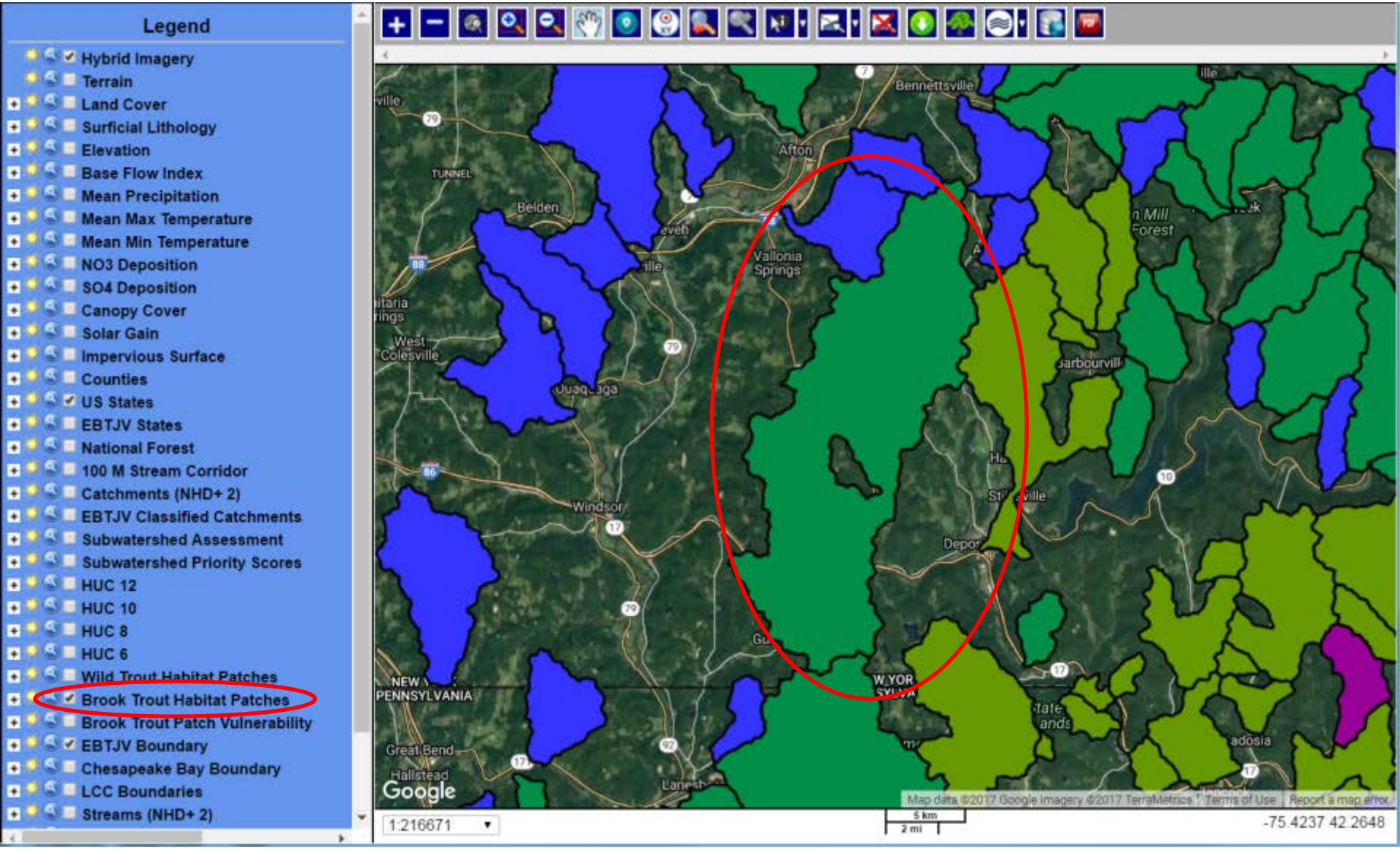
Moderate probability of EBT persistence under future climate scenarios (which can be elevated w/ restoration of riparian conditions)

Direct access to Riparian Decision Support Tool for evaluating on-the-ground opportunities

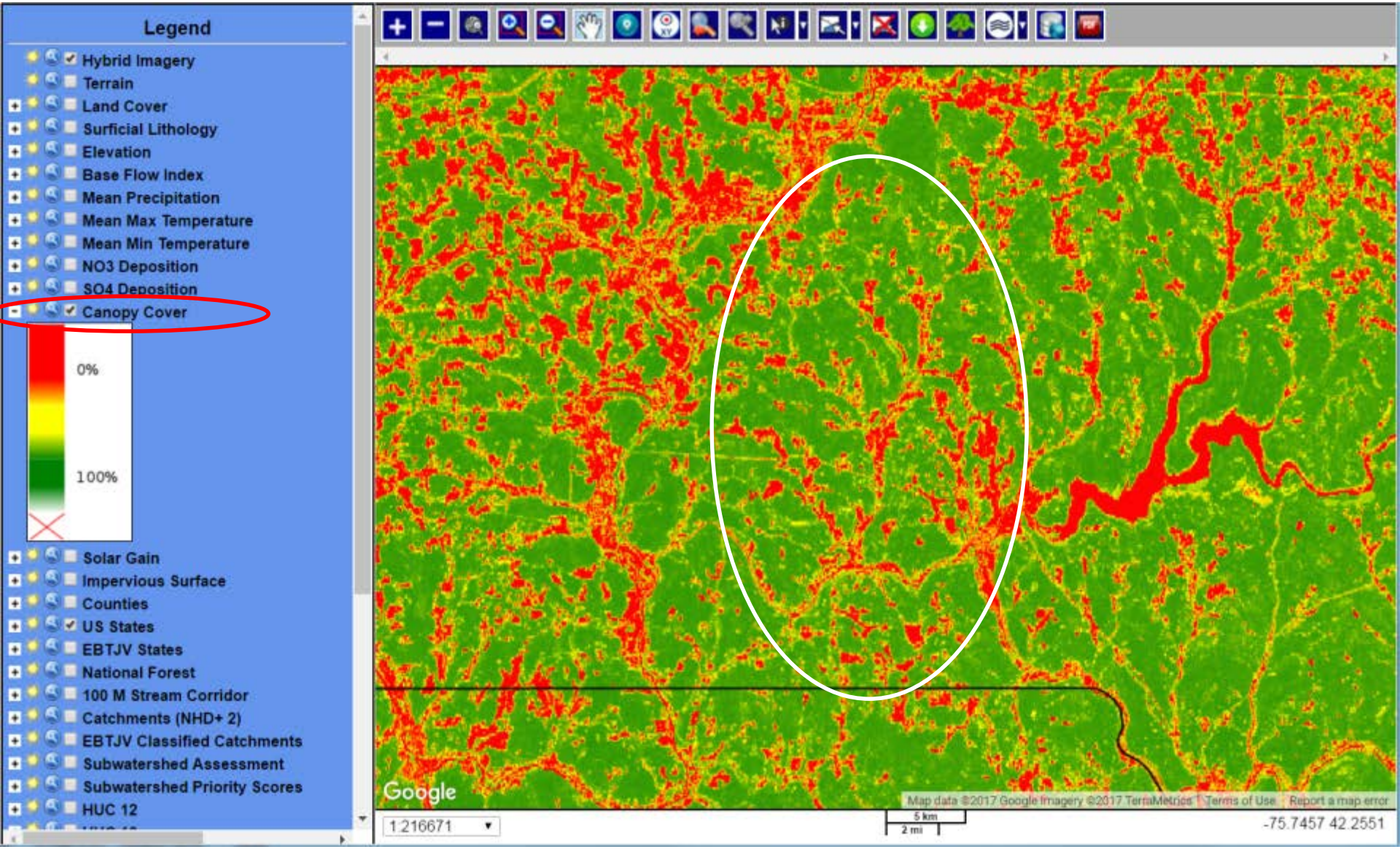
Locate patch of interest in EBTJV Decision Support Tool



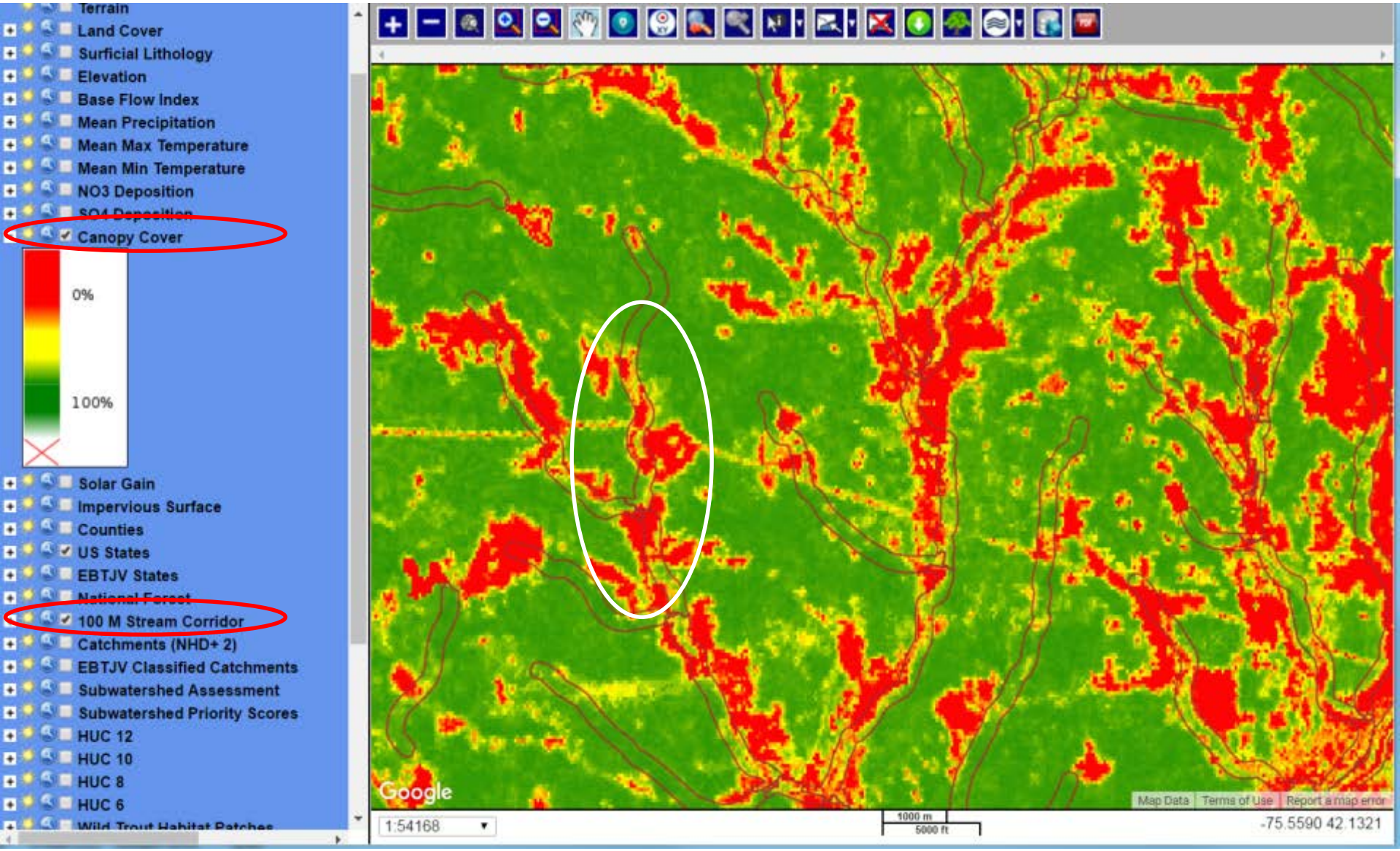
Locate patch of interest



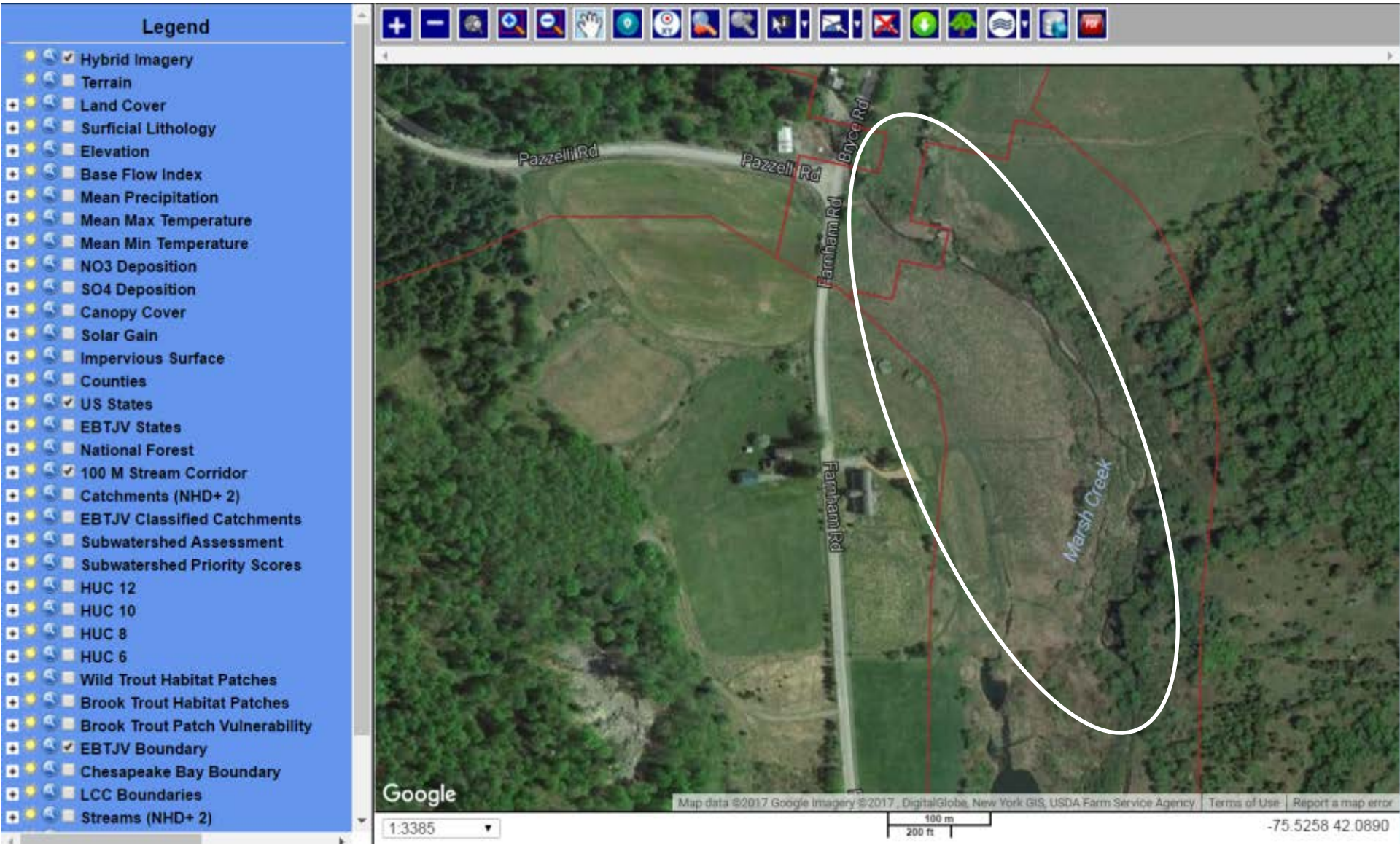
Turn on canopy cover layer



Turn on stream corridor, zoom to area with low canopy cover in corridor



Turn off canopy cover and explore aerial imagery

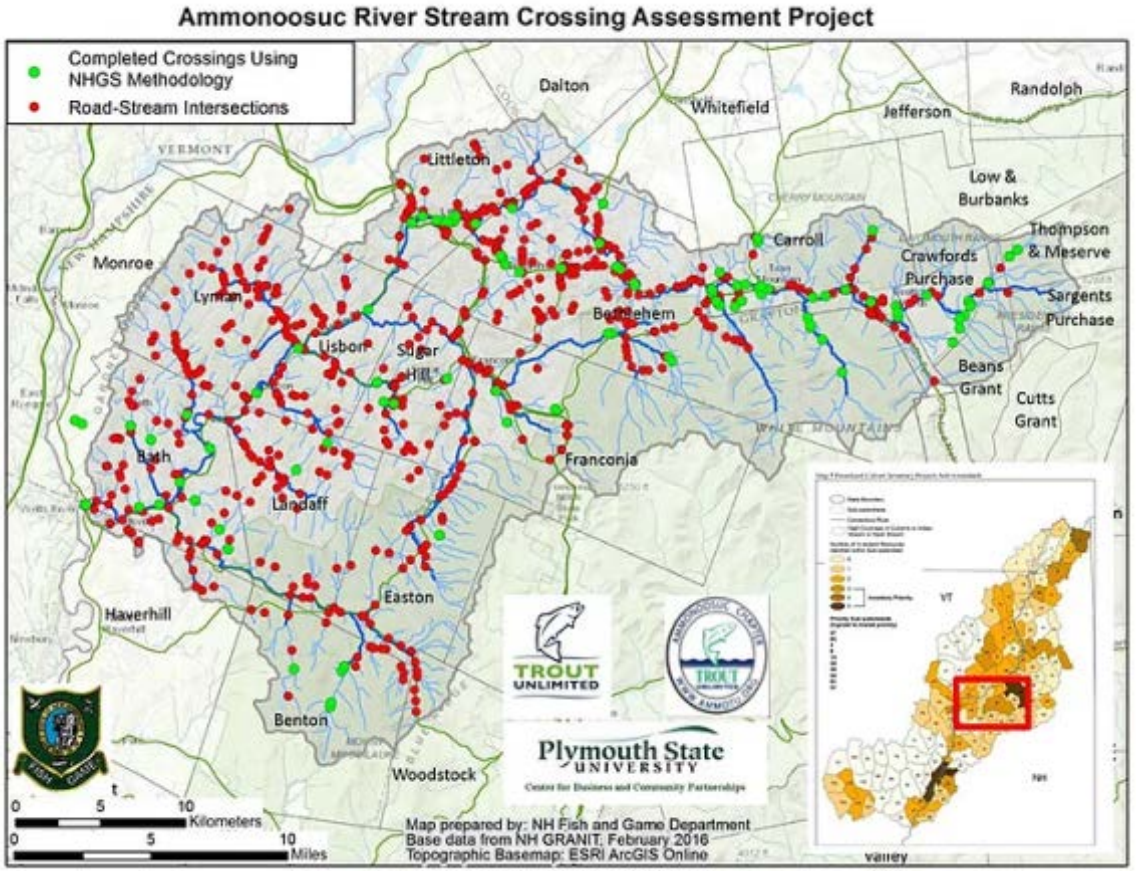


Example 2: Placing a local restoration effort within a range-wide brook trout context

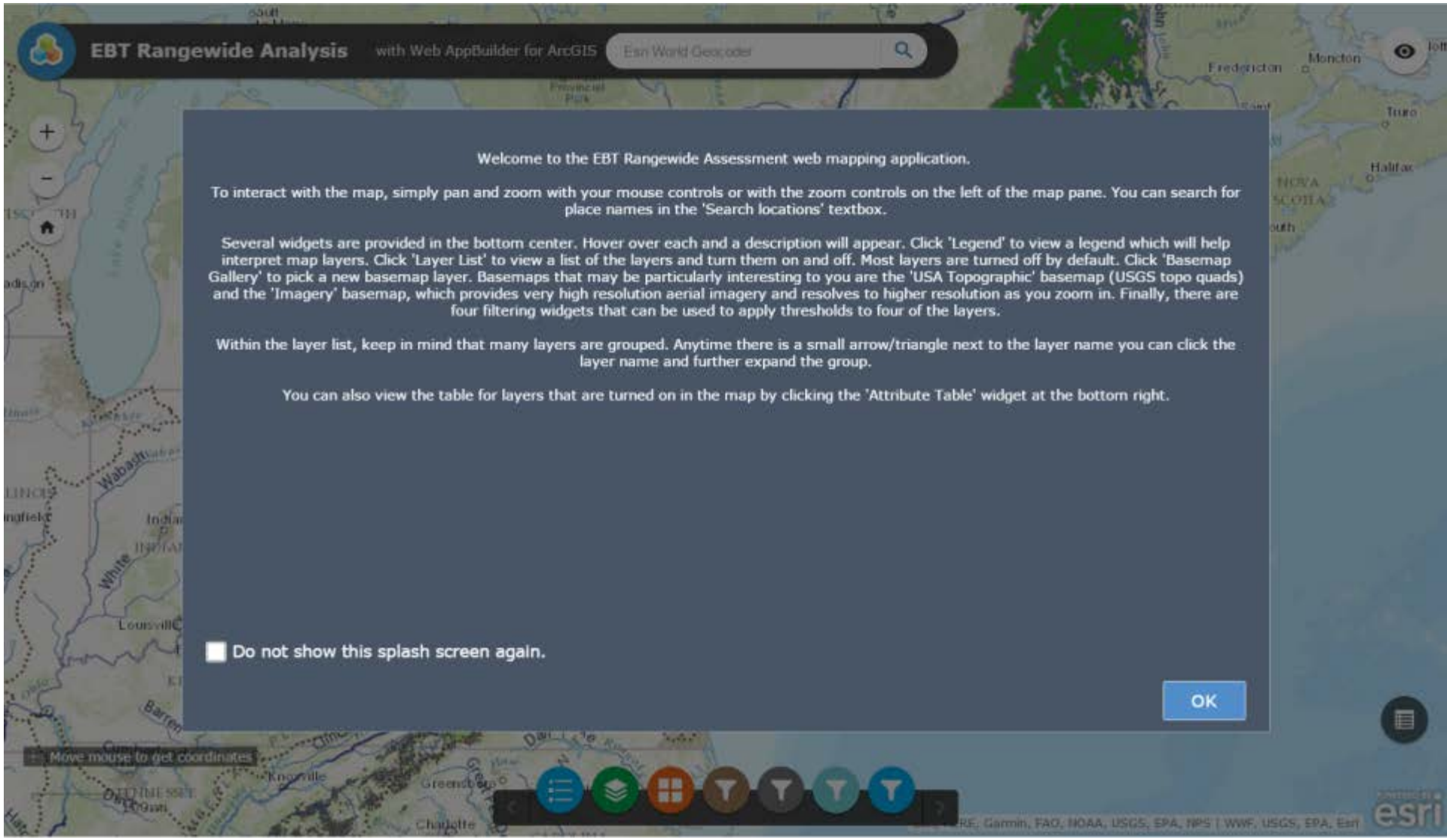
Objective: Evaluate several potential culvert removal projects in the Ammonoosuc River basin of NH and articulate project value to brook trout.

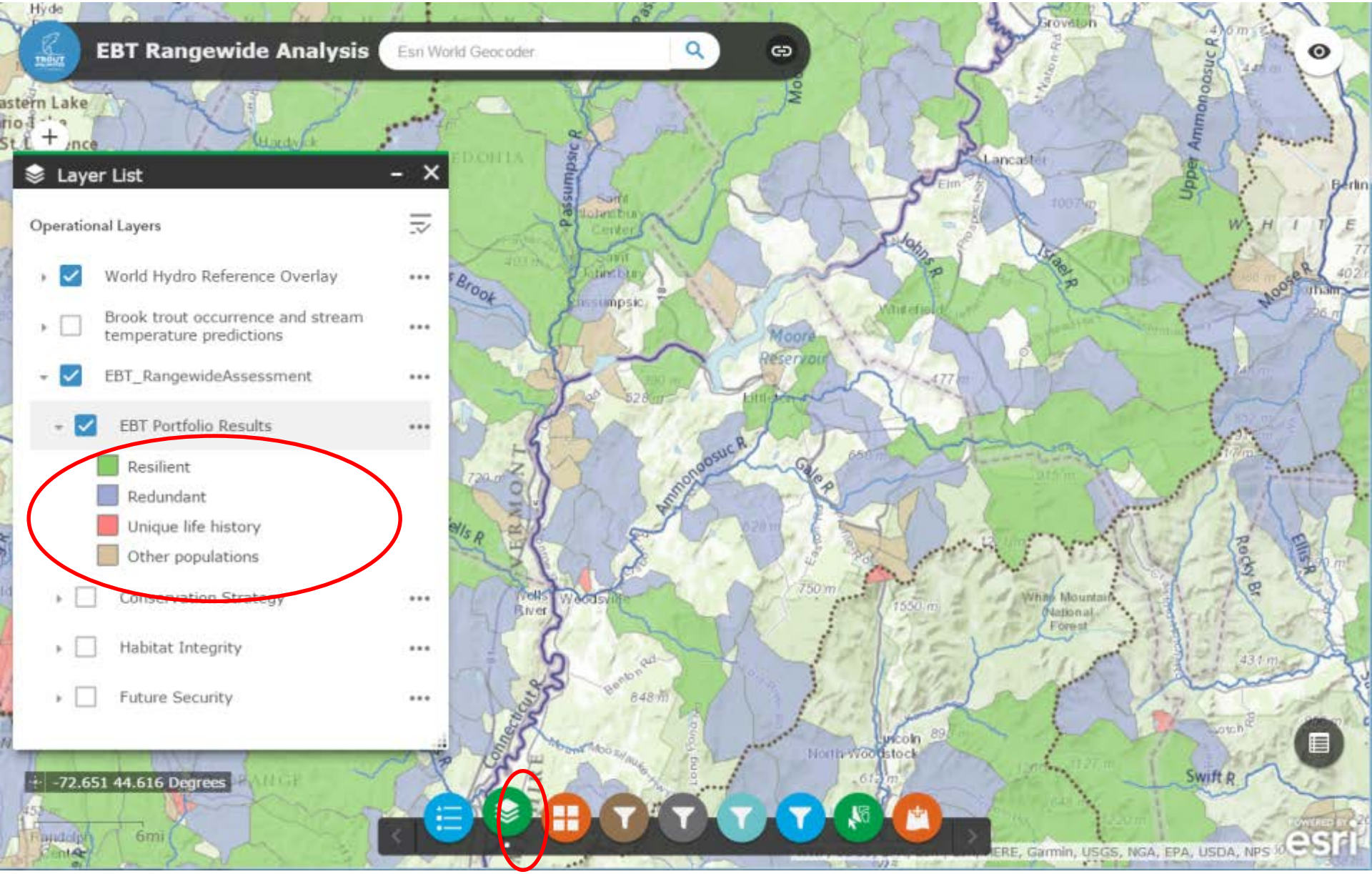
Criteria: Conservation Portfolio habitat condition and future security percentile scores

Tools: Conservation Portfolio and Range-wide Assessment map viewer

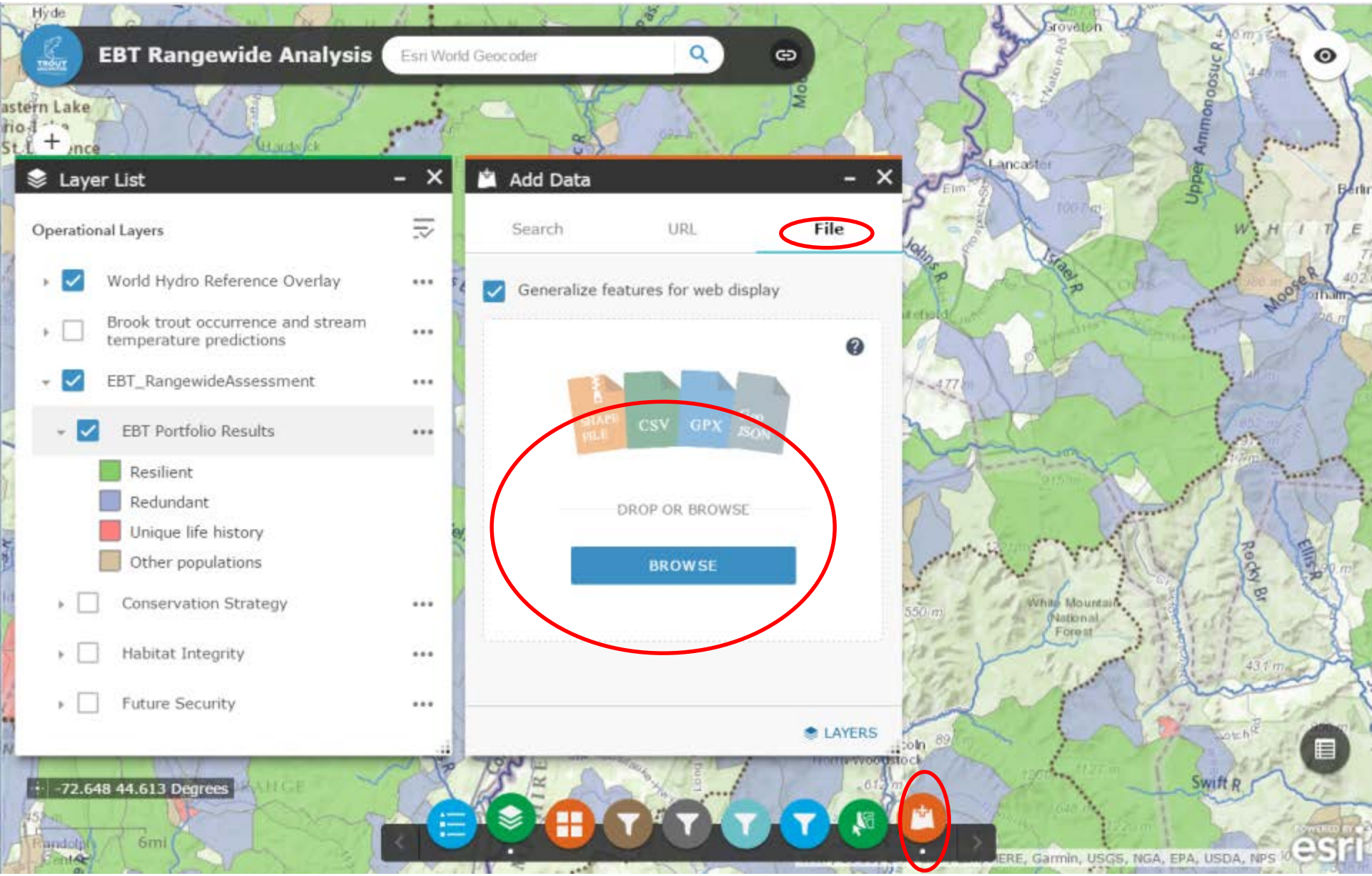


Portfolio and Range-wide Assessment webmap

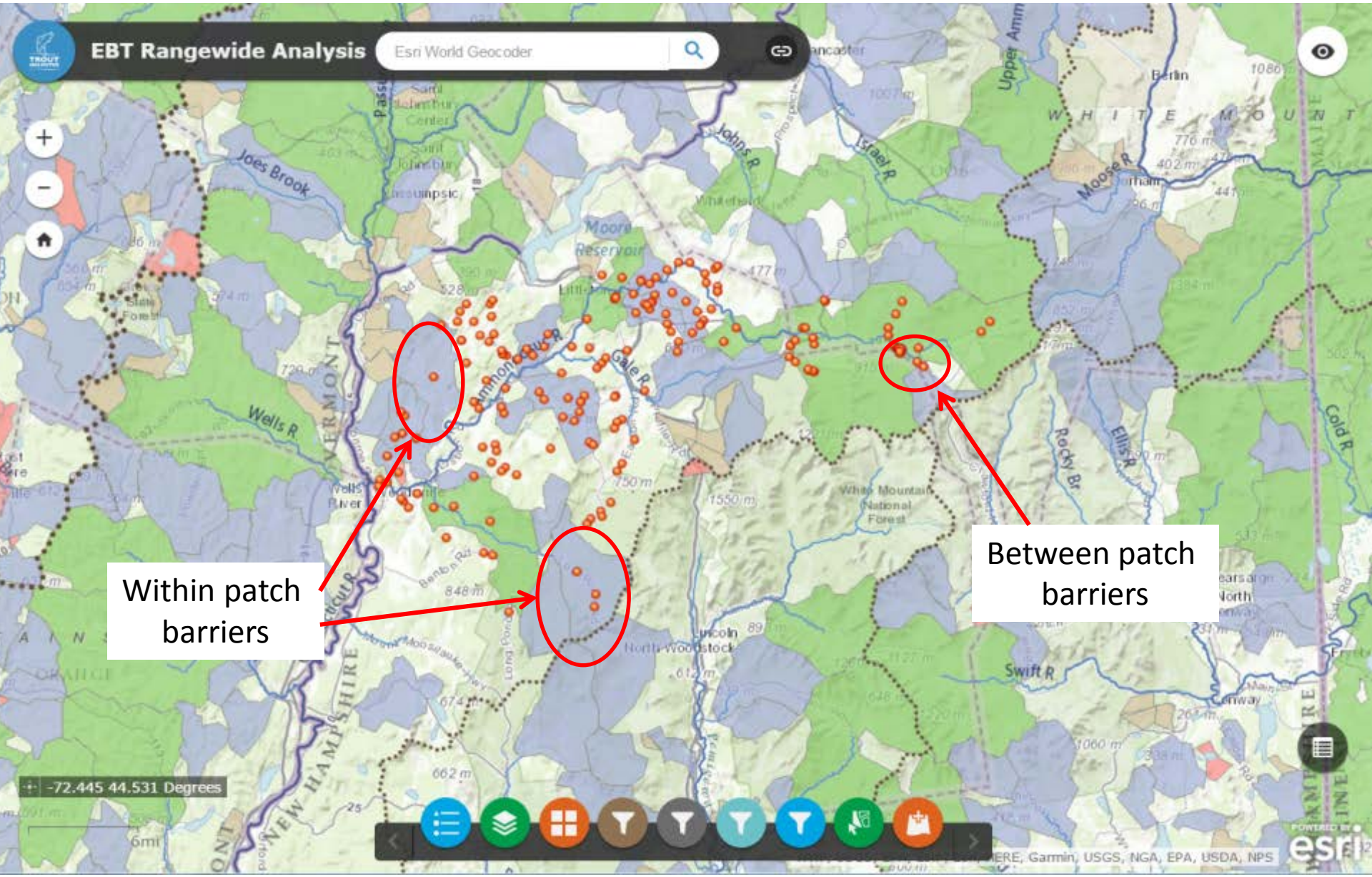


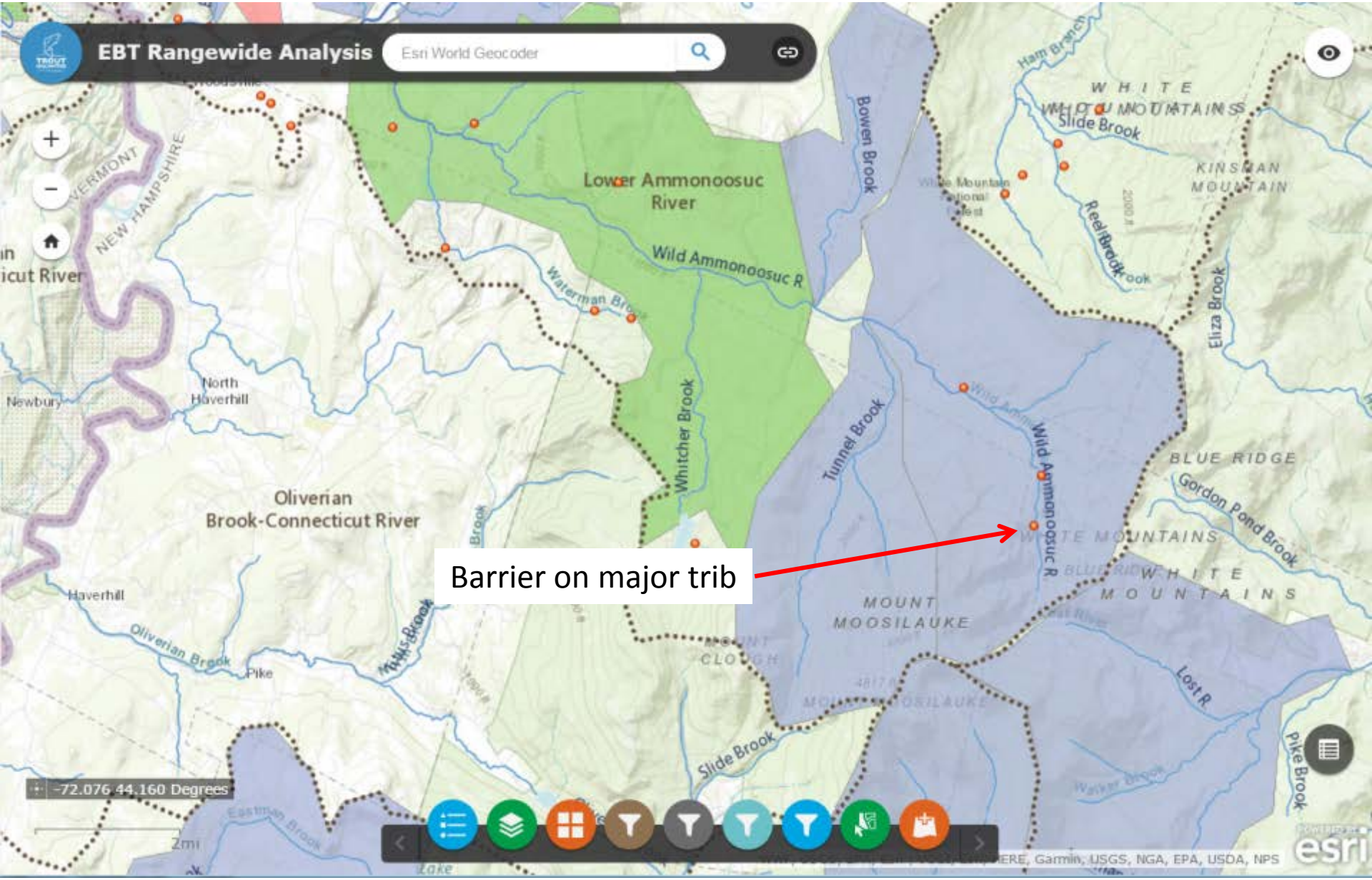

EBT Rangewide Analysis
Esri World Geocoder
Layer List
Operational Layers
World Hydro Reference Overlay
Brook trout occurrence and stream temperature predictions
EBT_RangewideAssessment
EBT Portfolio Results
Resilient
Redundant
Unique life history
Other populations
Conservation Strategy
Habitat Integrity
Future Security
-72.651 44.616 Degrees
6mi
esri

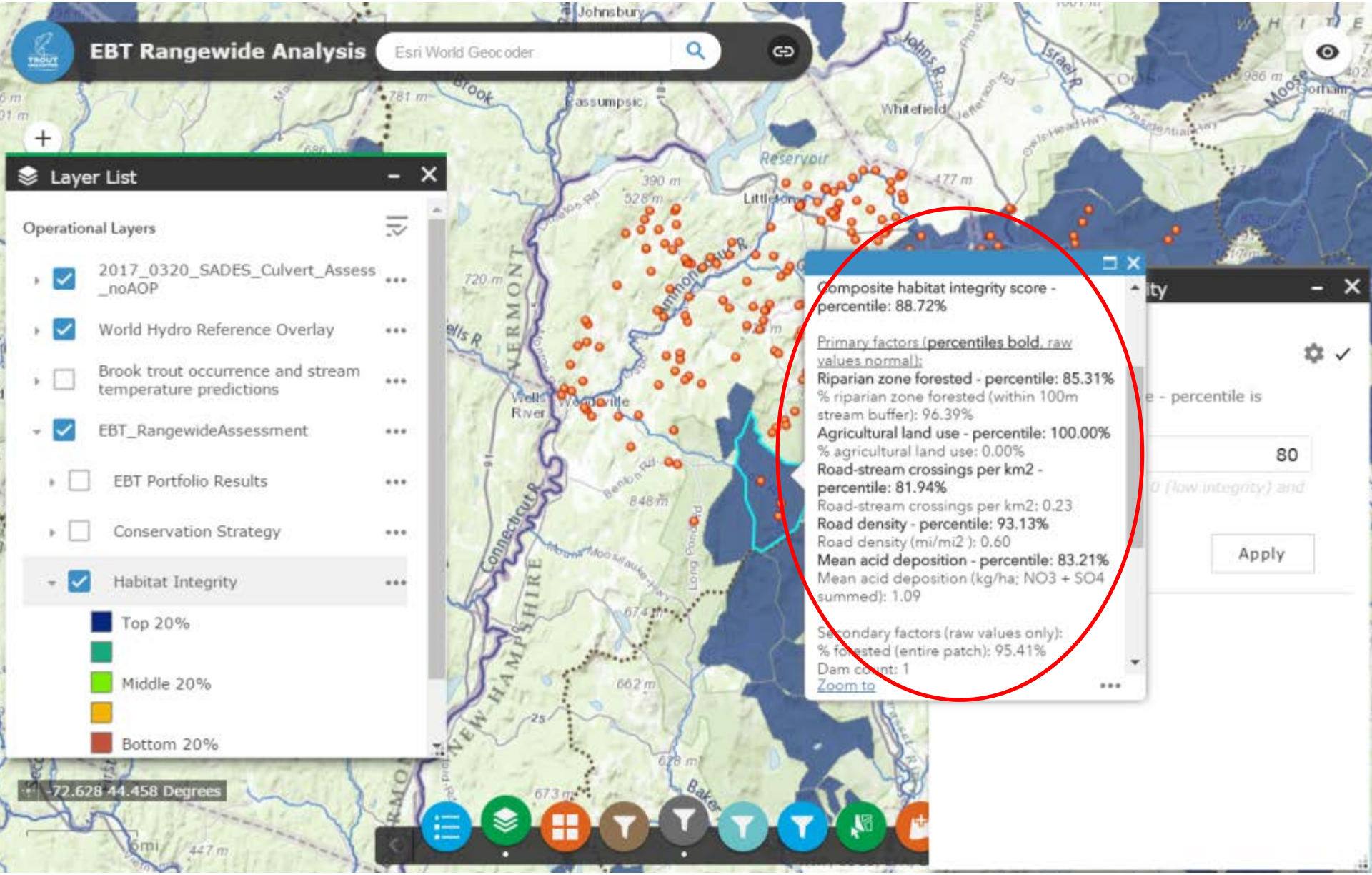
Layers tool



Add data tool


EBT Rangewide Analysis
Esri World Geocoder
Within patch barriers
Between patch barriers
-72.445 44.531 Degrees
esri


EBT Rangewide Analysis
Esri World Geocoder
Lower Ammonoosuc River
Wild Ammonoosuc R
Bowen Brook
Whitcher Brook
Tunnel Brook
Waterman Brook
Slide Brook
Reel Brook
Eliza Brook
Ham Branch
WHITE MOUNTAINS
KINSMAN MOUNTAIN
BLUE RIDGE
Gordon Pond Brook
MOUNT MOOSILAUKE
Lost R
Pike Brook
Oliverian Brook-Connecticut River
Oliverian Brook
Mills Brook
North Haverhill
Haverhill
Newbury
Pike
VERMONT
NEW HAMPSHIRE
Barrier on major trib
-72.076 44.160 Degrees
esri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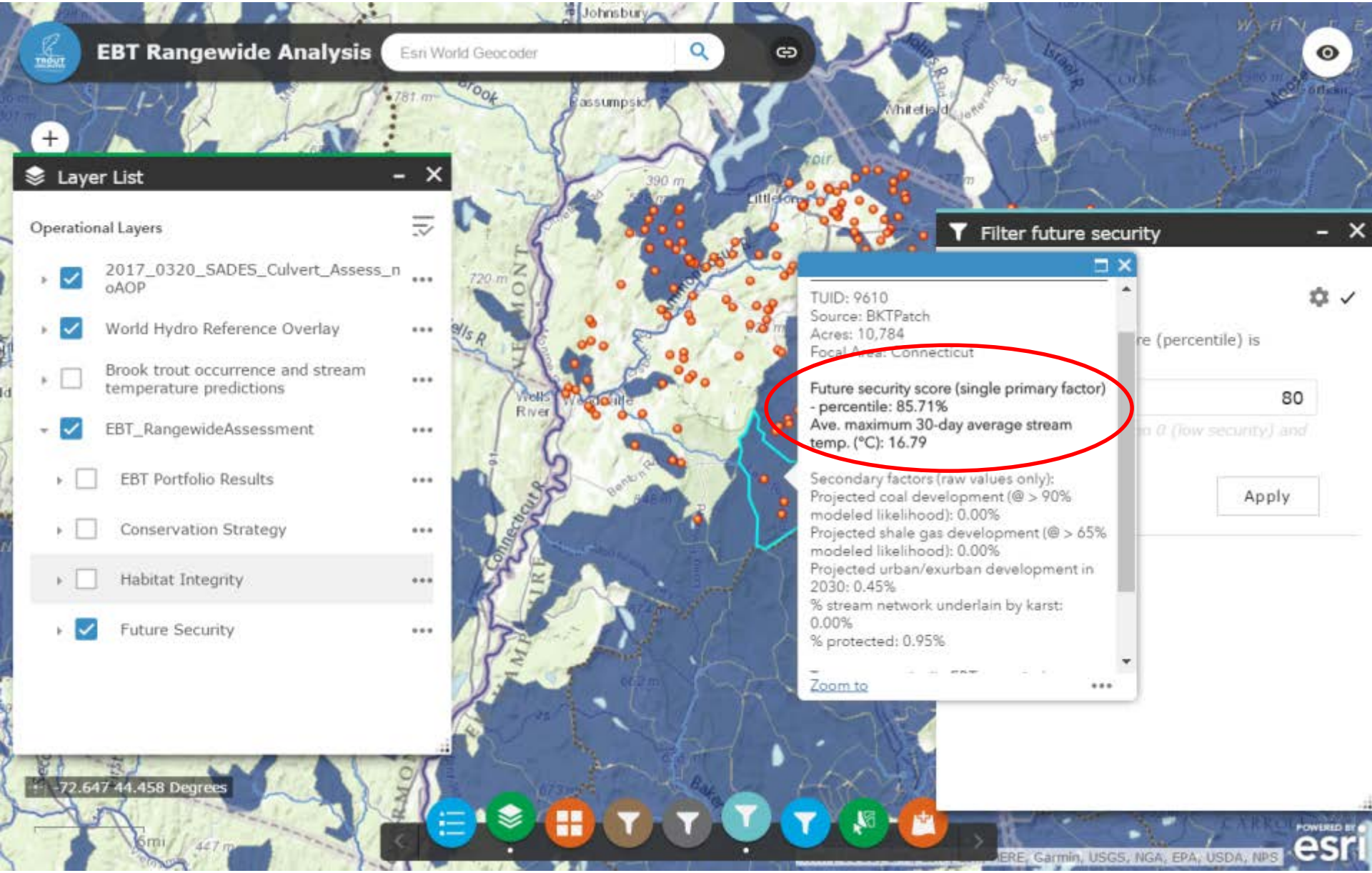
EBT Portfolio Results
Conservation Strategy
Habitat Integrity
Top 20%
Middle 20%
Bottom 20%
Composite habitat integrity score - percentile: 88.72%
Primary factors (percentiles bold, raw values normal):
Riparian zone forested - percentile: 85.31%
% riparian zone forested (within 100m stream buffer): 96.39%
Agricultural land use - percentile: 100.00%
% agricultural land use: 0.00%
Road-stream crossings per km2 - percentile: 81.94%
Road-stream crossings per km2: 0.23
Road density - percentile: 93.13%
Road density (mi/mi2): 0.60
Mean acid deposition - percentile: 83.21%
Mean acid deposition (kg/ha; NO3 + SO4 summed): 1.09
Secondary factors (raw values only):
% forested (entire patch): 95.41%
Dam count: 1
Zoom to
Apply
-72.628 44.458 Degrees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Habitat Integrity
Future Security
Filter future security
TUID: 9610
Source: BKTPatch
Acres: 10,784
Future security score (single primary factor) - percentile: 85.71%
Ave. maximum 30-day average stream temp. (°C): 16.79
Secondary factors (raw values only):
Projected coal development (@ > 90% modeled likelihood): 0.00%
Projected shale gas development (@ > 65% modeled likelihood): 0.00%
Projected urban/exurban development in 2030: 0.45%
% stream network underlain by karst: 0.00%
% protected: 0.95%
Zoom to
re (percentile) is
80
Apply
-72.647 44.458 Degrees
Johnsbury
Littleton
Whitefield
Wells River
Connecticut R.
esri

For More Information/Links to Reports and Data Visualization Tools

https://www.tu.org/science/conservation-planning-and-assessment/conservation-portfolio/eastern-brook-trout-conservation-portfolio/

Eastern Brook Trout Joint Venture

easternbrooktrout.org