Aquatic Connectivity Through Climate-Ready Infrastructure

Partnership with the Rutgers Raritan River Consortium

HUDSON RIVER FOUNDATION

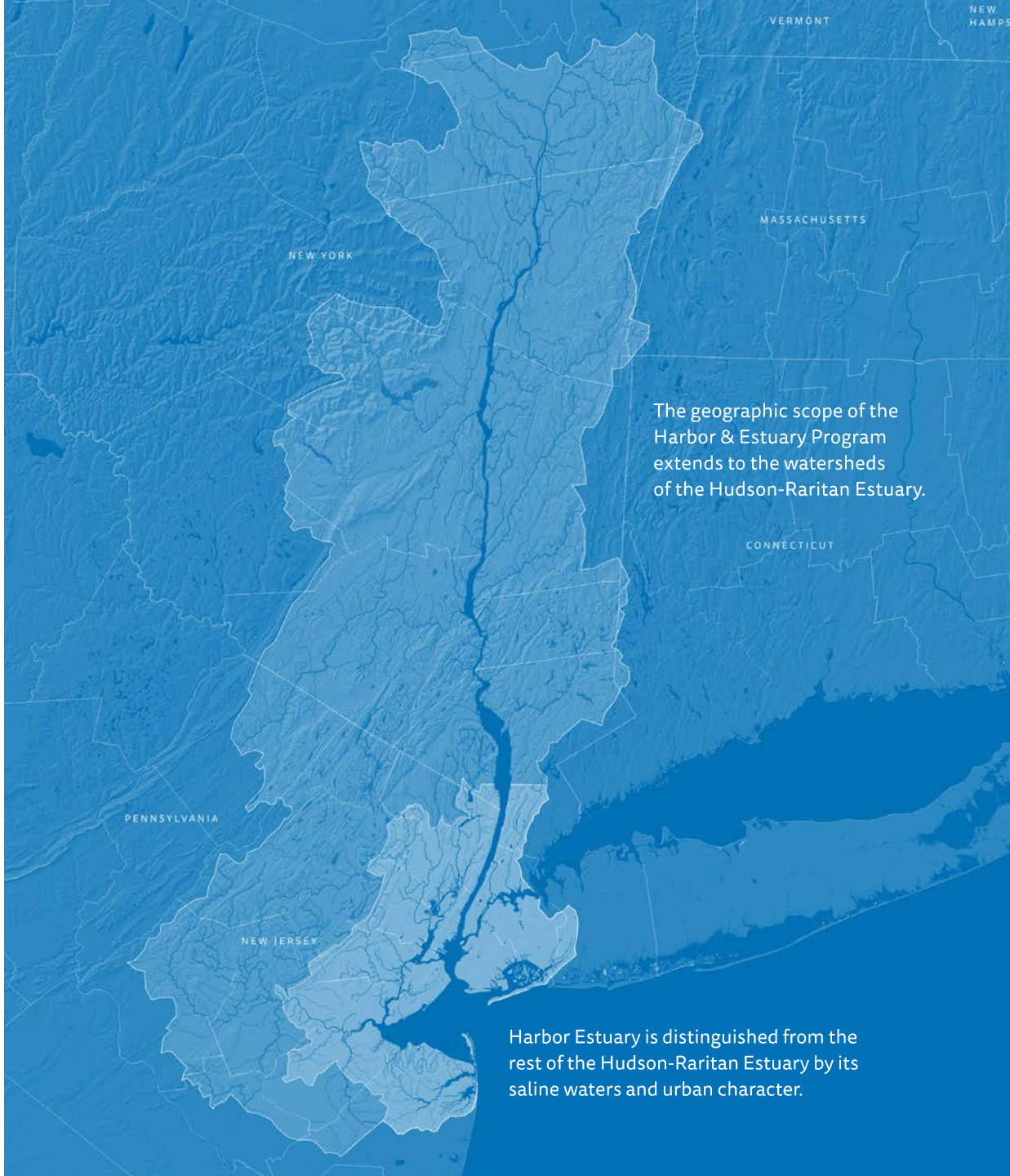
NY/NJ HARBOR & ESTUARY PROGRAM

One of the Nation’s 28 National Estuary Programs.

HEP was created by the EPA at the request of the governors of New York and New Jersey in 1988 under the Clean Water Act

The NY-NJ Harbor Estuary is the biggest public resource in the nation’s largest and most densely developed metropolitan area.

Managed by the Hudson River Foundation



Water Quality - Reduce the sources of pollution so that the waters of Harbor Estuary will meet the fishable/swimmable goal of the Clean Water Act, where attainable;

Habitat - Protect and restore vital habitat, ecological function, and biodiversity that provides society with renewed and increased benefits;

Public Access - Improve public access to the waters of the Estuary and the quality of experience at public spaces along the waterfront;

Maritime - Support port and associated maritime operations so that they are both economically and ecologically viable; and

Engagement - Foster community stewardship and involvement in decisions about the Estuary.

Habitat and Ecological Health

Aquatic Connectivity

North Atlantic Aquatic Connectivity Collaborative

NAACC

Hydraulic Capacity

CORNELL UNIVERSITY FOUNDED A.D. 1865

Water Resources Institute

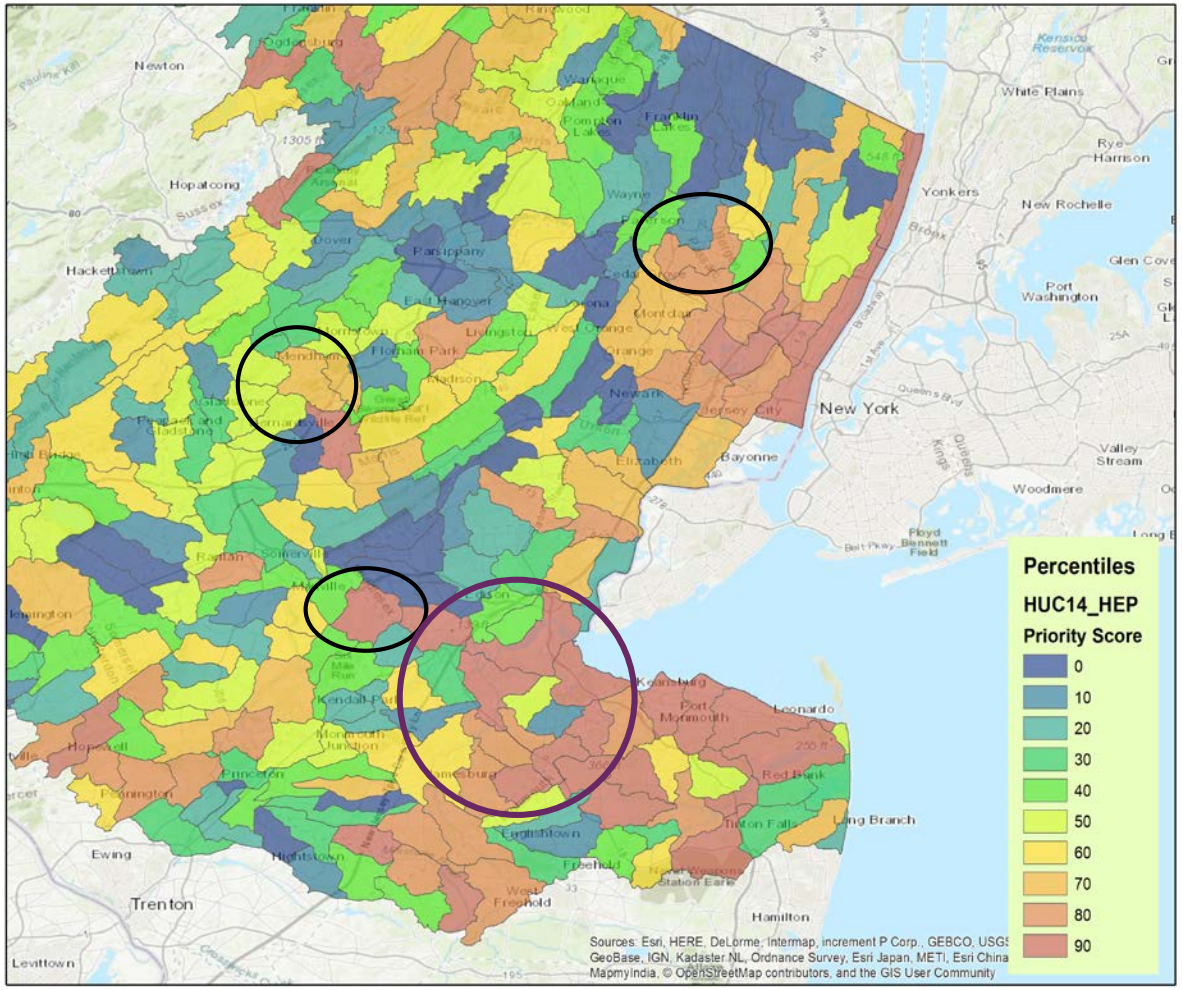
Cornell University

Cornel Culvert Model

Subwatershed Prioritization and Assessments

Based on metrics of need and opportunity

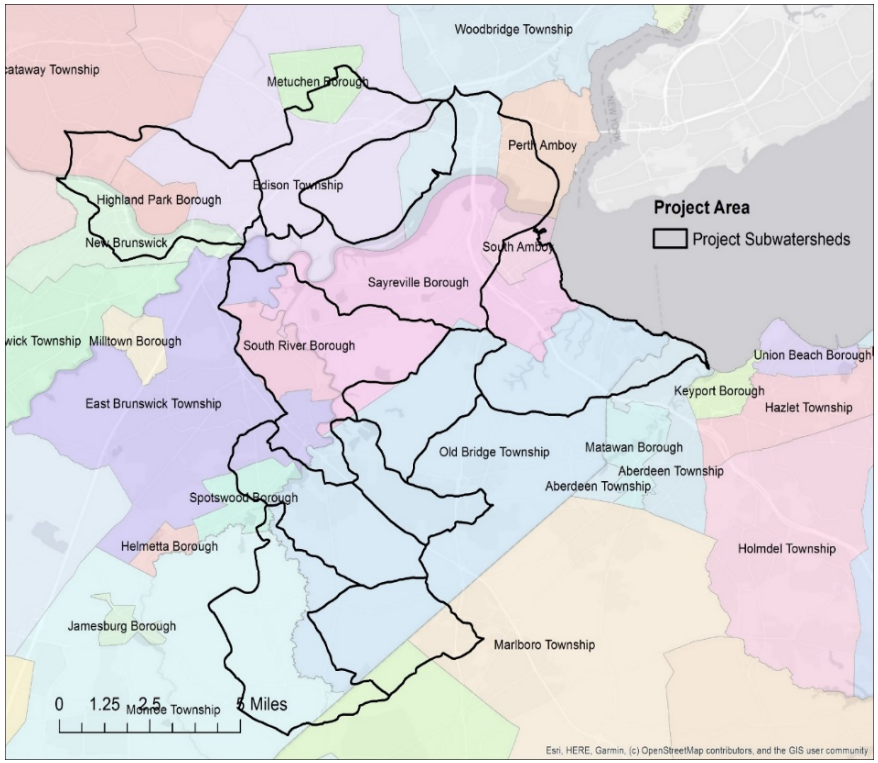
- 2019 – Lower Passaic, Lower Raritan (in partnership with Tom Grothues and funding from RC3)
- 2020 – Upper Passaic (Great Swamp)
- 2021 – 2022 – Lower Raritan and South Rivers



https://www.hudsonriver.org/article/actcri

Coastal Watershed Grant

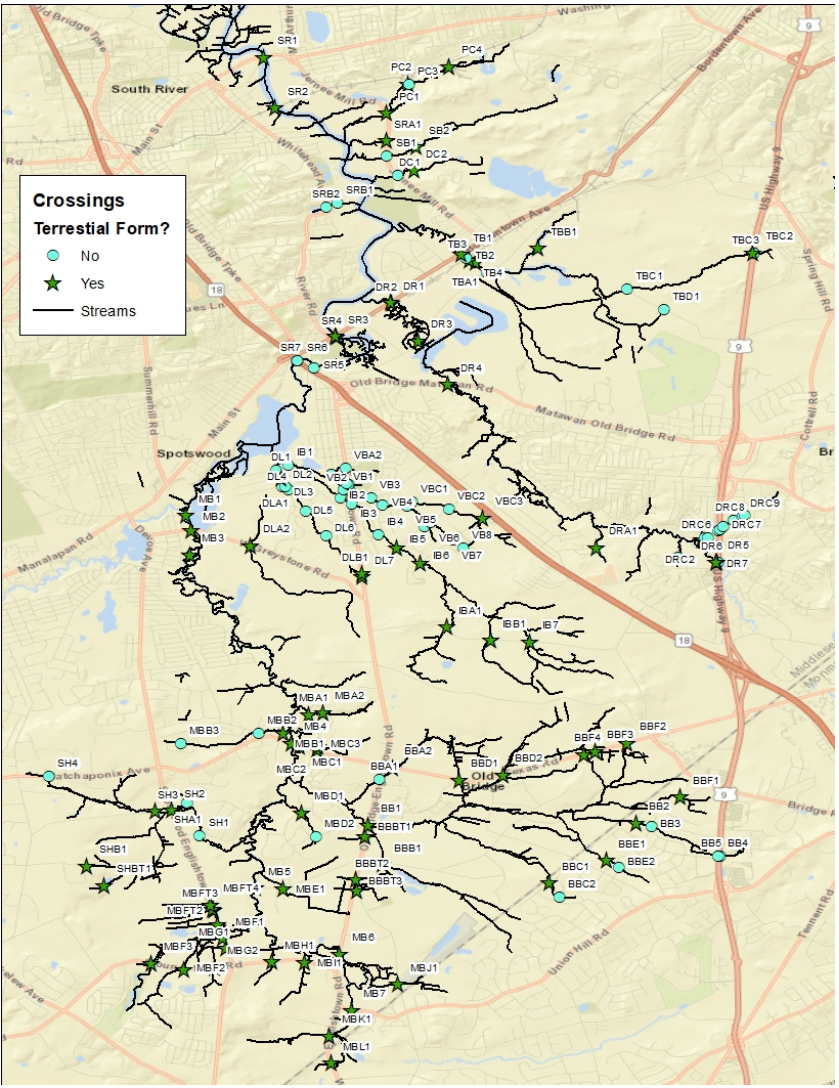
- EPA grant administered by Restore America's Estuaries
- Awarded $87,000
- Assessing > 350 crossings in 11 subwatersheds
- Sub-award to the Raritan River Consortium
- Contracting with a design and engineering firm to work towards restoration design

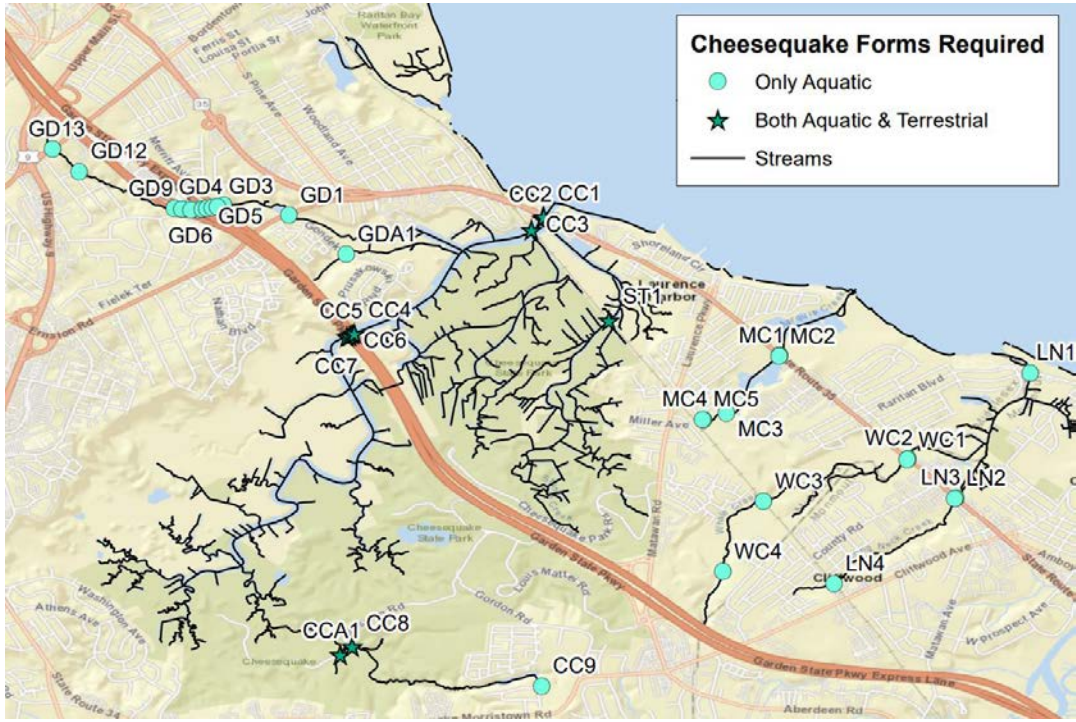


RUTGERS

Overview Map

Made in ArcGIS to give some direction to our efforts
Easy to make from a spreadsheet!
7 subwatersheds surveyed in the lower Raritan estuary





Summer Fieldwork

Waders, Boots, Safety Vest, Measuring Tools
But most importantly – lots of water

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code _____ **Local ID** (Optional) _____

Date Observed (00/00/0000) _____ **Lead Observer** _____

Town/County _____ **Stream** _____

Road _____ **Type** ☐ MULTILANE ☐ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) ☐☐.☐☐☐☐☐ °N Latitude — ☐☐.☐☐☐☐☐ °W Longitude

Location Description

Crossing Type ☐ BRIDGE ☐ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells _____

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☐ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☐ OK ☐ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☐ NO ☐ UNKNOWN

Alignment ☐ FLOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) _____

Bankfull Width (Optional) _____ **Confidence** ☐ HIGH ☐ LOW/ESTIMATED

Tailwater Scour Pool ☐ NONE ☐ SMALL ☐ LARGE

Constriction ☐ SEVERE ☐ MODERATE ☐ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Crossing Comments

STRUCTURE 1

Structure Material ☐ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED **Outlet Armoring** ☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☐ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions **A. Width**_____.___ **B. Height**_____.___ **C. Substrate/Water Width**_____.___ **D. Water Depth**_____.___

Outlet Drop to Water Surface_____.___ **Outlet Drop to Stream Bottom**_____.___ **E. Abutment Height** (Type 7 bridges only)_____.___

L. Structure Length (Overall length from inlet to outlet)_____.___

INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☐ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions **A. Width**_____.___ **B. Height**_____.___ **C. Substrate/Water Width**_____.___ **D. Water Depth**_____.___

ADDITIONAL CONDITIONS

Slope % (Optional)_____ **Slope Confidence** ☐ HIGH ☐ LOW **Internal Structures** ☐ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER_____

Structure Substrate Matches Stream ☐ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☐ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☐ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☐ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☐ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES ☐ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☐ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☐ NO ☐ UNKNOWN **Height above Dry Passage**_____

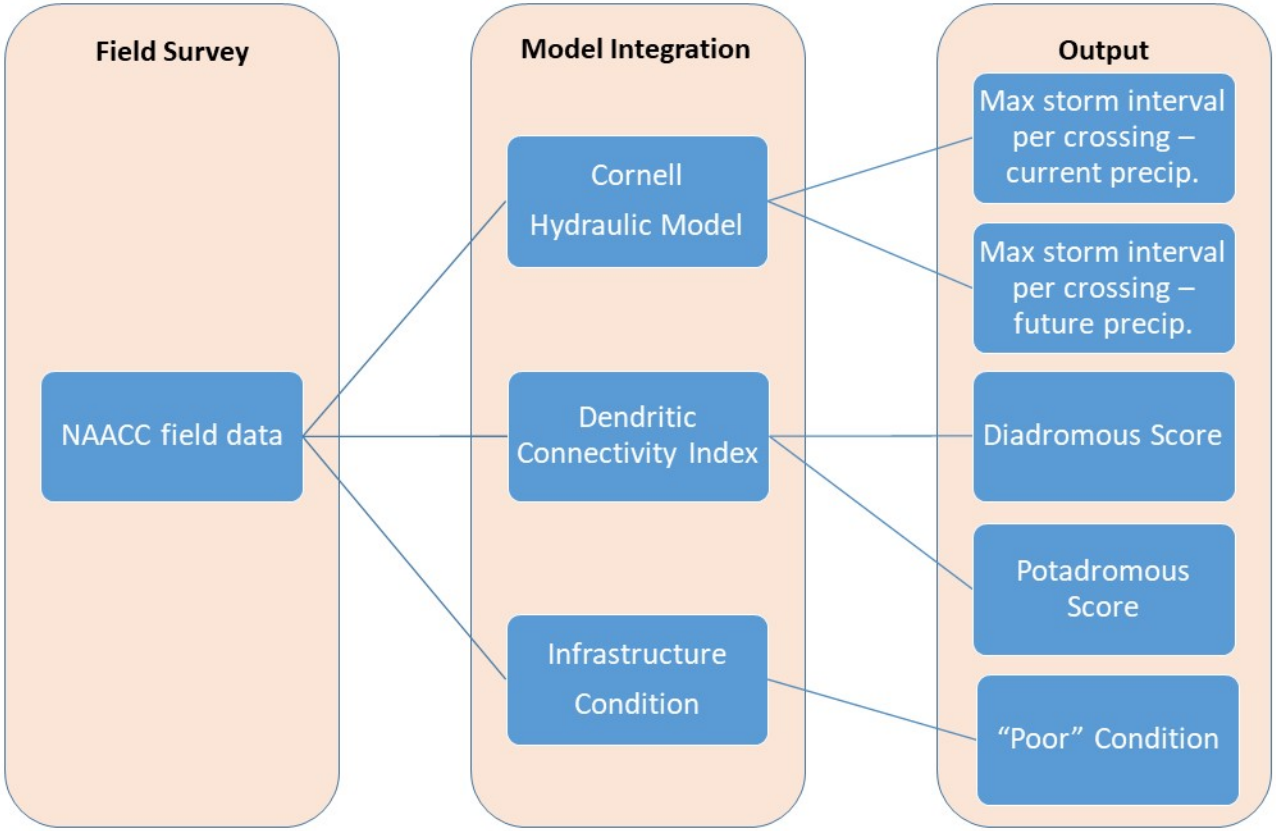
Comments

5/26/16

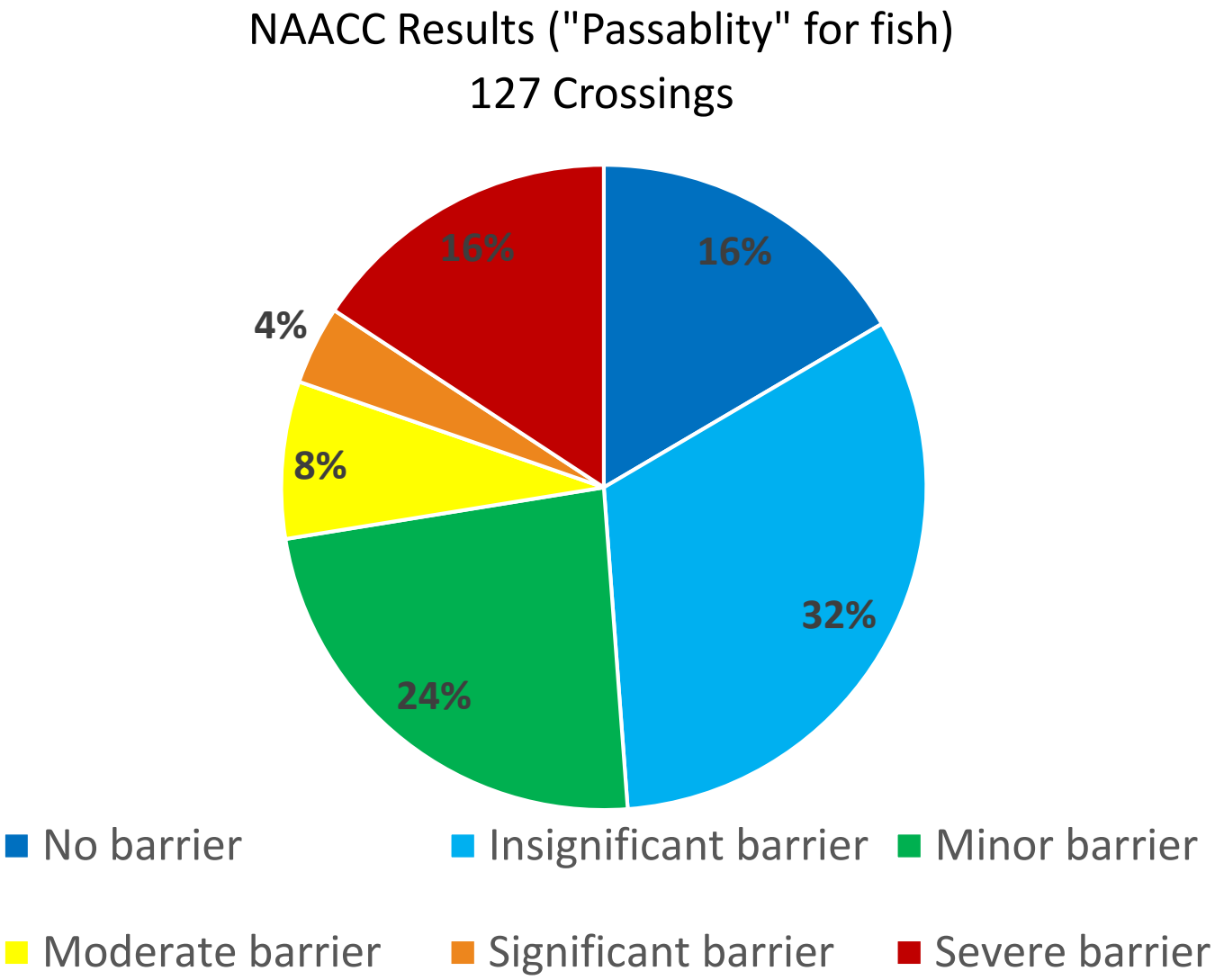
Some crossings were easily accessible and safe to measure so we could fill out the entirety of the datasheet with relative ease.

And some were not! This was a partially inaccessible culvert – we could locate it and record only some required data. This water was well above waist level and thick mud was at the bottom making it unsafe.

Evaluation for Prioritization

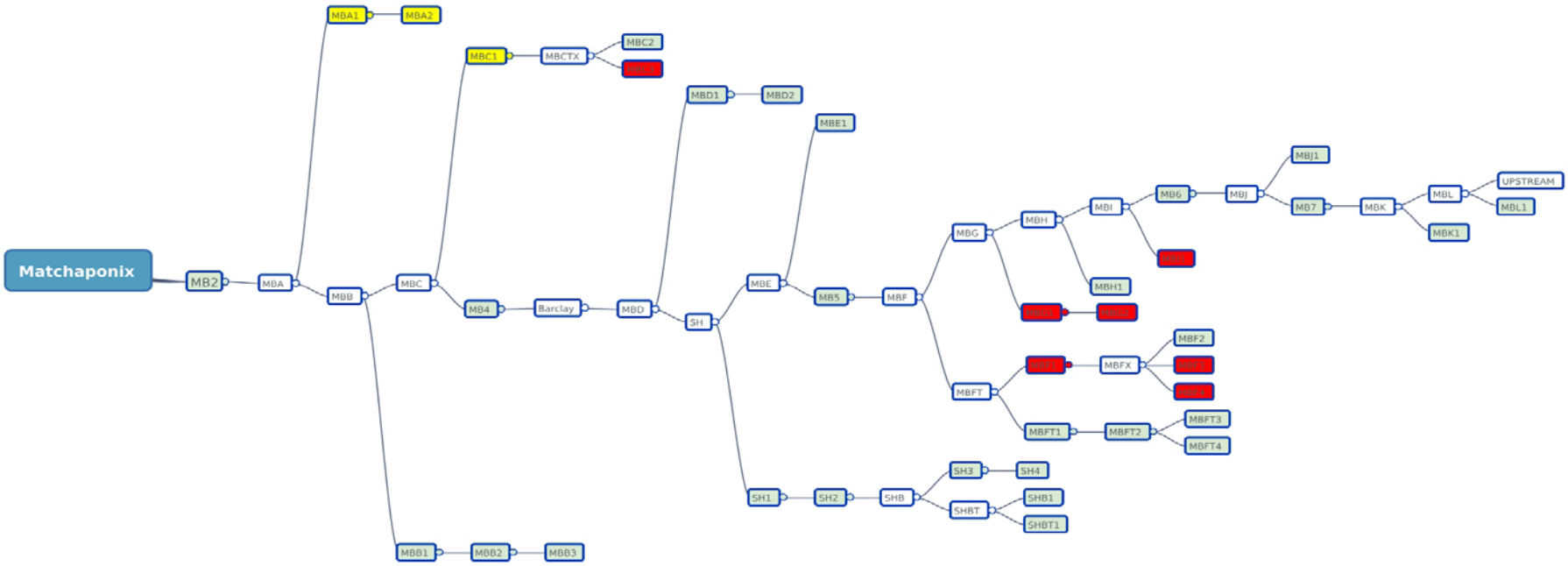


Habitat and Ecological Health



Habitat and Ecological Health

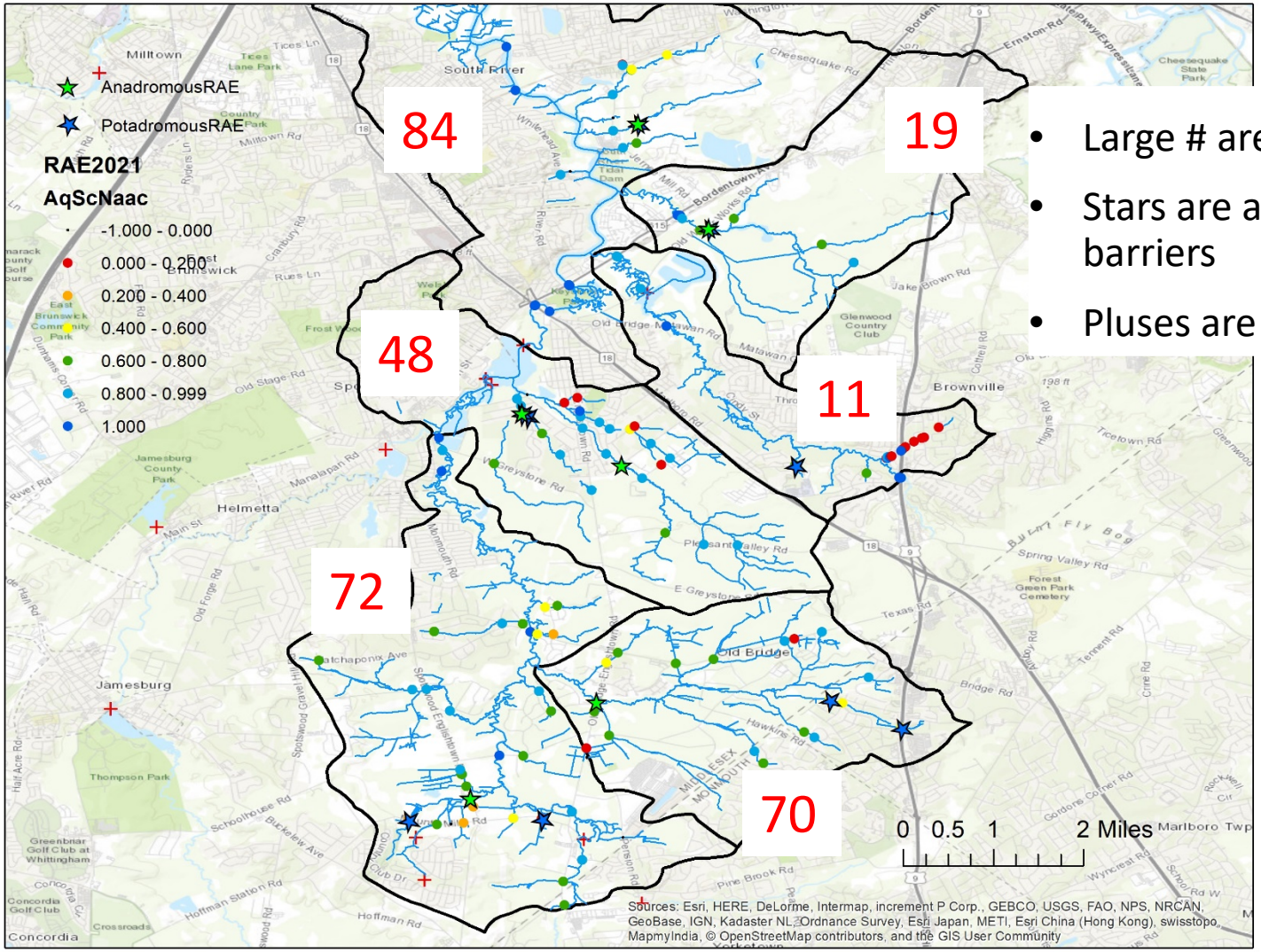
Dendritic Connectivity Index



DCI Score = Passability X Length of stream until the next barrier
Summed up for the whole system

Habitat and Ecological Health

RAE 2021 Dendritic Connectivity Results



- Large # are the DCI score (0-100)
- Stars are aquatic organism barriers
- Pluses are dams


BB2


TB 5.5


MBF3


DR dam

Next Steps

- Run the hydrologic model
- Preliminary evaluation
- Engage an engineering and design firm
- Prep for next field season

Questions?

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