NEW YORK
STATE OF
OPPORTUNITY

Department of
Environmental
Conservation

Right-sizing Stream Crossings for Fish, Wildlife, and Resiliency

January 2021

New York State Department of Environmental Conservation

photo: Scott Jackson

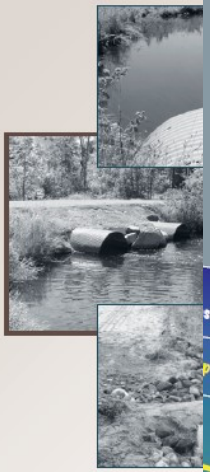
STREAM CROSSINGS

This brochure was developed for those involved in designing and constructing stream crossings with an eye toward protecting and restoring stream continuity.

The guidelines and standards presented here describe minimum criteria to avoid fragmentation of streams. The objective is to maintain natural conditions that do not restrict the movement of fish and wildlife through the stream system. Although these guidelines meet this objective, additional engineering design may be necessary to ensure structural integrity and appropriate hydraulic capacity.

Fish Friendly Culverts

Proper design, installation, and maintenance can protect both roadways and fish



Wisconsin DNR

U.S. Department of Agriculture

Forest Service

National Technology and Development Program

7700—Transportation Mgmt
0877 1801—SDTDC
August 2008

STREAM SIMULATION: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings

Ecologically speaking, what are streams?

Streams are “long linear ecosystems”

- USFS Stream Simulation Manual

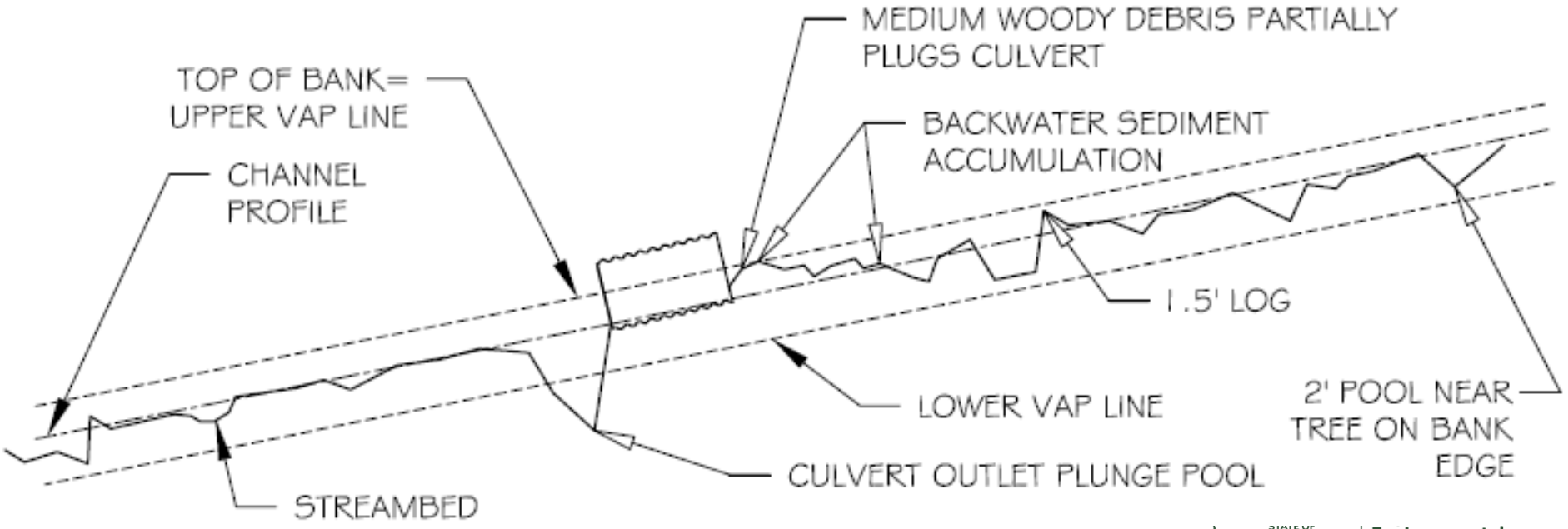
More than that, streams are long linear interconnected ecosystems.

Aquatic barriers

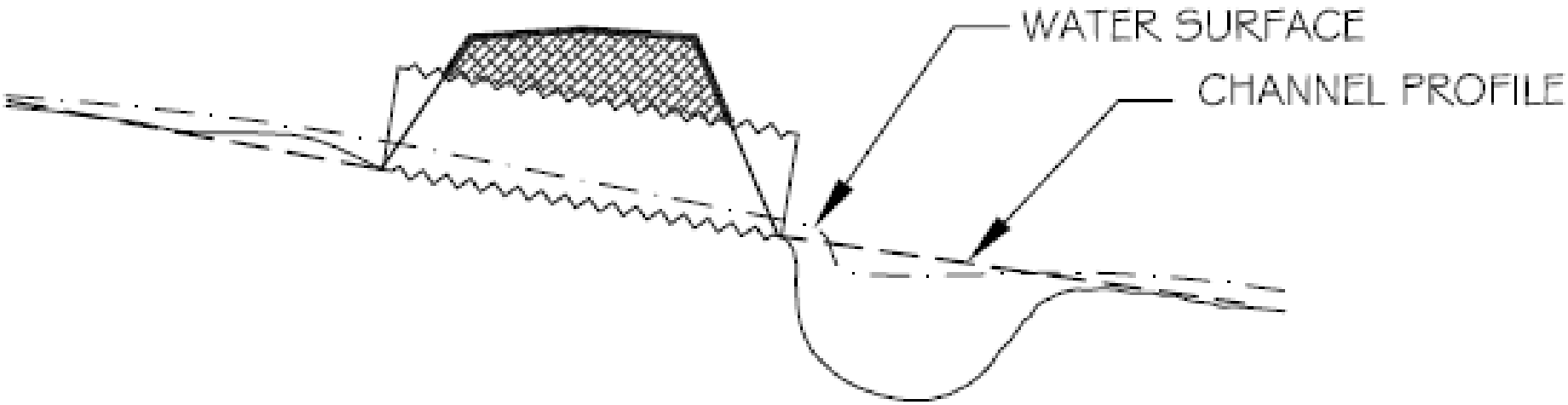
"…a growing ecological and fiscal liability"

National Forest System Legacy Roads and Trails program 2013

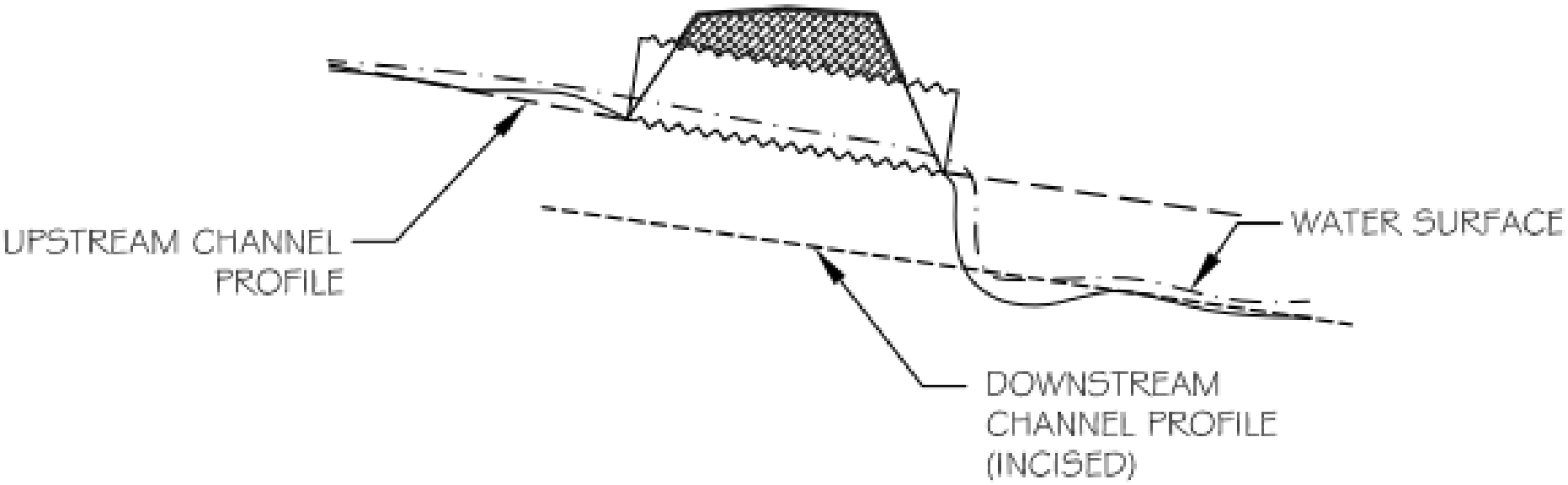
Profile view of an undersized / non-embedded culvert interacting with stream



US Forest Service Stream Simulation Manual



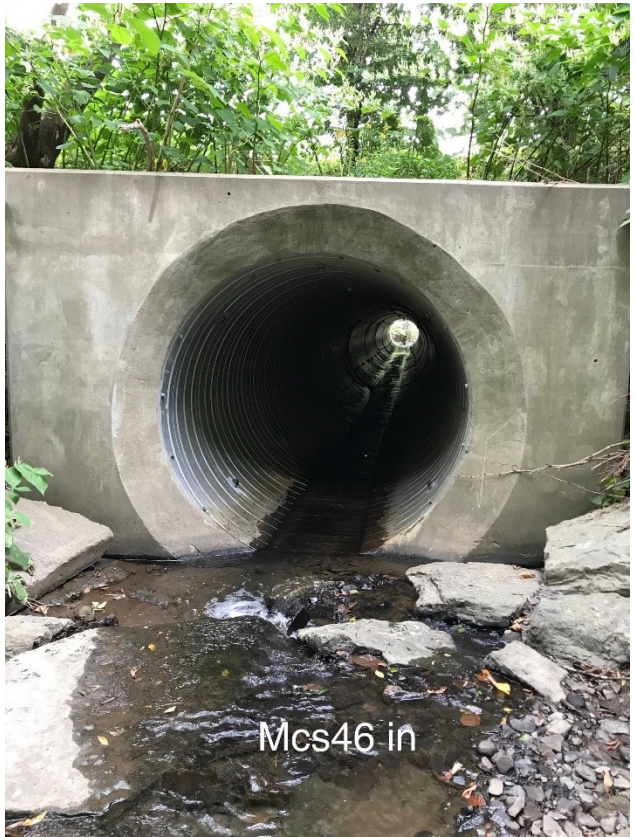
US Forest Service Stream Simulation Manual



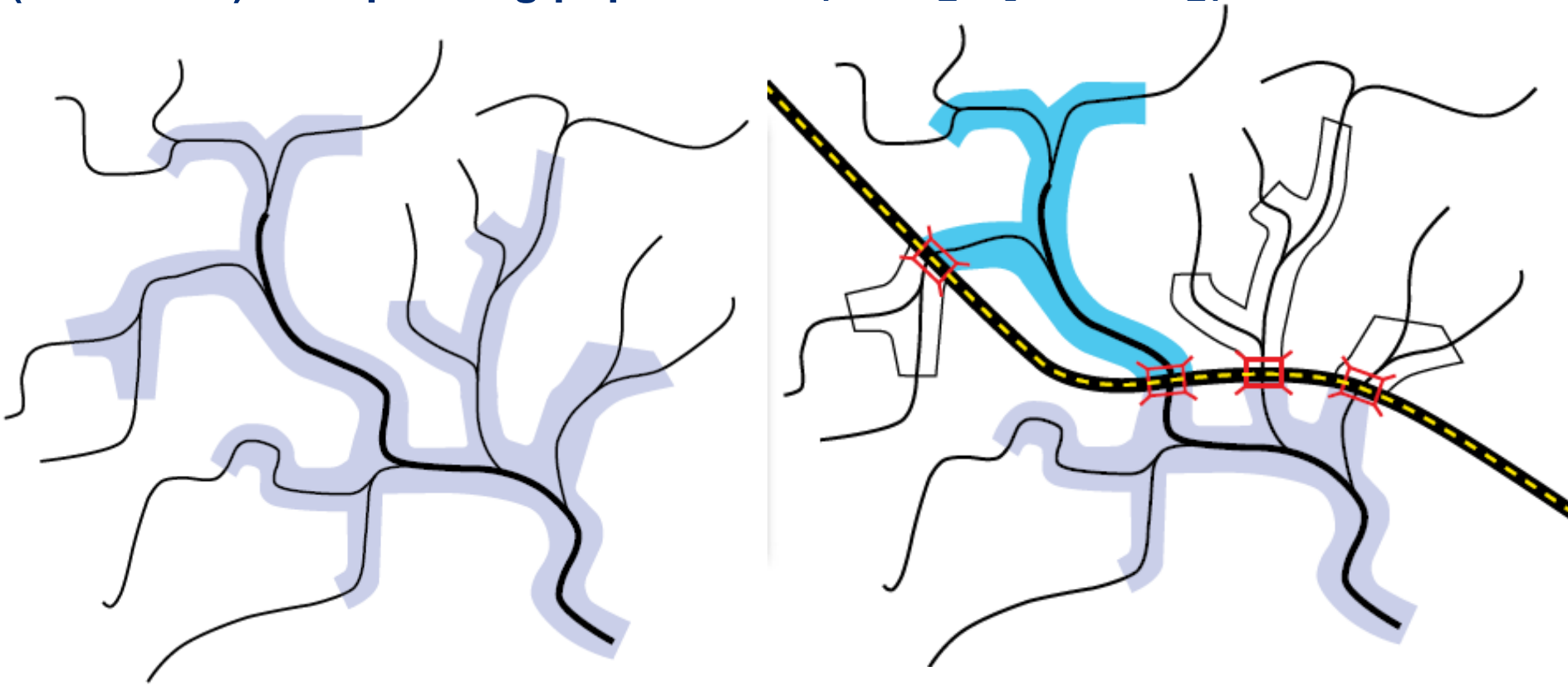
US Forest Service Stream Simulation Manual

Culvert pipe preventing AOP (Aquatic Organism Passage)

Upstream view, inlet view, outlet view



Culverts that act as barriers fragment habitats, preventing access (unshaded) or separating populations (blue/gray shading).



US Forest Service Stream Simulation Manual

Crossings should consider anticipated storm flows, not just low flow (baseflow)

Shared Objective

Flooding
Resiliency

Asset Mgmt. &
Maintenance

Optimized Road/Stream Crossings

Connectivity

Connectivity

NEW YORK
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Conservation

Proactively Creating Optimized Road/Stream Crossings

Good for "Fish, Flooding & Fauna"

WHERE: Identify & Assess

WHAT: Rank & Prioritize

HOW: Target for Replacement & Link to Funding

FIX: Structures Replaced or Repaired

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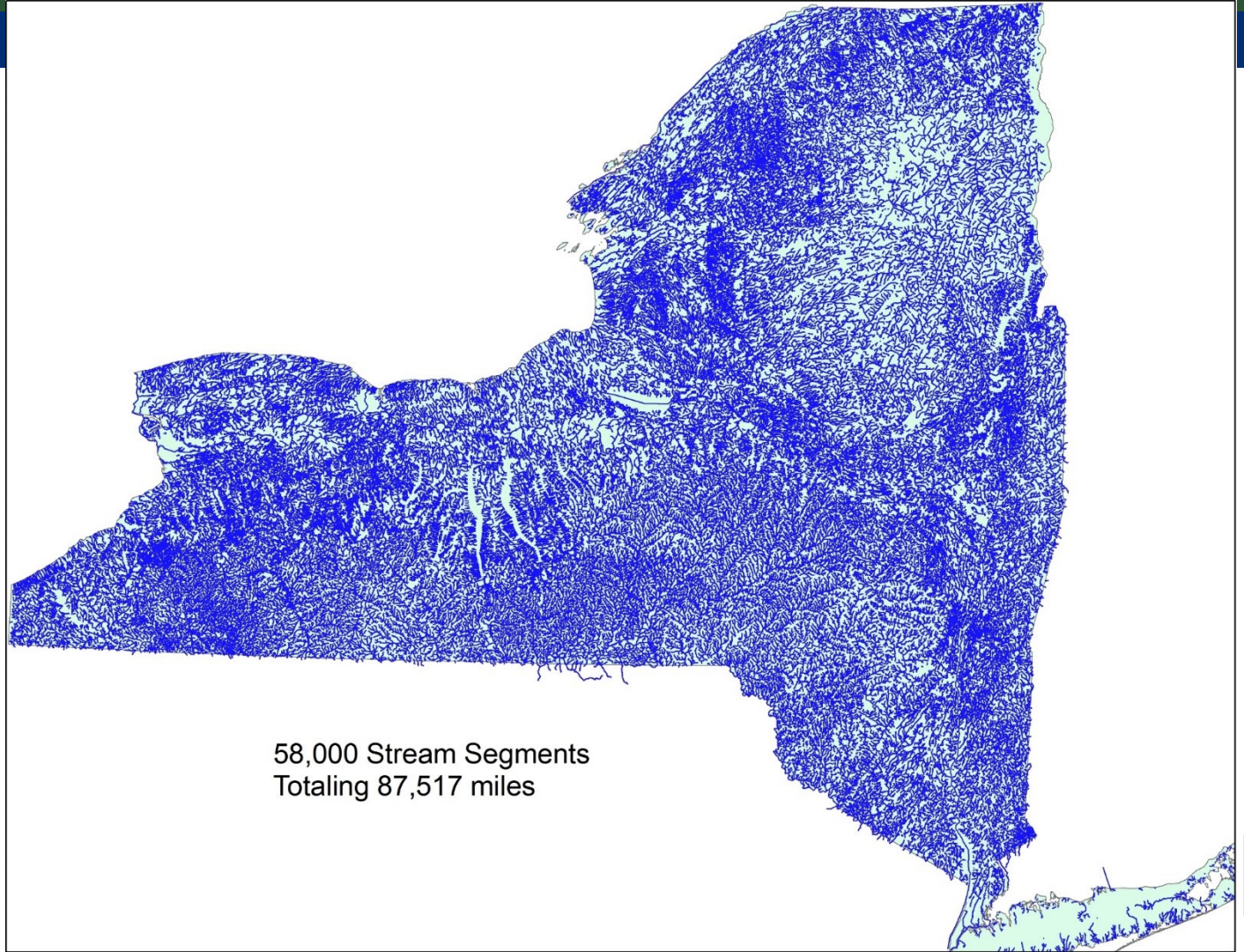
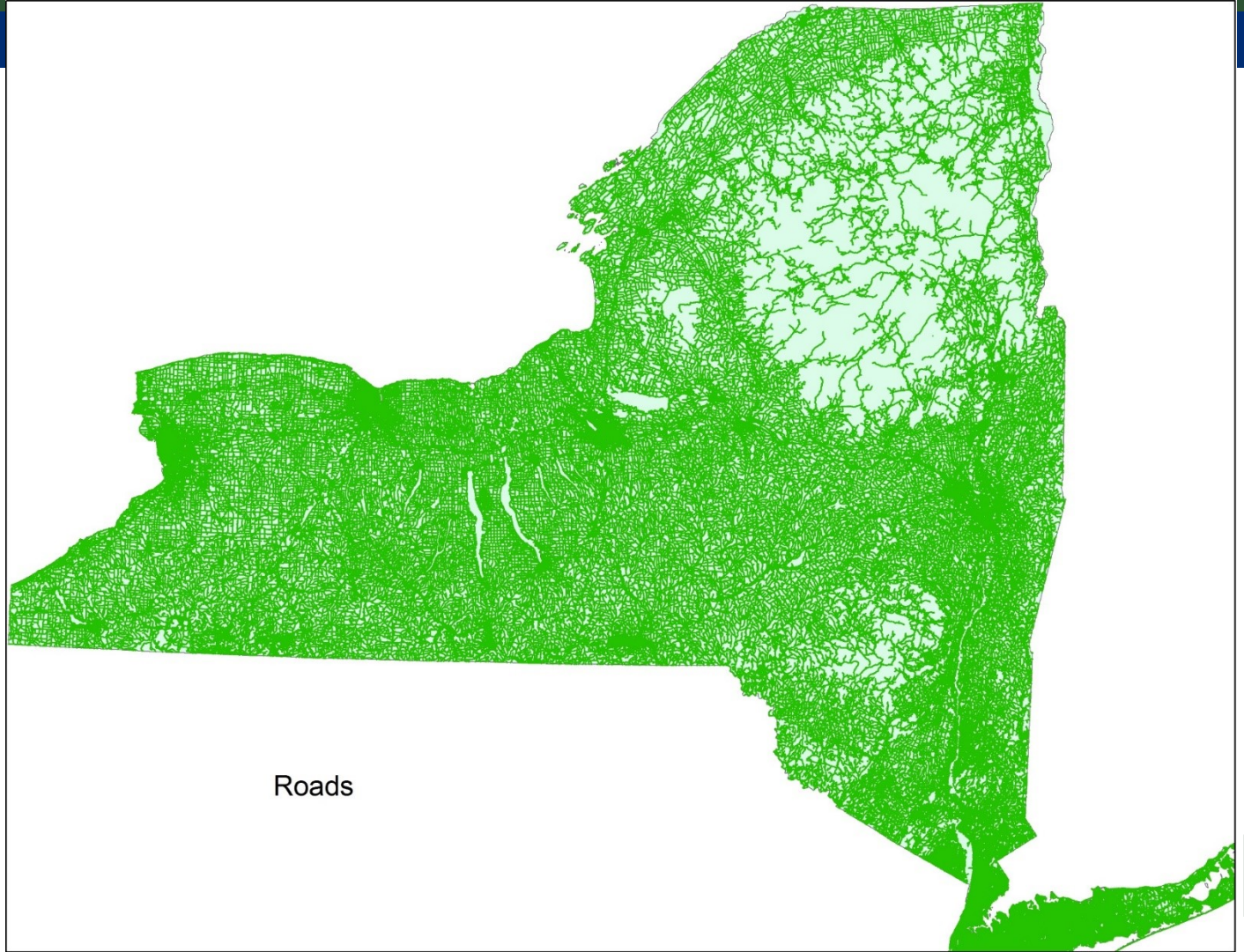


Department of Environmental Conservation



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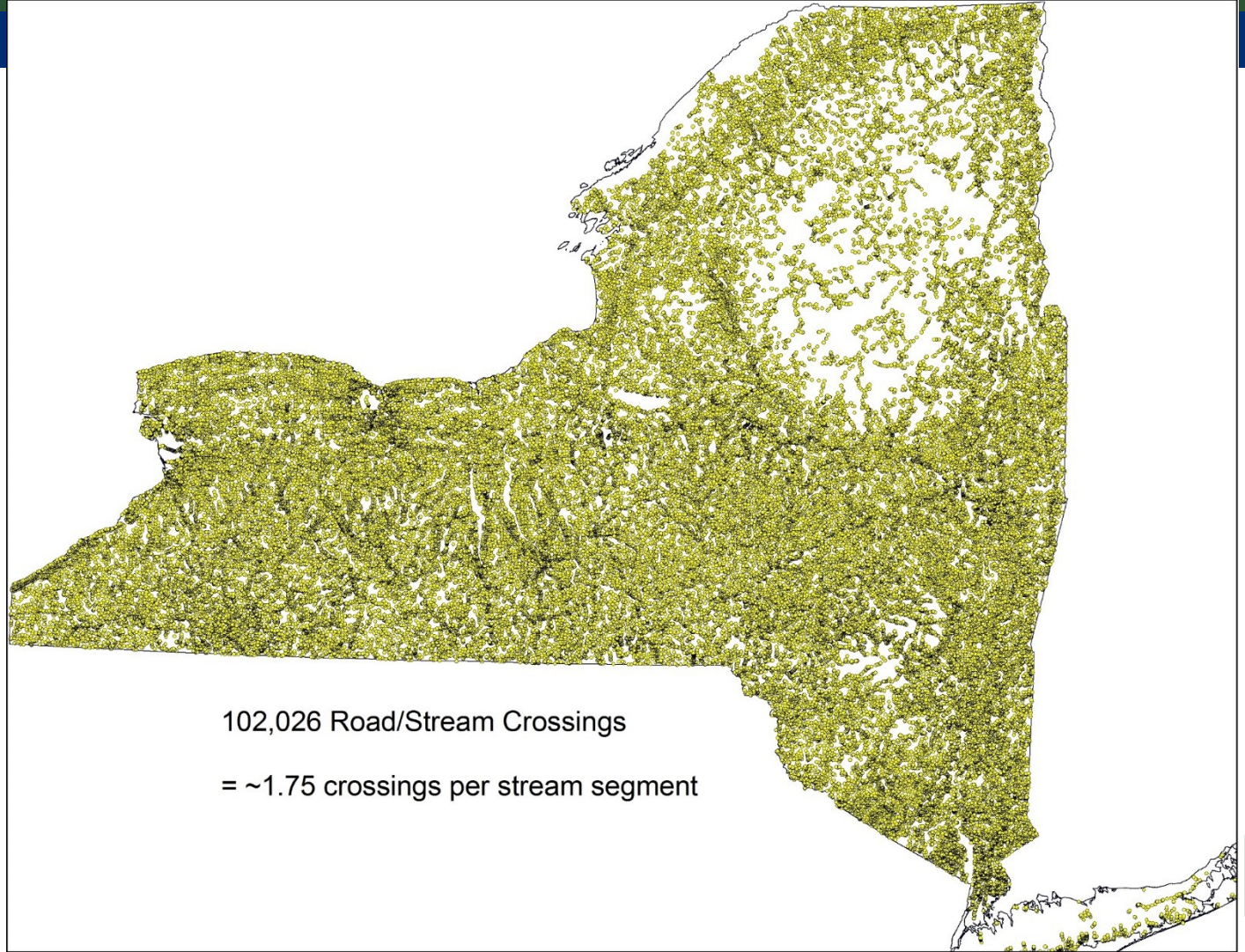
102,026 Road/Stream Crossings
= ~1.75 crossings per stream segment

Problem

- Disconnected studies and databases of road/stream crossings
- Dissimilar assessment standards, no consistency
- No central source of information
- Not all publicly available
- Not effective for programmatic or statewide goals linking *funding*
- Need hydrologic, condition and resiliency planning components

Solution

Comprehensive standardized methodology for assessing road/stream crossings and Consolidated, user-friendly database

→ ***NAACC***

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North Atlantic Aquatic Connectivity Collaborative

NAACC Project
completed June, 2015

44 confirmed participants from:

- **Federal agencies: NOAA, USFWS, USFS**
- **State Environment / F&W agencies:**
  - **CT, MA, NH, NJ, NY, PA, VA**
- **DOTs: MA, MD, ME, NH, NY, VT**
- **Conservation groups: TU, TNC, American Rivers**
- **Regional groups/engineers**

Cornell University

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North Atlantic Aquatic Connectivity Collaborative

Elements of NAACC in NY:

1. Field survey protocol with data collection (digital & paper)
2. Public database and mapping tools
3. Training on use of protocol, data QA/QC
4. Automated scoring systems (passability scoring, critical linkages)
5. Capacity modeling (Cornell tool post processing)
6. Module expansion: Condition assessment, terrestrial, tidal

Where can I learn more?

Web portal - https://streamcontinuity.org

NAACC homepage - https://streamcontinuity.org/NAACC

NAACC database homepage – https://NAACC.org

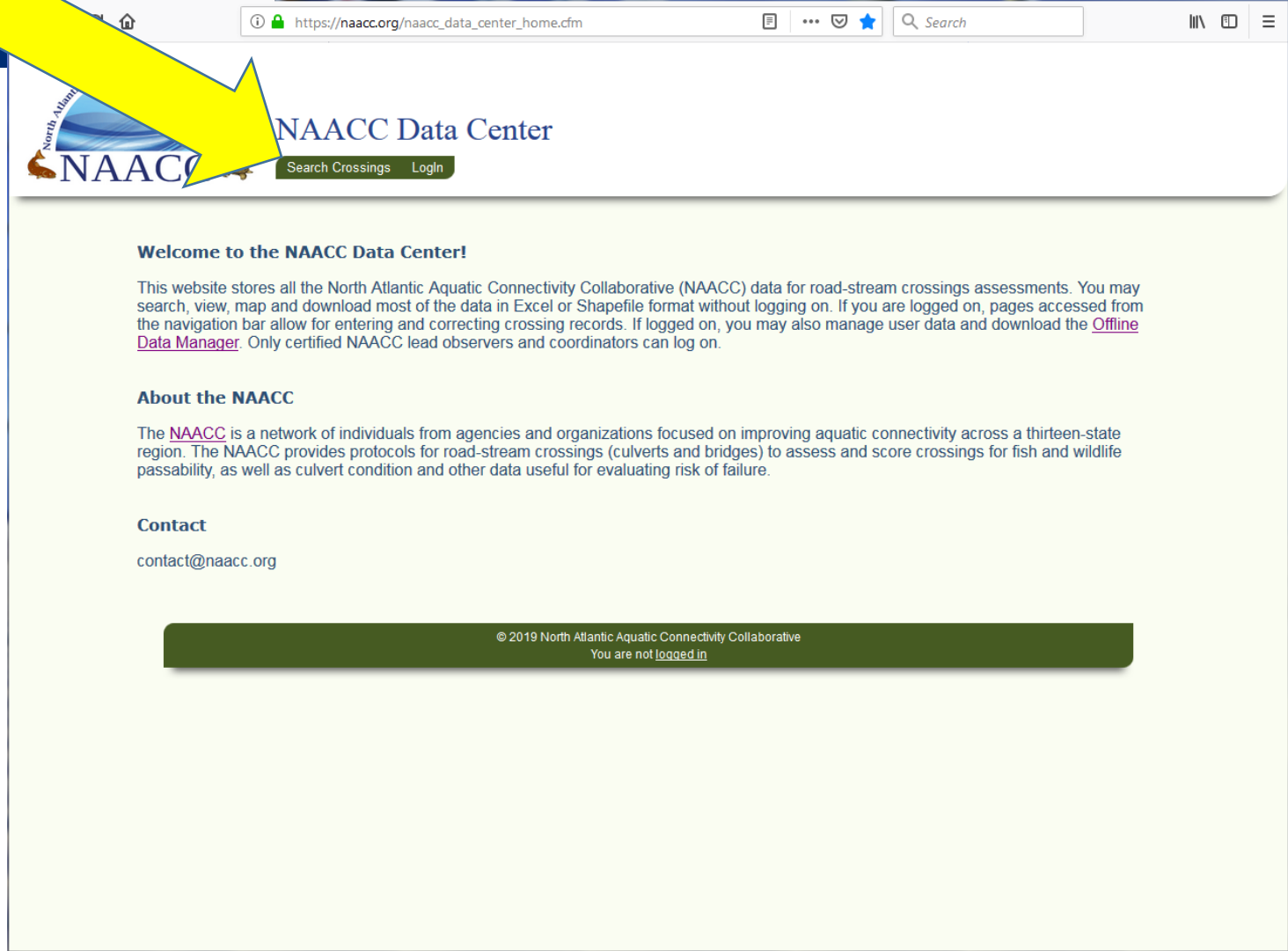
North Atlantic Aquatic Connectivity Collaborative

NAACC

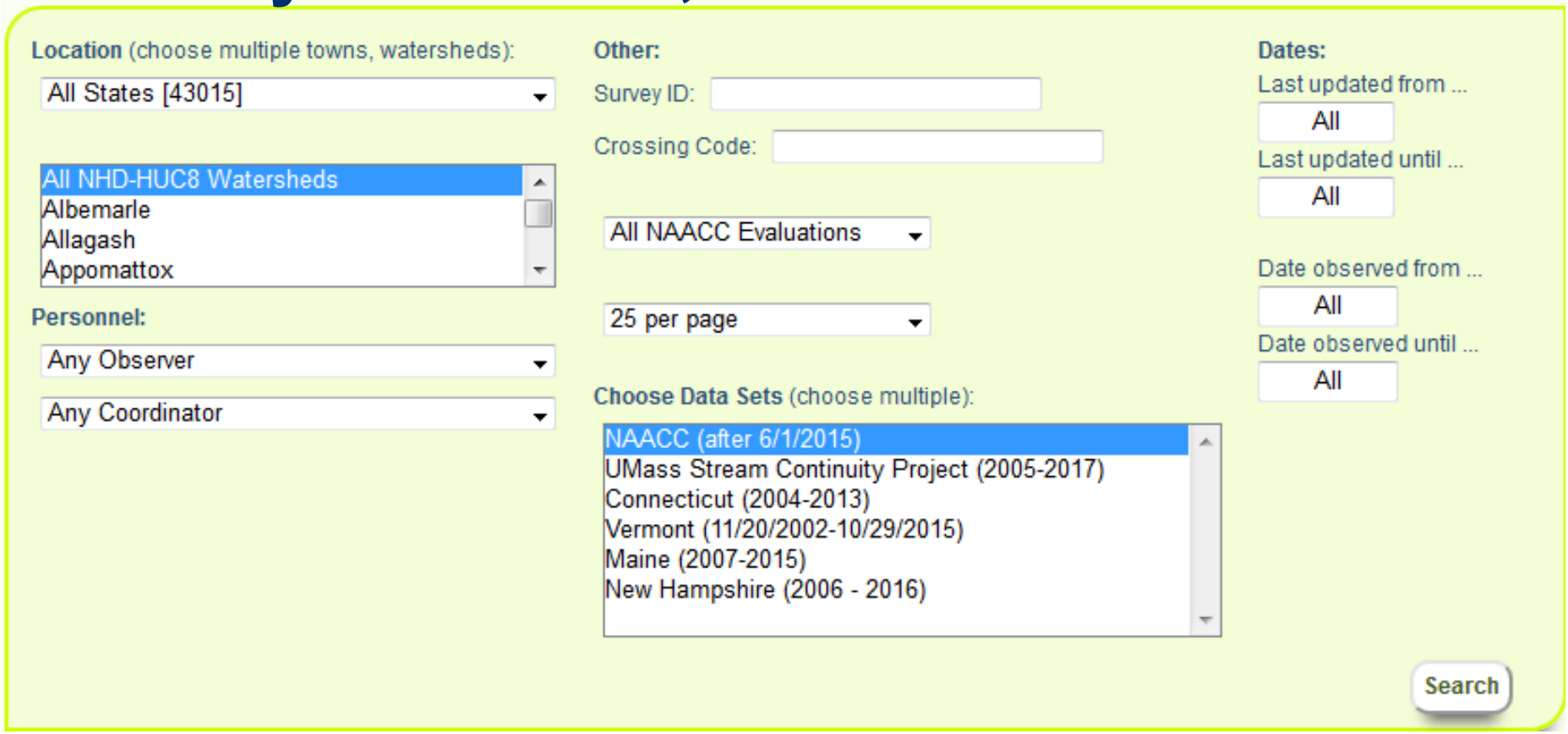
NAACC Data Center | Toolkit | Participating States | Get Involved!

The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a network of individuals from universities, conservation organizations, and state and federal natural resource and transportation departments focused on improving aquatic connectivity across a thirteen-state region, from Maine to West Virginia. See below for some of our stream crossing assessments.

NAACC.org


https://naacc.org/naacc_data_center_home.cfm
Search
NAACC Data Center
Search Crossings
LogIn
Welcome to the NAACC Data Center!
This website stores all the North Atlantic Aquatic Connectivity Collaborative (NAACC) data for road-stream crossings assessments. You may search, view, map and download most of the data in Excel or Shapefile format without logging on. If you are logged on, pages accessed from the navigation bar allow for entering and correcting crossing records. If logged on, you may also manage user data and download the Offline Data Manager. Only certified NAACC lead observers and coordinators can log on.
About the NAACC
The NAACC is a network of individuals from agencies and organizations focused on improving aquatic connectivity across a thirteen-state region. The NAACC provides protocols for road-stream crossings (culverts and bridges) to assess and score crossings for fish and wildlife passability, as well as culvert condition and other data useful for evaluating risk of failure.
Contact
contact@naacc.org
© 2019 North Atlantic Aquatic Connectivity Collaborative
You are not logged in

Narrow your search, then click “search”



Data Set	GIS	Excel Reports		
NAACC (after 6/1/2015)	shapefile	simple	detailed	Not available

Shapefile or Excel Reports

Showing 788 Records , 25 per page.

Next [763]

Survey ID	Crossing Code	Date Observed	Last Updated	Town	Stream	Road	Evaluation	Culvert
20017	xy4115699874056378	2015/07/15	2015/09/29	Ramapo NY	Unnamed	Park Terrace	No barrier	0
20018	xy4120727074026341	2015/07/06	2015/09/29	Haverstraw NY	Unnamed	Underpass Rd	Insignificant barrier	1
20019	xy4116848074036412	2015/07/01	2015/09/29	Ramapo NY	Minisceongo	Pomona	Moderate barrier	1
20020	xy4116748474052906	2015/07/01	2015/09/29	Ramapo NY	Unnamed	Pomona	no score - missing data	1
20021	xy4119982174027117	2015/07/06	2015/09/01	Haverstraw NY	unnamed	Highway Dept	Insignificant barrier	2
20022	xy4116729874048974	2015/07/01	2015/09/29	Ramapo NY	Unnamed	Pomona	no score - missing data	3
20023	xy4119436274027974	2015/07/06	2015/09/29	Haverstraw NY	unnamed	Anderson Rd	Insignificant barrier	2
20024	xy4119225074041866	2015/07/06	2015/09/01	Haverstraw NY	unnamed	Quaker Rd	Insignificant barrier	1
20025	xy4116843174049633	2015/07/01	2015/09/29	Ramapo NY	Unnamed	South Camp Hill	Insignificant barrier	3
20026	xy4116998574050192	2015/07/01	2015/09/29	Ramapo NY	Unnamed	Camp Hill	Minor barrier	3
20027	xy4120546974008227	2015/07/07	2015/09/29	Haverstraw NY	Minisceongo Creek	Suffern Ln	No barrier	0
20028	xy4120600474011366	2015/07/07	2015/09/01	Haverstraw NY	unnamed	Bianchi Drive	No barrier	0
20029	xy4116853274060563	2015/07/01	2015/09/29	Ramapo NY	Unnamed	Willow Ct	no score - missing data	1
20030	xy4117307674060286	2015/07/01	2015/10/02	Ramapo NY	Unnamed	Tara Dr	No barrier	0
20031	xy4121017974019987	2015/07/07	2015/09/01	Haverstraw NY	Minisceongo Creek	Rosman	Insignificant barrier	1
20032	xy4116984874060561	2015/07/01	2015/08/31	Ramapo NY	Unnamed	White Birch Ln	No barrier	0
20034	xy4121056874014559	2015/07/07	2015/09/01	Haverstraw NY	unnamed	Suffern Ln.	no score - missing data	2
20035	xy4117171074060275	2015/07/01	2015/10/02	Ramapo NY	Unnamed	White Birch Ln	No barrier	0
20036	xy4118001574055857	2015/07/02	2015/09/29	Ramapo NY	Unnamed	Camp Hill	Insignificant barrier	2
20037	xy4118039074055690	2015/07/02	2015/09/29	Ramapo NY	Unnamed	Camp Hill	Insignificant barrier	1
20038	xy4120019674013276	2015/07/08	2015/09/01	Haverstraw NY	unnamed	Rosman Rd	Minor barrier	2
20039	xy4119021074057110	2015/07/02	2015/09/29	Haverstraw NY	Unnamed	Grey Beech Ln	Minor barrier	1
20040	xy4118485374059253	2015/07/02	2015/09/29	Haverstraw NY	Unnamed	Ladentown	Minor barrier	1
20041	xy4118287574049143	2015/07/02	2015/09/29	Ramapo NY	Unnamed	Route 202	Insignificant barrier	2
20042	xy4120181774013368	2015/07/07	2016/03/25	Haverstraw NY	unnamed	Crescent Drive	Insignificant barrier	6

Next [763]

Crossings surveyed

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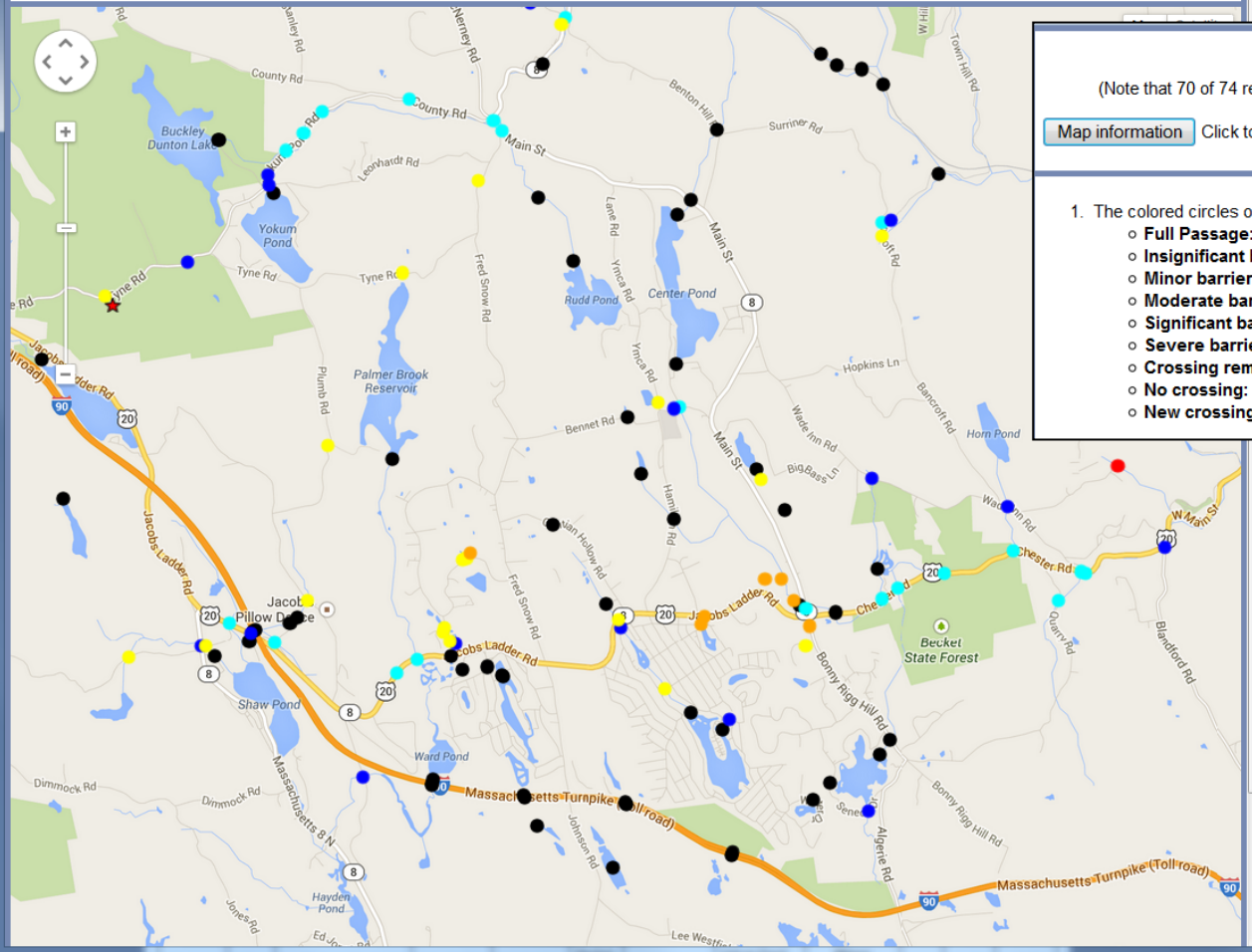
Welcome to our new search results map page!

(Note that 70 of 74 records in your search results have been mapped. Only records having valid xy crossing codes or GPS information can be mapped.)

Map information Click to show/hide map information



Welcome to our new search results map page!

(Note that 70 of 74 records in your search results have been mapped. Only records having valid xy cross

Map information Click to show/hide map information

1. The colored circles on the map represent surveyed crossings color coded as follows:
   - **Full Passage:** green
   - **Insignificant barrier:** blue green
   - **Minor barrier:** blue
   - **Moderate barrier:** yellow
   - **Significant barrier:** orange
   - **Severe barrier:** red
   - **Crossing removed:** magenta
   - **No crossing:** black circle with bold red x
   - **New crossing pending approval:** black circle with red slash

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NAACC

North Atlantic Aquatic Connectivity Collaborative

Search Crossings Login

Data checked and accurate by Andrew, Meyer on 09-18-2015

NAACC Data Set:

C[illegible]

AOP Coarse Screen: No AOP
Aquatic Passability Score: 0.58

xy4218012073850377(inlet)6-27-2015.jpg

xy4218012073850377(outlet)6-27-2015.jpg

xy4218012073850377(upstream)6-27-2015.jpg

xy4218012073850377(downstream)6-27-2015.jpg

Crossing Data:

Coordinator: Andrew Meyer

Lead Observer: Tracey Testo

Date observed in field: 06-27-2015

Observer Phone: 518-622-9820

Stream/River: unnamed

Town/County: Livingston, NY

Location: none

GPS: Lat: 42.18017 , Long: -73.85015

GPS to crossing distance (meters): 19.5

Crossing Code: xy4218012073850377

First entered: 07-27-2015

Last updated: 01-01-2016

Observer Email: tet35@cornell.edu

Road: 9G

Road Type: Paved

NHD-HUC8 Watershed: Middle Hudson

Flow condition: Typical low-flow

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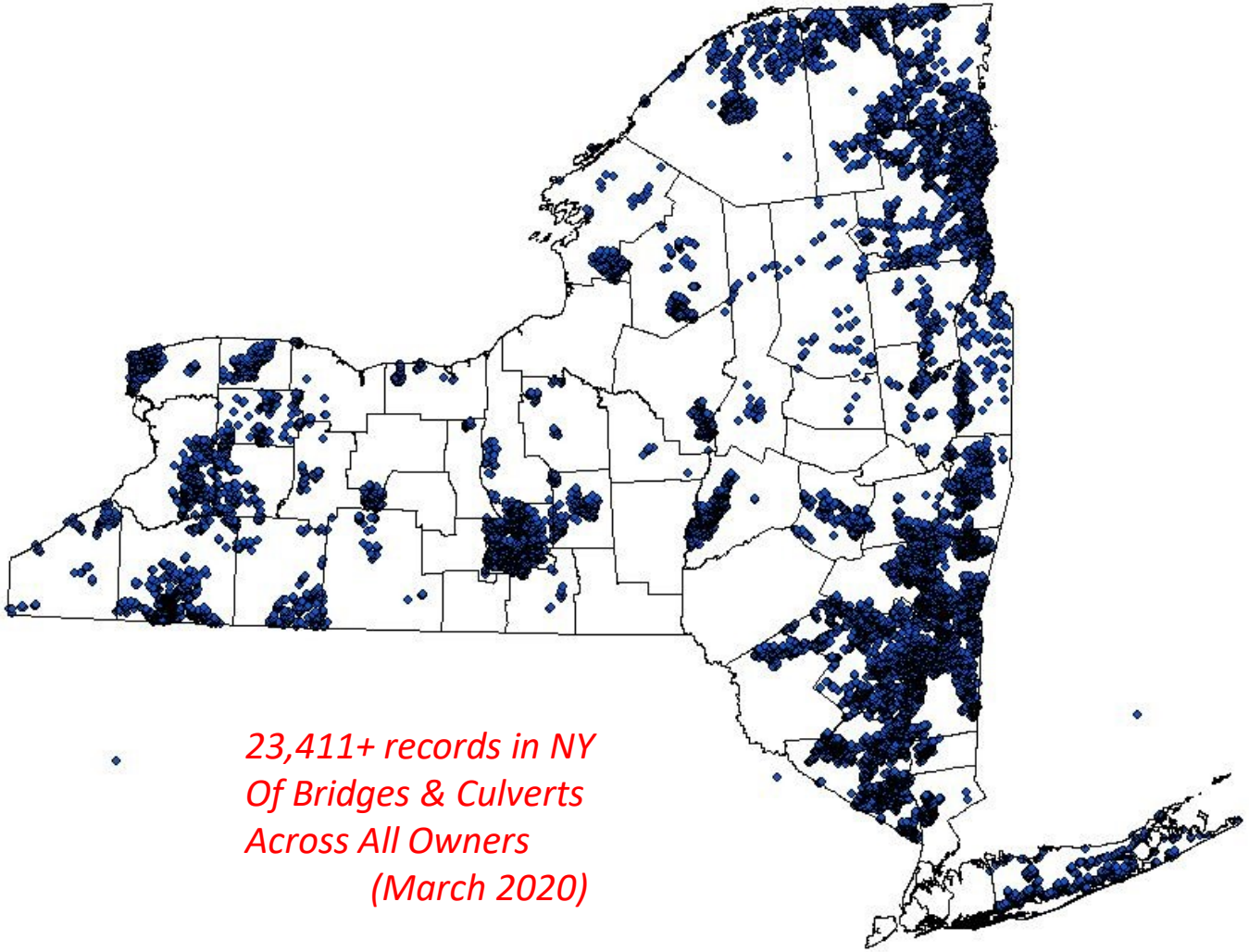

23,411+ records in NY
Of Bridges & Culverts
Across All Owners
(March 2020)

Department of Environmental Conservation

AQUATIC CONNECTIVITY
Stream Crossing Survey
DATA FORM

NAACC

CROSSING DATA

STRUCTURE 1

OUTLET

INLET

ADDITIONAL CONDITIONS

DIMENSIONS

Pipe Arch / Elliptical Culvert

Box Culvert

Bridge with Abutments and Side Slopes

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Department of Environmental Conservation

Roles within NAACC

Lead Observers

Certified to assess stream crossings in the field.

- Lead survey teams (*one LO per crew*)
- Coordinate survey materials and schedules
- Collect field data (paper or electronic)
- Match survey locations to xycodes
- Ensure assessments are done safely
- Enter data into the online database

Training Requirements:

- Online "protocols" training with tests (16 modules)
- Field training (1-2 days)/Shadow a certified lead observer (20 crossings)

Database credentials to upload data

L1 (Level 1) Coordinators

Oversee and organize observers.

- Recruit and supervise lead observers
- Establish standards and expectations for safety
- Ensure adherence to protocols and QA/QC procedures
- Field audit 10% of a lead observer's first 50 records
- Review and approve data entered into database

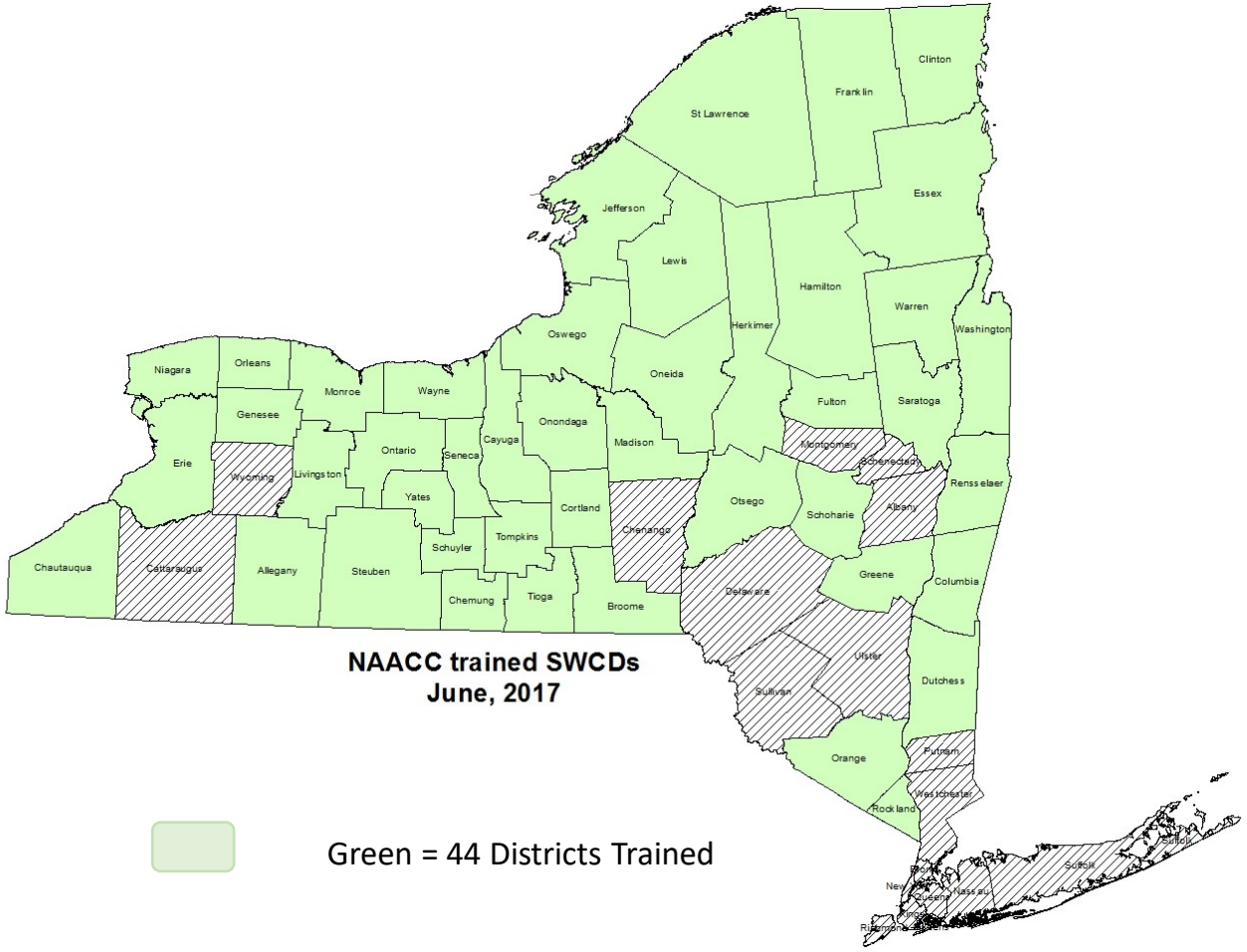
Training Requirements:

- Certification as a lead observer
- Online coordinator training unit
- Must pass online coordinator training unit test

Database credentials to enter and edit data, and add and edit observers.

L2 (Level 2) Coordinators

Oversee surveys across a fairly large geographic area (state, large watershed).



Green = 44 Districts Trained

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What have we learned so far?

Passability Scoring – how it works…

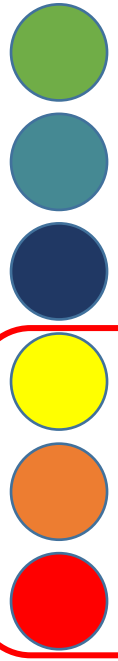
Numeric scoring algorithm using categorical and numeric data associated with the following variables:

- Inlet grade, outlet drop, physical barriers, constriction, water depth, water velocity, scour pool, substrate matching stream, substrate coverage, openness, height, outlet armoring, internal structures.

NAACC AOP scoring breakdown

Descriptor	Aquatic Passability Score(s)
No barrier	1.0
Insignificant barrier	0.80 – 0.99
Minor barrier	0.60 – 0.79
Moderate barrier	0.40 – 0.59
Significant barrier	0.20 – 0.39
Severe barrier	0.00 – 0.19

NAACC Assessments Evaluation
- a sample of NY data -



- Full Passage – 12%
- Insignificant Barrier – 27%
- Minor Barrier – 26%
- Moderate Barrier – 14%
- Significant Barrier – 5%
- Severe Barrier – 16%

35%

Cornell University

Determining Peak Flow Under Different Scenarios and Identifying Undersized Culverts

Objective

To identify undersized culverts, for both current and future precipitation conditions.

Flow Capacity Modeling

- GIS model & calculations
- Delineation of watershed to pour point using DEMs
- Calculation of covertypes for runoff coefficients and hydrograph generation
- Precipitation model (current & future)
- Flow estimates applied to pipe flow equation and road fill height

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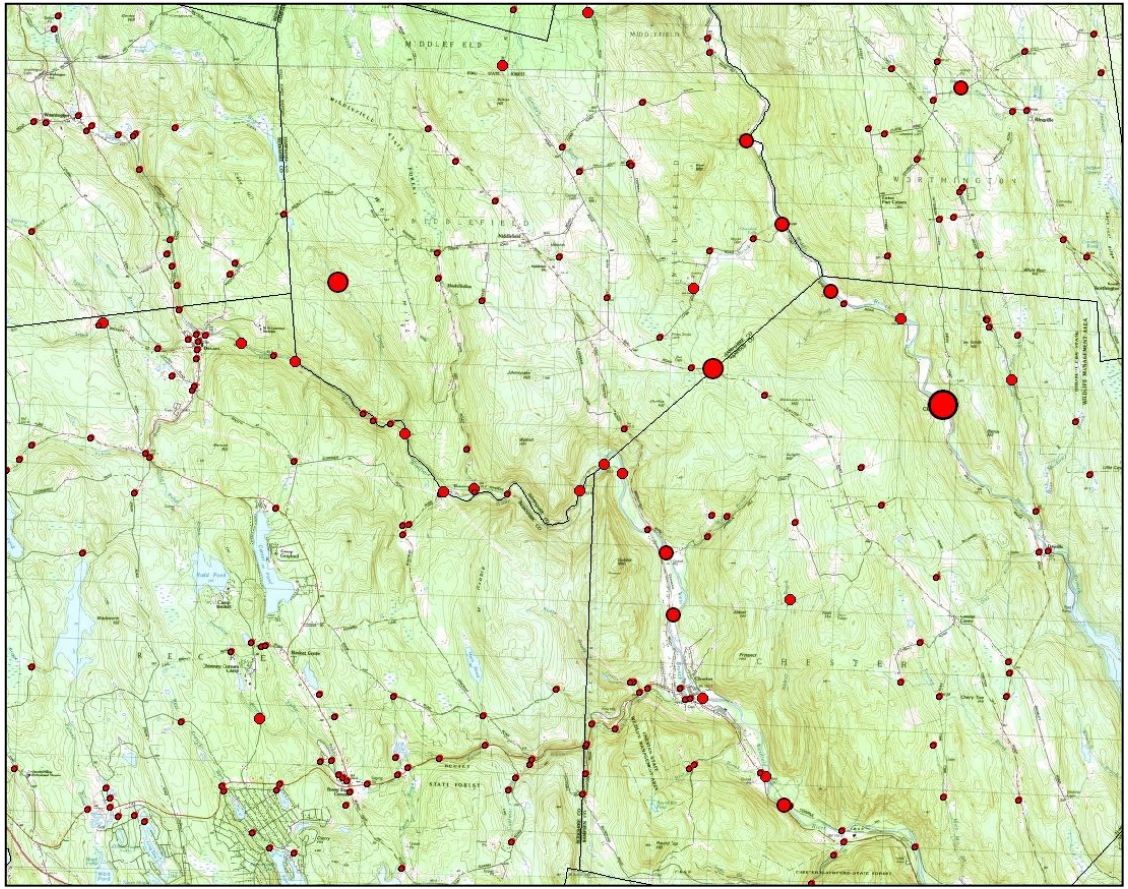
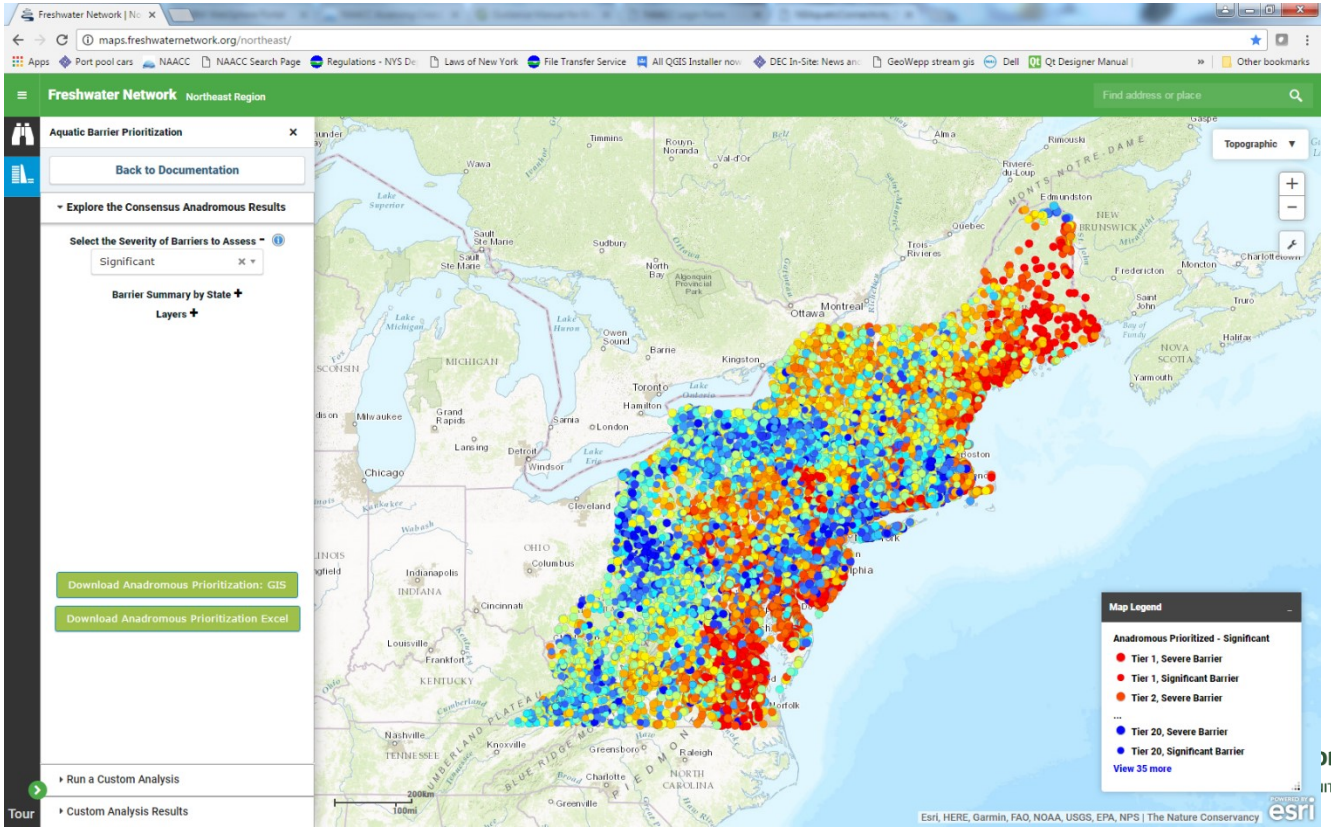
NAACC Applications – Critical Linkages



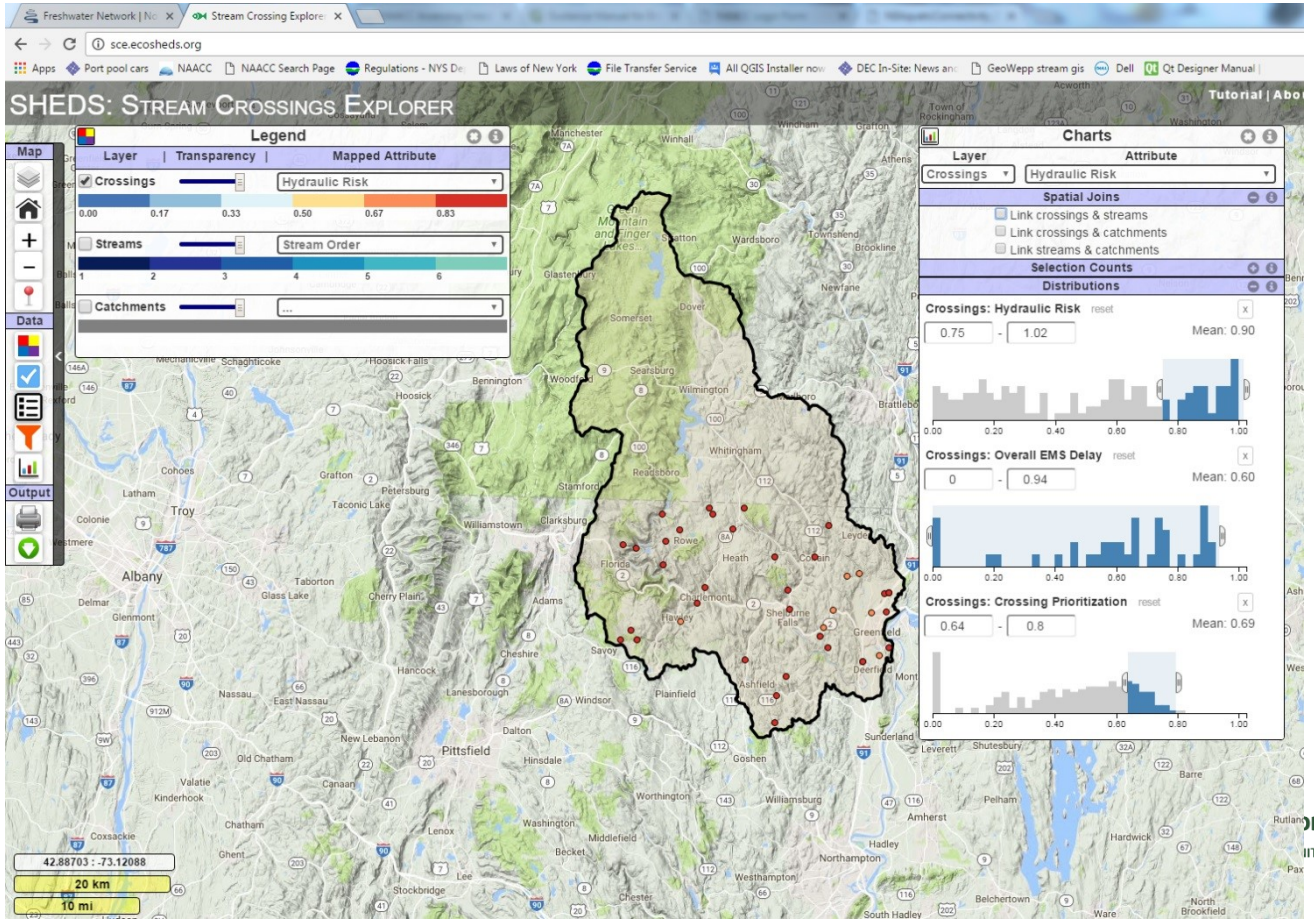
NAACC Applications – TNC Barrier Prioritization Web Tool

http://maps.freshwaternetwork.org/northeast/



NAACC Applications – Stream Crossings Explorer Web Tool

http://sce.ecosheds.org/



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- Use NAACC database to learn about project sites, prepare permit applications and/or review applications
- Use prioritization in web tools to identify most appropriate designs considering connectivity & flooding resiliency
- Use prioritization within funding programs to identify/rank/replace structures (WQIP, SWG, BridgeNY etc.)

Proactively Creating Optimized Road/Stream Crossings

Good for "Fish, Flooding & Fauna"

WHERE:
Identify & Assess

WHAT:
Rank & Prioritize

HOW:
Target for Replacement & Link to Funding

FIX:
Structures Replaced or Repaired

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Water Quality Improvement Project (WQIP) Program

“The Water Quality Improvement Project (WQIP) program is a competitive, statewide reimbursement grant program open to local governments and not-for-profit corporations to implement projects that directly address documented water quality impairments or protect a drinking water source. This funding is for construction/implementation projects, not projects that are exclusively for planning.”

Project Types (2019)

- Wastewater Treatment Improvement
- Non-Agricultural Nonpoint Source Abatement and Control
- Land Acquisition for Source Water Protection
- Salt Storage
- Aquatic Connectivity Restoration
- Municipal Separate Storm Sewer Systems (MS4s)

Water Quality Improvement Project (WQIP) Program
WQIP Contract Process, Documents and Forms
WQIP Land Acquisition Projects for Source Water Protection Toolkit

Home » Publications, Forms, Maps » Grant Applications » Water Quality Improvement Project (WQIP) Program

Water Quality Improvement Project (WQIP) Program

WQIP awards have been announced. See below for details.

WQIP Grant Awards Announced

On December 19, 2019 Governor Cuomo announced over $93 million in grants awarded for 85 projects through WQIP. The projects will improve water quality, reduce the potential for harmful algal blooms, and protect drinking water across the state.

The WQIP Round 16 Awards List (PDF) provides key information about each funded project.

WQIP grants are administered by DEC and made available through the Governor's Regional Economic Development Council Consolidated Funding Application, an annual competitive funding program.

Successful Applicant Requirements

Successful applicants will be required to sign a State of New York Master Grant Contract (MCG) in the Grants Gateway (leaves DEC website) and will be required to comply with statewide, agency, and program terms and conditions and payment reporting requirements as identified in the MCG.

Program Description

The Water Quality Improvement Project (WQIP) program is a competitive, reimbursement grant program that funds projects that directly address documented water quality impairments or protect a drinking water source.

The Round 16 (2019) WQIP Program included the following project types and required match amounts:

- Wastewater Treatment Improvement (high priority projects 25%, general projects 60%)

Important Links
2019 WQIP Program Overview (PDF)
NYS DEC/EFC Engineering Planning Grant
Nonpoint Source Planning Grant

Links Leaving DEC's Website
Consolidated Funding Application
Regional Economic Development Councils (REDC)
Grants Gateway

PDF Help
For help with PDFs on this page, please call 518-402-8267.

Contact for this Page
Division of Water
625 Broadway
Albany, NY
12233-3502
518-402-8179

Aquatic Connectivity Restoration (2019)

Projects that improve aquatic habitat connectivity at road/stream crossings or dams	$250,000	25% of award amount	Projects **must** focus on culverts, bridges or dams that are causing the aquatic connectivity obstructions. Applicant **must** own the property or obtain an access agreement for the proposed site. Projects with a total cost that exceeds the maximum award amount **must** demonstrate in their application that they have secured funding for the remainder of the project cost to be eligible. Projects **should** remove barriers to aquatic connectivity. Sample projects include but are not limited to: upgrade and replacement of road stream crossing structures (culverts and bridges) to a larger size and appropriate

Nonpoint Source (2019)

Culvert Repair and Replacement	Projects to address erosion and erosion risks caused by failing or inadequately sized culverts through culvert repair or replacement	$1,000,000	25% of award amount	The primary purpose of the project **must** be to address erosion and/or erosion risks caused by failing or inadequately sized culverts, as documented in the WI/PWL segment assessment or photographs (must show erosion on the upstream side of the culvert). Proposals to repair or replace culverts at two or more locations should apply under the Nonpoint Source Program subtype (below). Projects that also improve aquatic organism connectivity, reduce flooding and protect infrastructure will receive additional points. However, projects that are for the primary goal of improving aquatic organism passage should apply under the Aquatic Connectivity Restoration project type.

WQIP funded project before…

Photo credit: Jared Popoli


WQIP funded project after.

Thank You!

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