



Department of
Environmental
Conservation

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

March 2020

Today's topics

1. Problem identification
2. Road / Stream Crossing Assessments using NAACC
3. Funding Opportunities through WQIP





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

Many good resources are available

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.



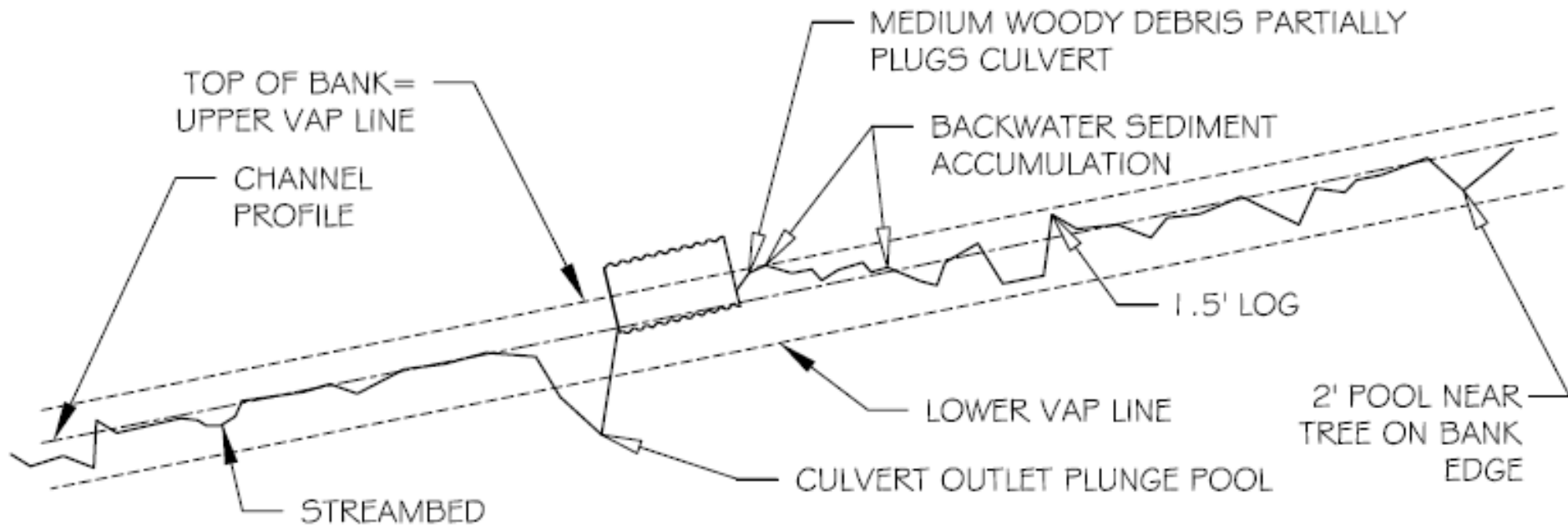


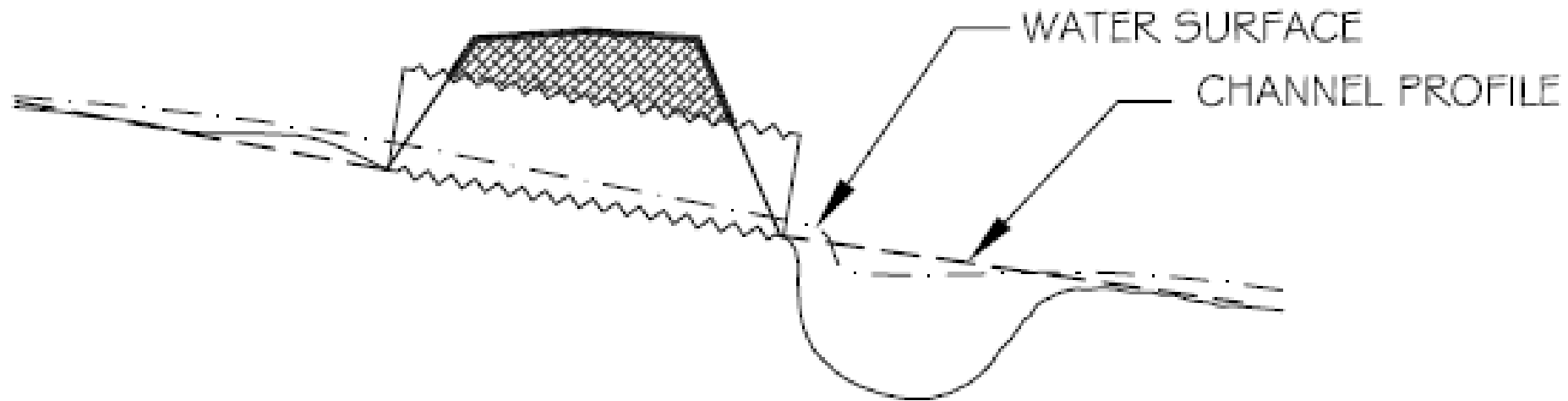
Aquatic barriers

“...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



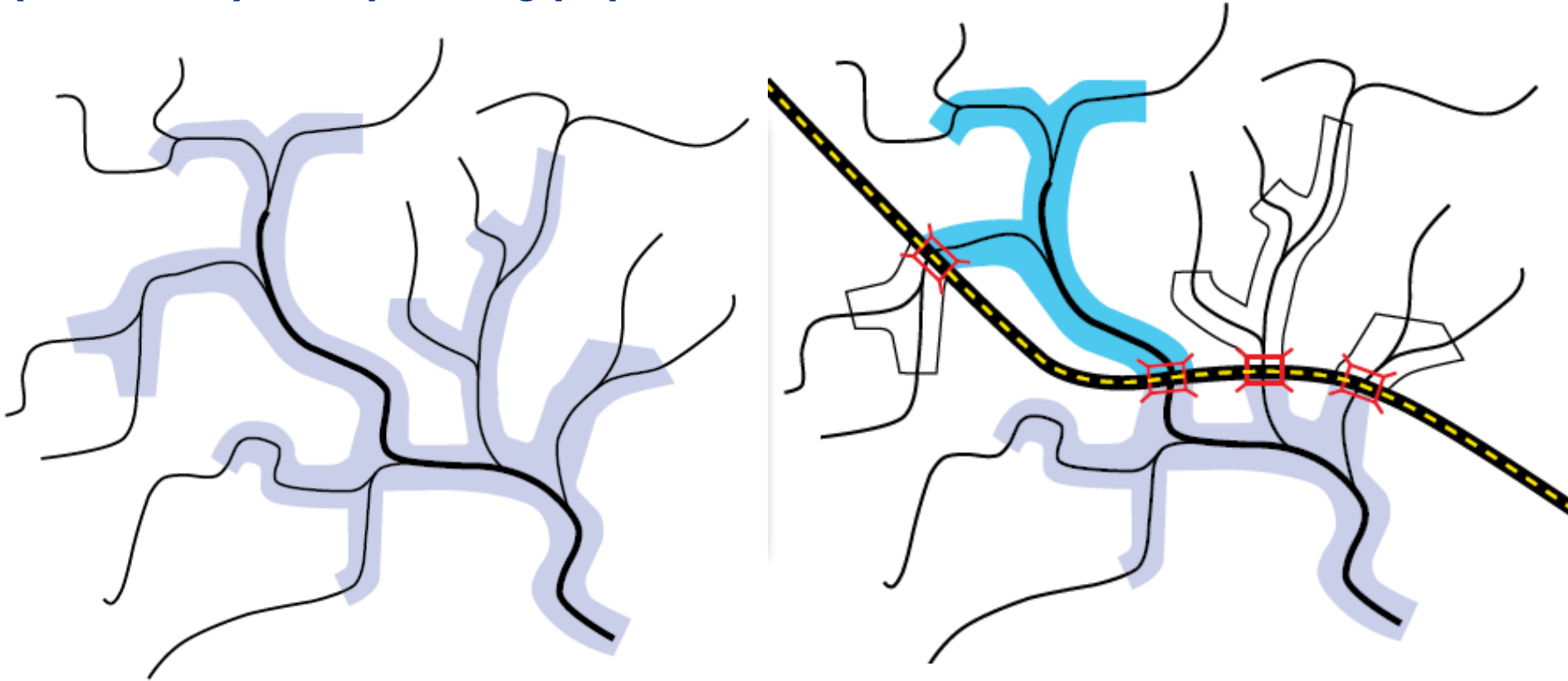


Culvert pipe preventing AOP (Aquatic Organism Passage)

Upstream view, inlet view, outlet view



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

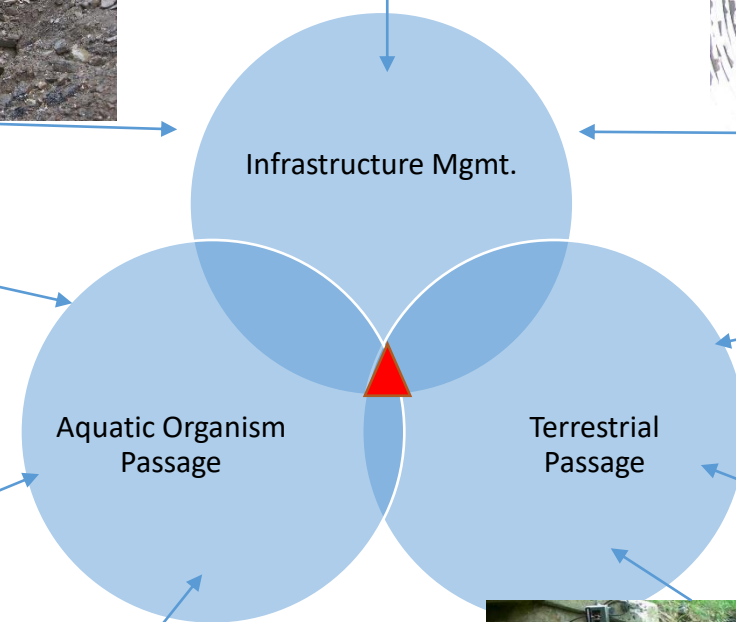




Crossings should consider anticipated storm flows, not just low flow (baseflow)



Asset Mgmt. & Maintenance



Connectivity



NEW YORK
STATE OF
OPPORTUNITY

**Department of
Environmental
Conservation**

Connectivity



Shared Objective

12

Flooding
Resiliency



Asset Mgmt. &
Maintenance

Optimized Road/Stream Crossings



Connectivity



Connectivity



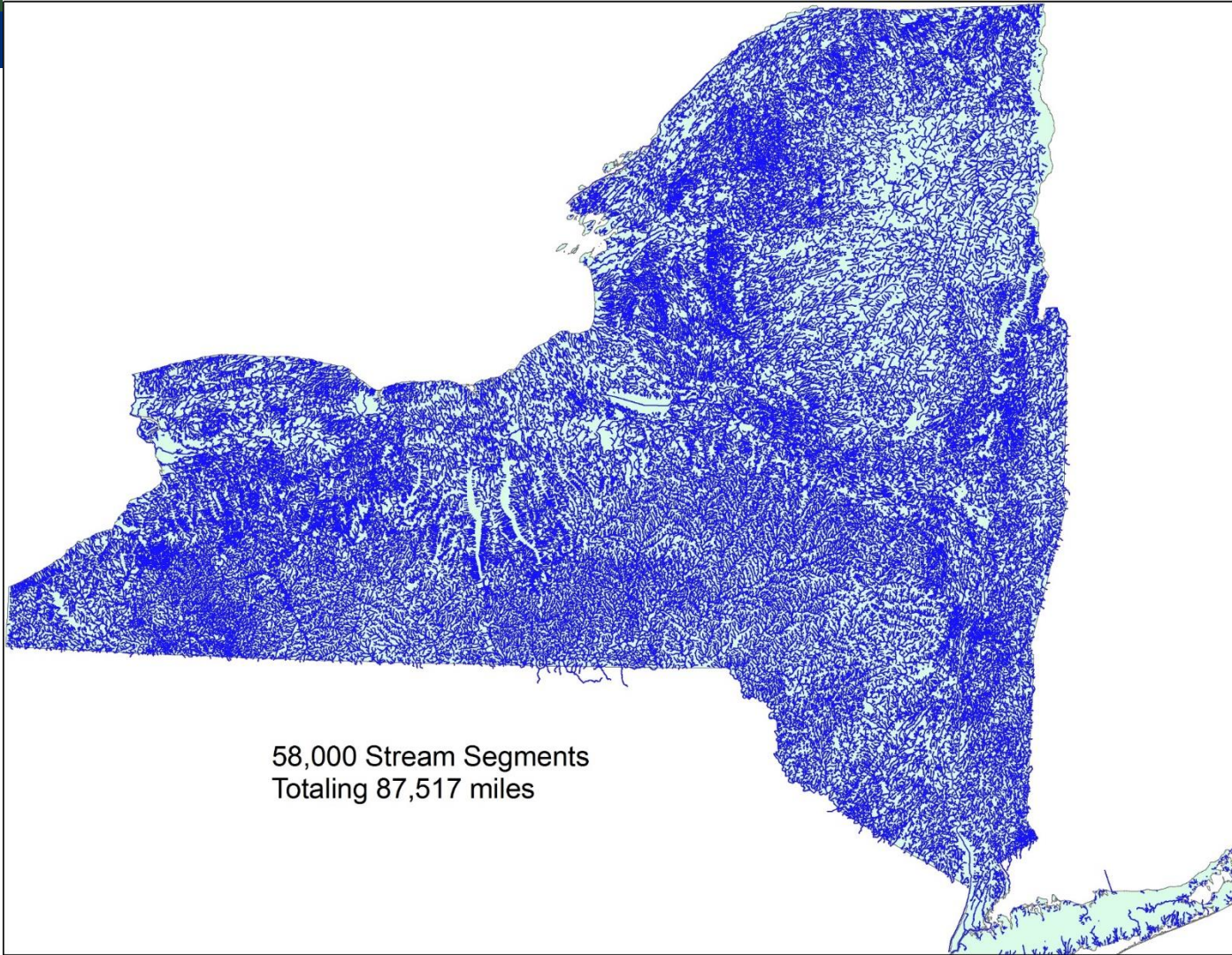
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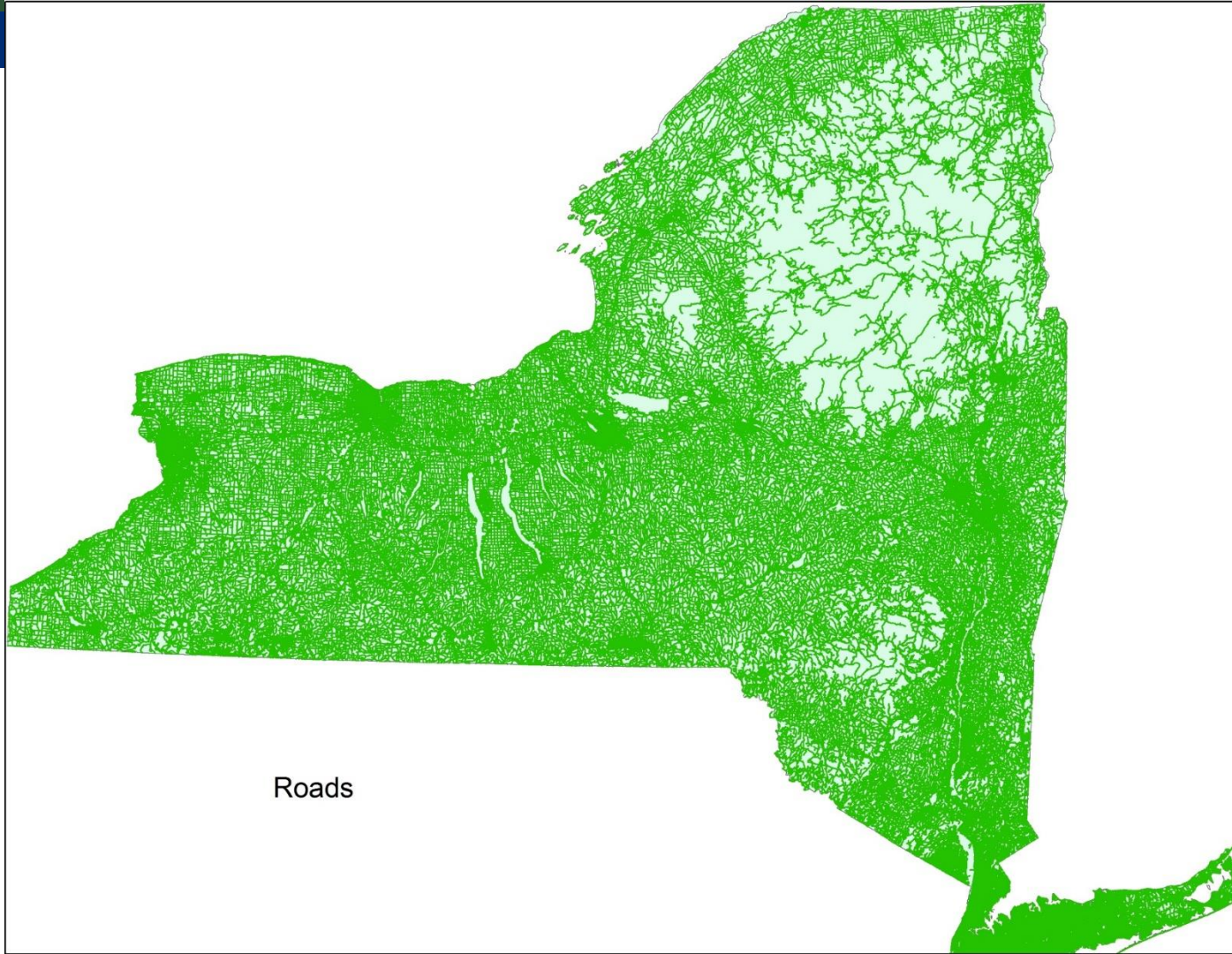
Proactively Creating Optimized Road/Stream Crossings
Good for "Fish, Flooding & Fauna"



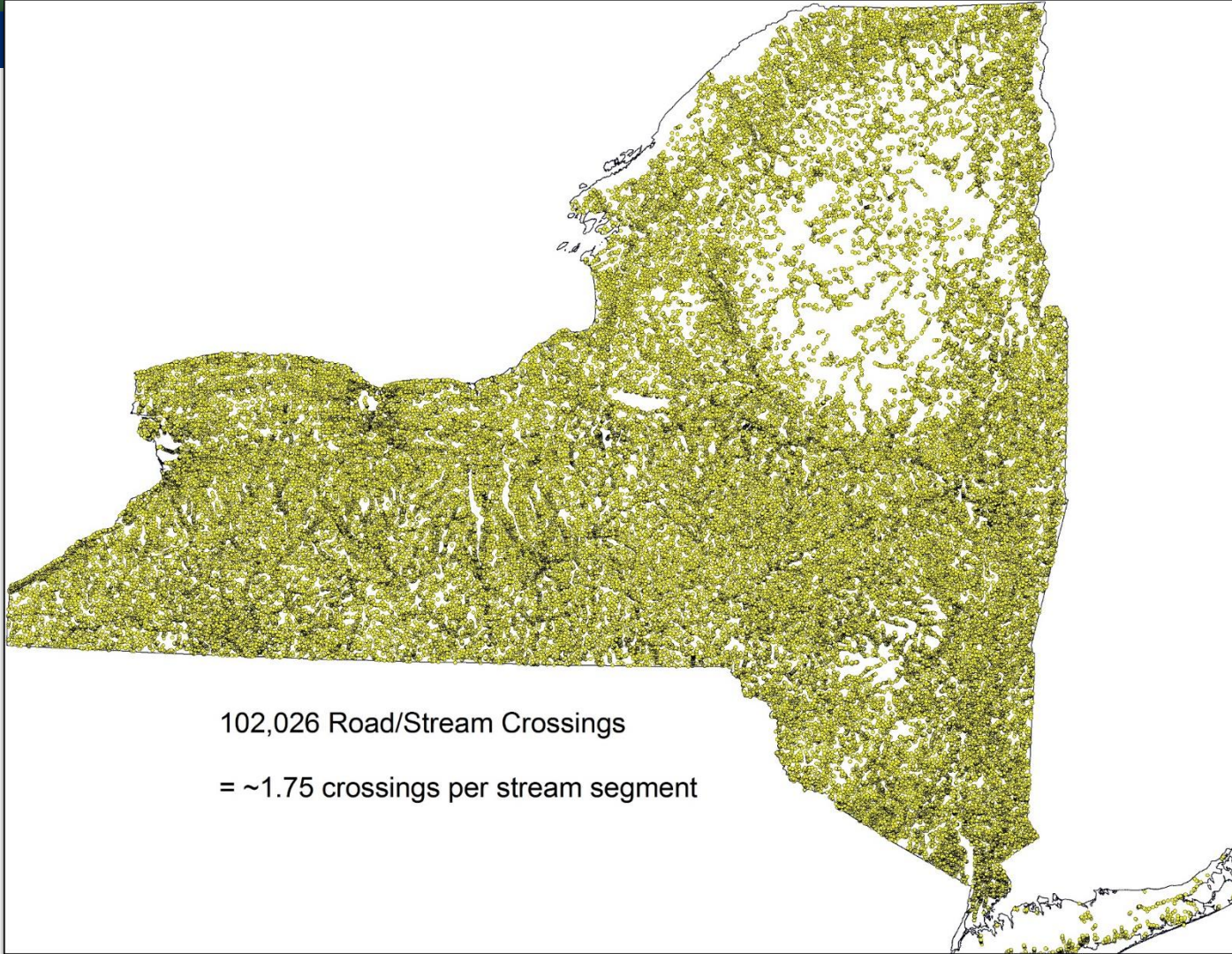
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58,000 Stream Segments
Totaling 87,517 miles



Roads



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**



Cornell University

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



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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



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Where can I learn more?

Web portal - <https://streamcontinuity.org>

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

NAACC database homepage – <https://NAACC.org>



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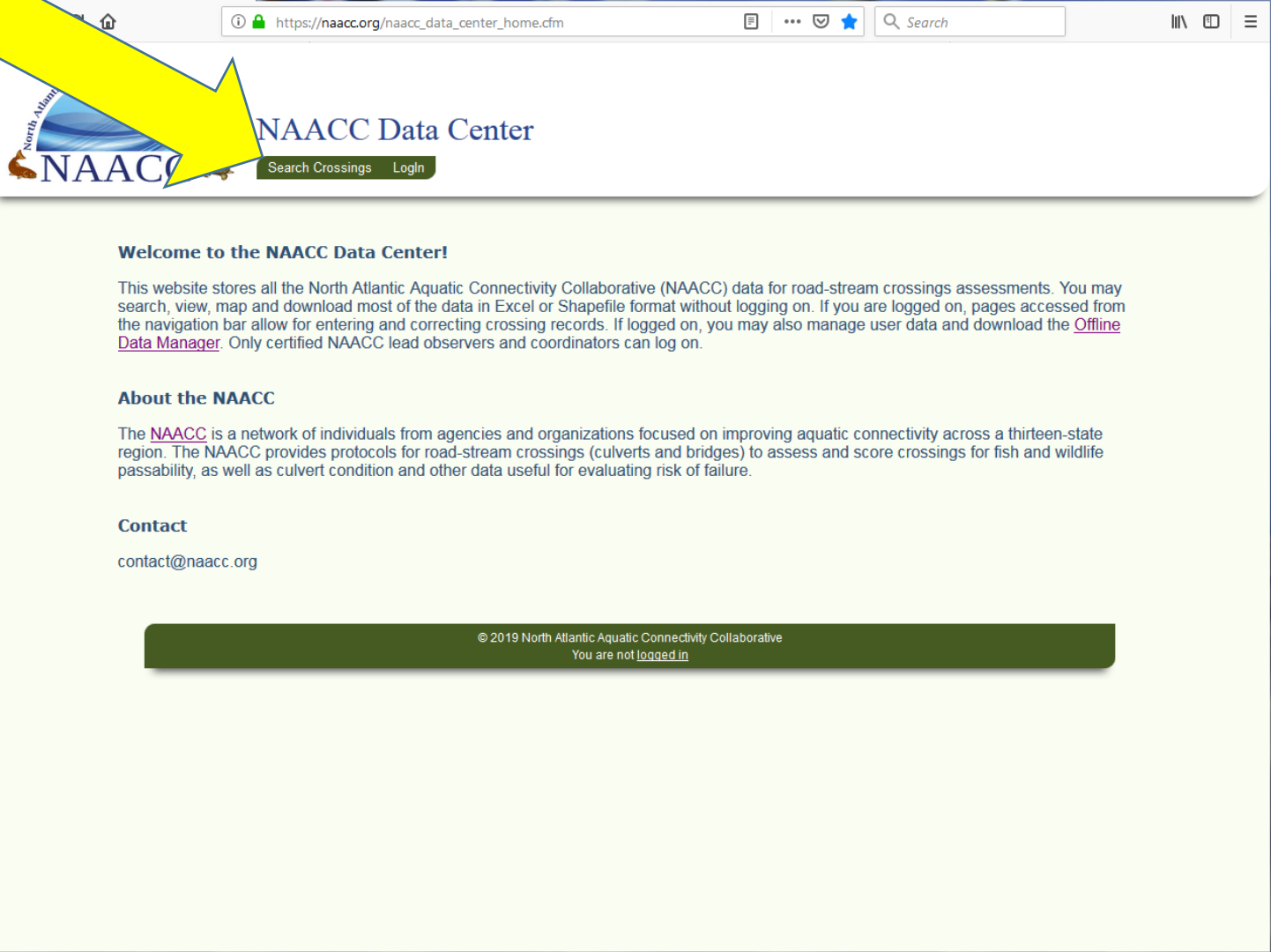


North Atlantic Aquatic Connectivity Collaborative

[About](#)[What's at Stake](#)[Assessments](#)[Data Center](#)[Toolkit](#)[States](#)[Projects](#)[News & Events](#)[FAQ](#)[Donate](#)[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



The screenshot shows the NAACC Data Center website. A large yellow arrow points from the top left towards the NAACC logo. The browser's address bar shows the URL https://naacc.org/naacc_data_center_home.cfm. The website header includes the NAACC logo, the text "NAACC Data Center", and buttons for "Search Crossings" and "Login". The main content area has a green background and contains the following sections:

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”

Location (choose multiple towns, watersheds):

All States [43015]

All NHD-HUC8 Watersheds

Albemarle

Allagash

Appomattox

Personnel:

Any Observer

Any Coordinator

Other:

Survey ID:

Crossing Code:

All NAACC Evaluations

25 per page

Choose Data Sets (choose multiple):

NAACC (after 6/1/2015)

UMass Stream Continuity Project (2005-2017)

Connecticut (2004-2013)

Vermont (11/20/2002-10/29/2015)

Maine (2007-2015)

New Hampshire (2006 - 2016)

Dates:

Last updated from ...

All

Last updated until ...

All

Date observed from ...

All

Date observed until ...

All

Search


 Map results

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 \(763\)](#)

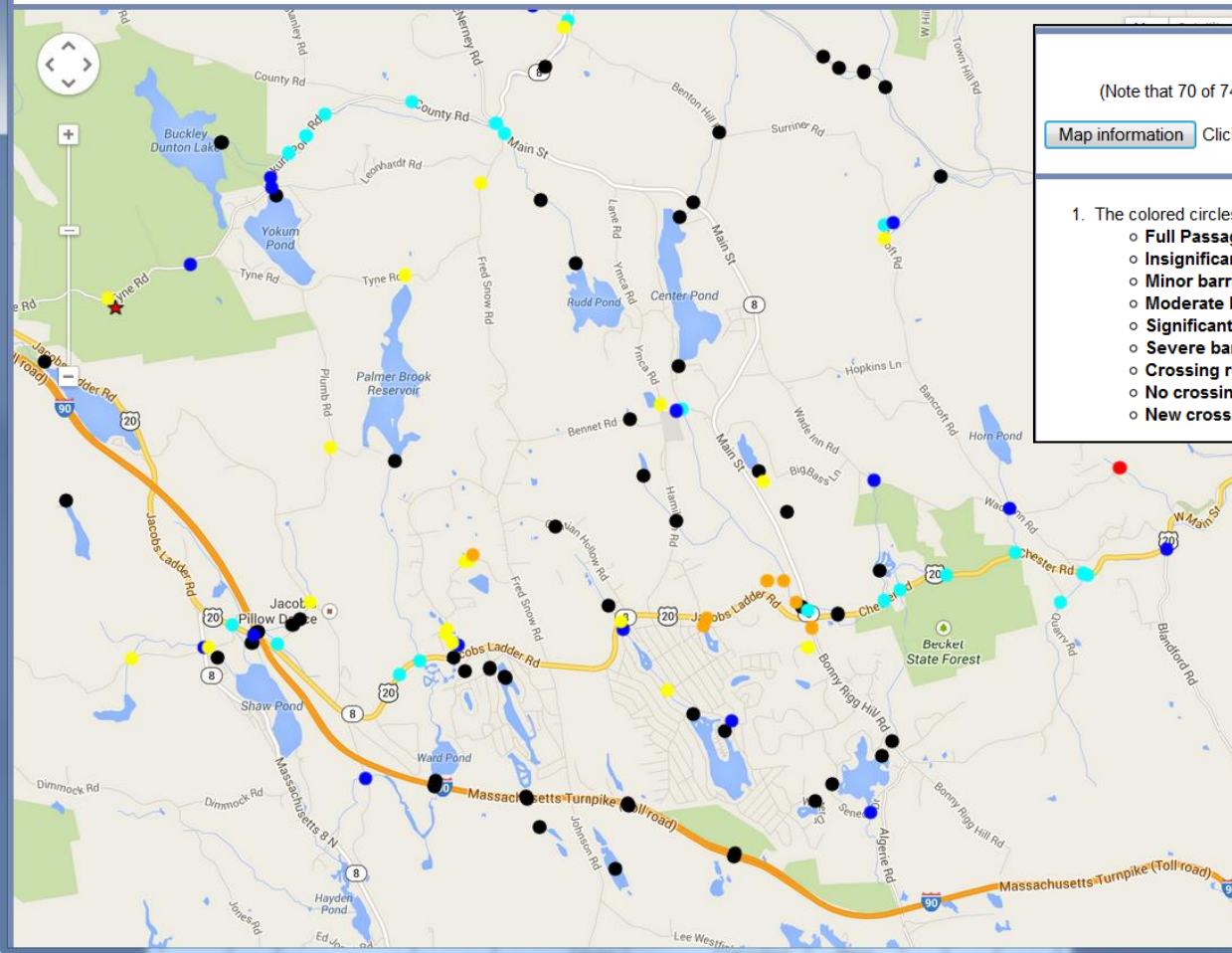
Survey ID	Crossing Code	Date Observed	Last Updated	Town	Stream	Road	Evaluation	Culvert
20017	xy4115699874056378	2015/07/15	2015/09/29	Ramapo NY	Unnamed	Park Terrae	No barrier	0
20018	xy4120727074026341	2015/07/06	2015/09/29	Haverstraw NY	Unnamed	Underpass Rd	Insignificant barrier	1
20019	xy4116848074036412	2015/07/01	2015/09/29	Ramapo NY	Minisoeongo	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	xy4116729674048974	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	Minisoeongo 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	Minisoeongo 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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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:

- o Full Passage: green ●
- o Insignificant barrier: blue green ●
- o Minor barrier: blue ●
- o Moderate barrier: yellow ●
- o Significant barrier: orange ●
- o Severe barrier: red ●
- o Crossing removed: magenta ●
- o No crossing: black circle with bold red x ✕
- o New crossing pending approval: black circle with red slash /



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

NAACC Data Set:

Crossing Code: xy4218012073850377

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

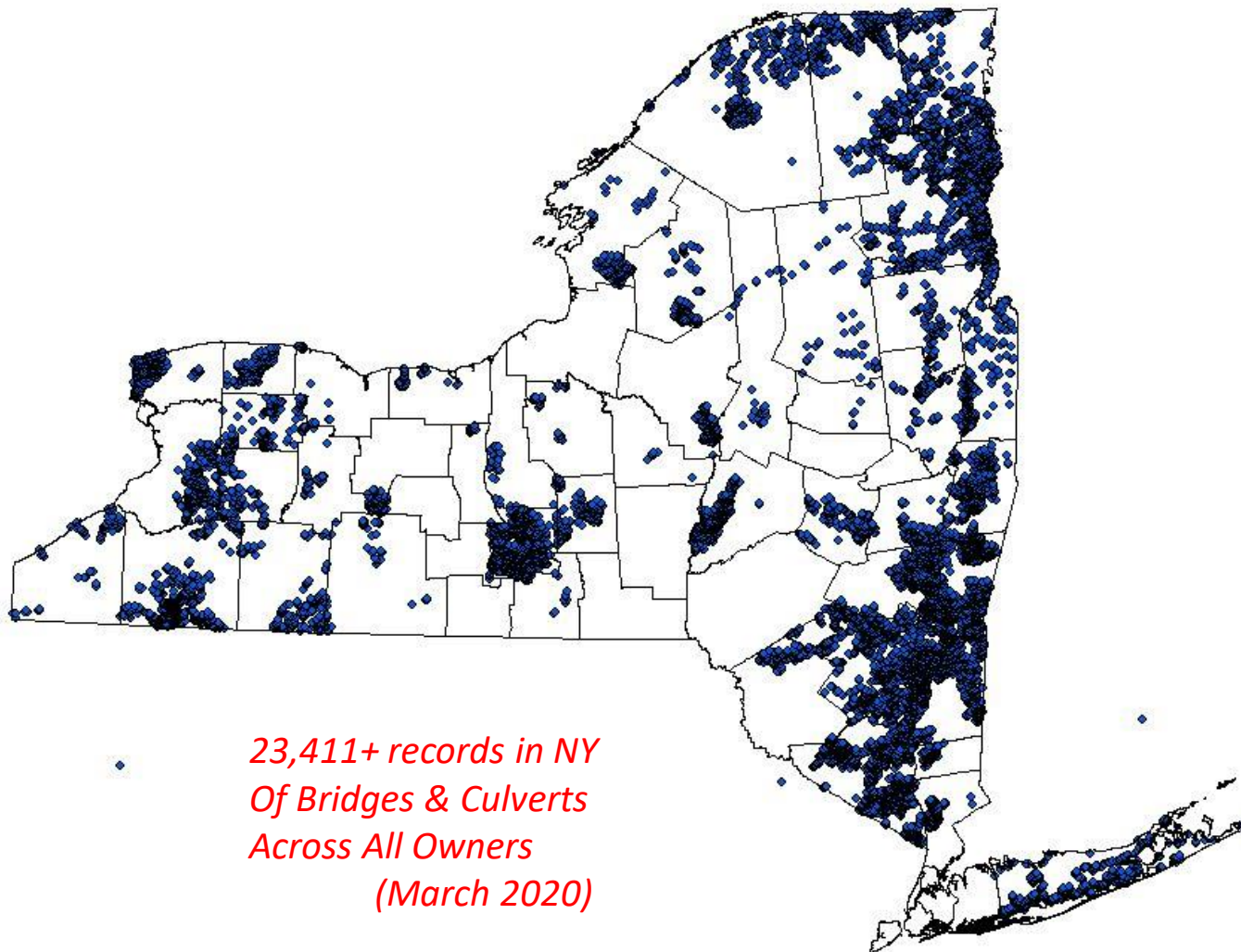
Observer Email: tet35@cornell.edu

Road: 9G

Road Type: Paved

NHD-HUC8 Watershed: Middle Hudson

Flow condition: Typical low-flow



AQUATIC CONNECTIVITY
Stream Crossing Survey
DATA FORM

CROSSING DATA

Crossing Code _____ Date Observed _____
 Town/County _____ Road _____
 GPS Coordinates (Latitude/Longitude) _____
 Location Description _____
 Crossing Type _____
 Photo IDs _____
 Flow Condition _____
 Tidal Site _____
 Bankfull Width _____
 Tailwater Scow Pool _____
 Crossing Comments _____

Lead Observer _____ Stream _____
 Type _____
 Crossing Condition _____
 Road Fill Height _____
 Constriction _____
 Number of Culverts/Bridge Cuts _____

STRUCTURE 1

Outlet Shape _____
 Outlet Grade _____
 Outlet Dimensions A Width _____
 Outlet Drop to Water Surface _____
 L-Structure Length _____
 Inlet Shape _____
 Inlet Grade _____
 Inlet Dimensions _____
 Slope % _____
 Structure Substrate Matches Stream _____
 Structure Substrate Type _____
 Structure Substrate Coverage _____
 Physical Barriers _____
 Severity _____
 Water Depth Matches Stream _____
 Water Velocity Matches Stream _____
 Dry Passage through Structure _____
 Comments _____

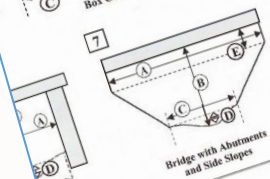
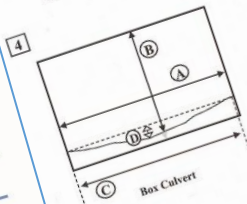
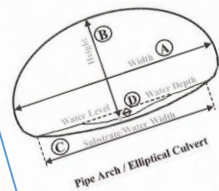
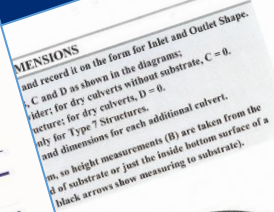
ADDITIONAL CONDITIONS

Structure Material _____
 Substrate/Water Width _____
 Abutment Height _____
 Water Depth _____
 Inlet Structures _____
 Height above Dry Passage _____

MEASUREMENTS

and record it on the form for Inlet and D and as shown in the diagrams; Identifier for dry culverts without substrates; for dry culverts, D = 0. only for Type 7 Structures, and dimensions for each additional measurement (B) are, so height measurements (B) are of substrate or just the inside bottom of culverts; black arrows show measuring to

Diagram: A diagram of a stream crossing with labels for 'Water Level', 'Substrate', and 'Pipe A'.



Roles within NAACC

Lead Observers

L1 (Level 1) Coordinators

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

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

What have we learned so far?



Passability Scoring – how it works...

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

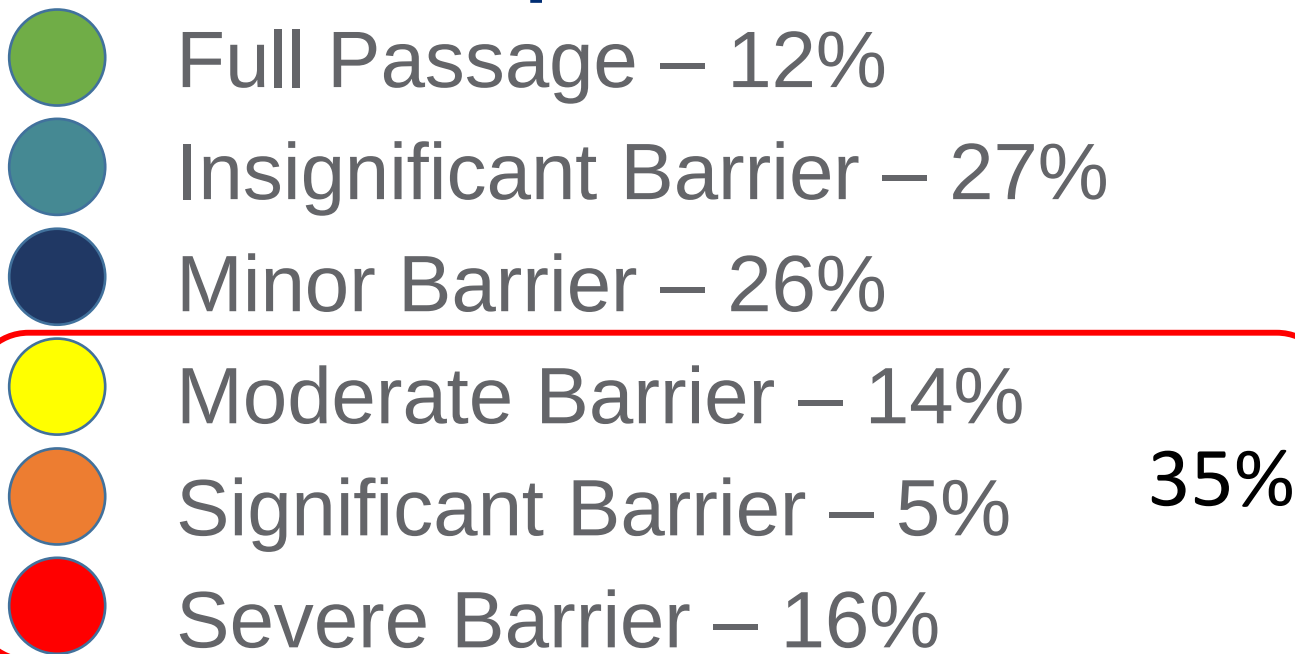
- Inlet grade, outlet drop, physical barriers, constriction, water depth, water velocity, scour pool, substrate matching stream, substrate coverage, openness, height, outlet armoring, internal structures.

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 -





Cornell University

Determining Peak Flow Under Different Scenarios and Identifying Undersized Culverts

Objective

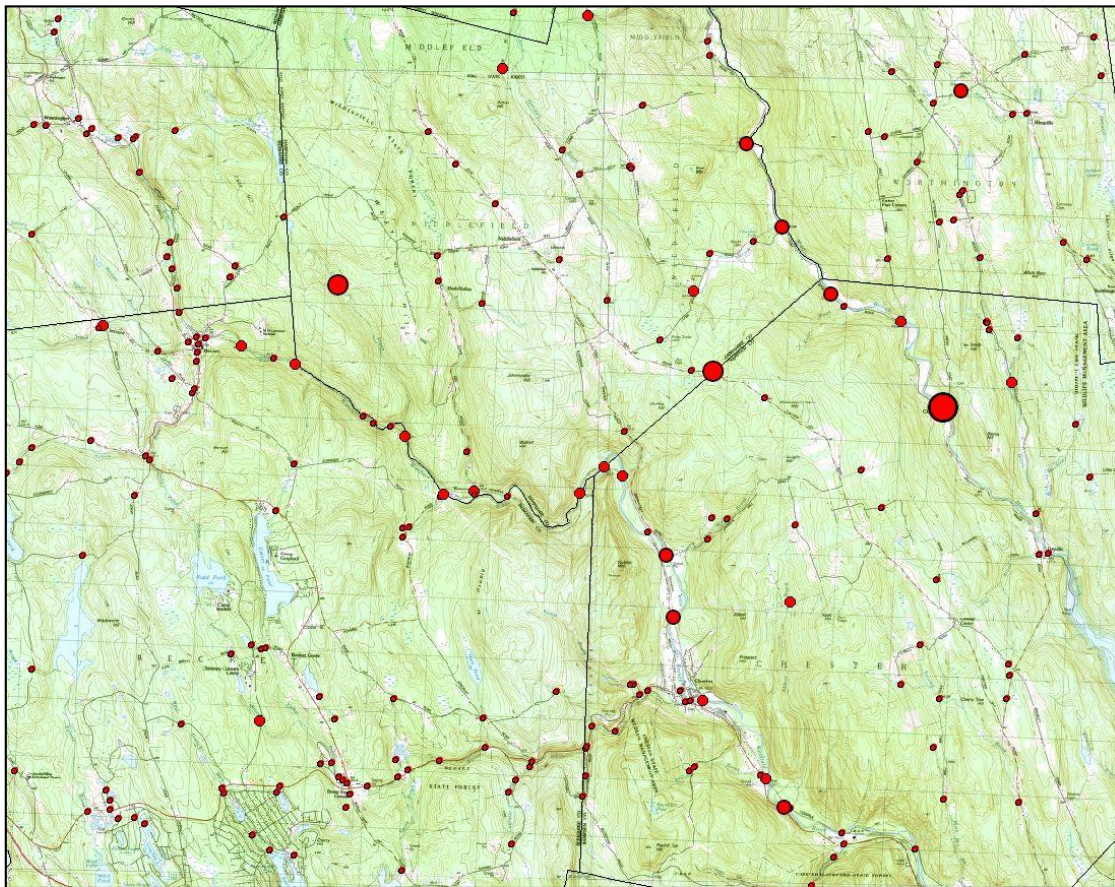
To identify undersized culverts, for both current and future precipitation conditions.

Flow Capacity Modeling

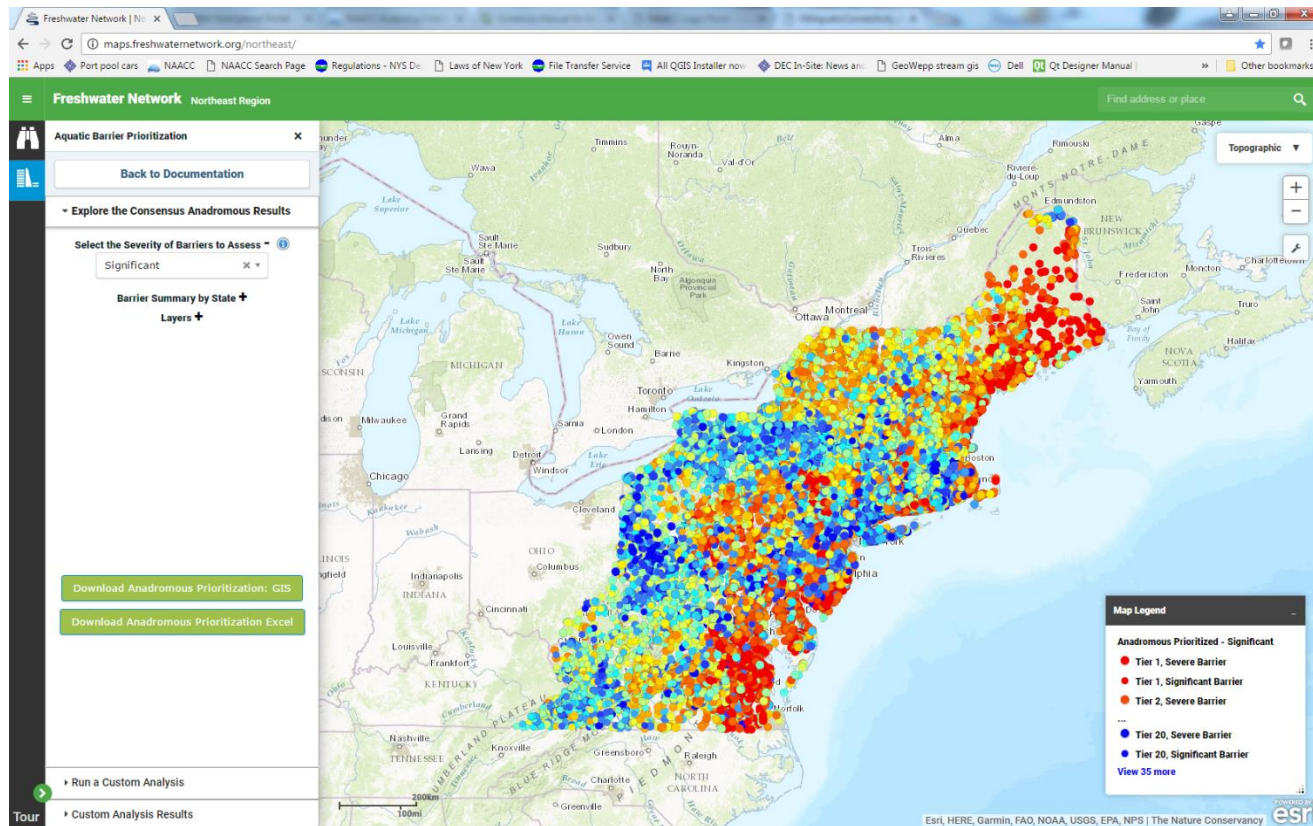
- GIS model & calculations
- Delineation of watershed to pour point using DEMs
- Calculation of covertypes for runoff coefficients and hydrograph generation
- Precipitation model (current & future)
- Flow estimates applied to pipe flow equation and road fill height



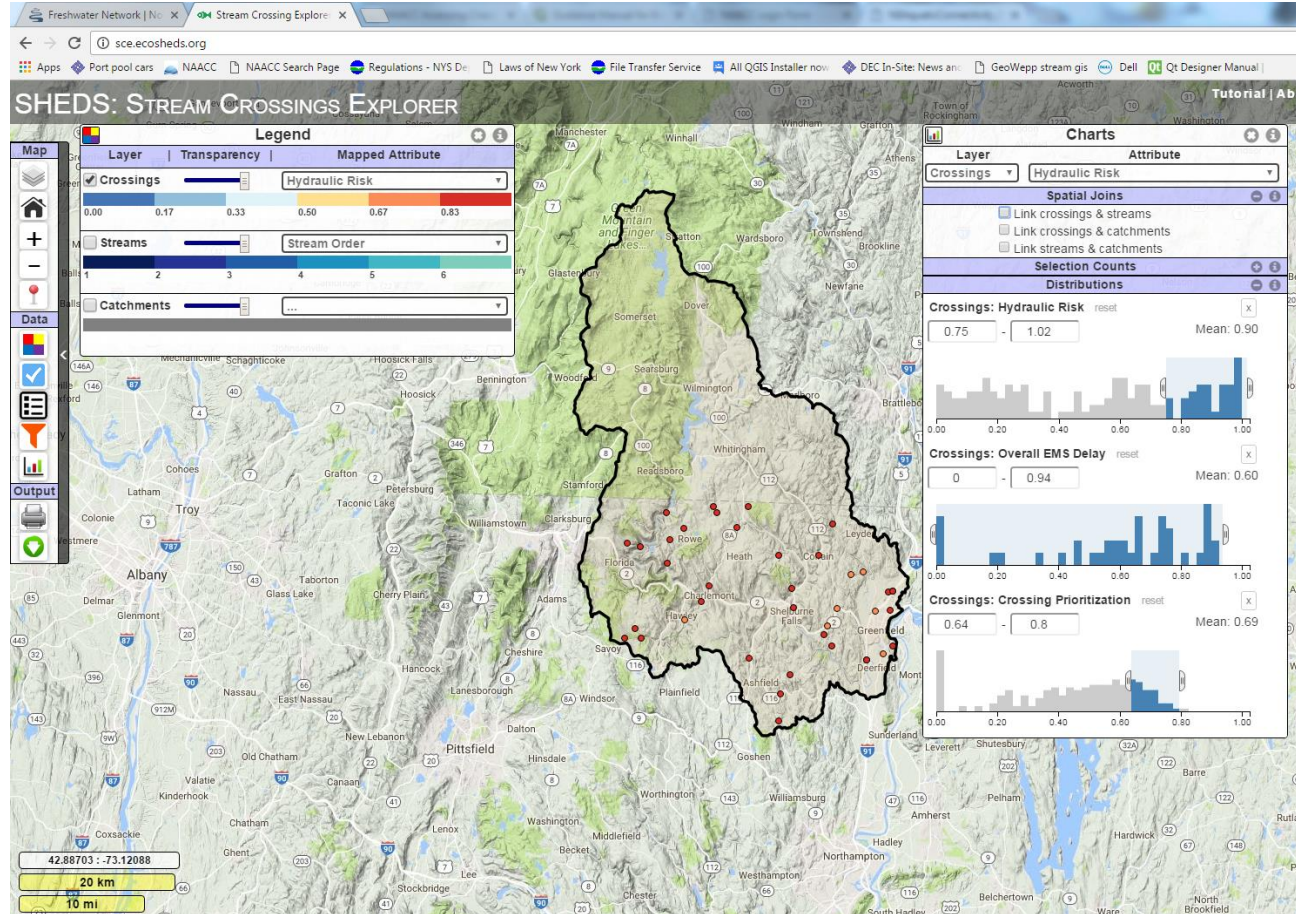
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<http://maps.freshwaternetwork.org/northeast/>



<http://sce.ecosheds.org/>



- 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”



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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%)



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Enter email address:

Submit

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

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Contact for this Page

Division of Water
625 Broadway
Albany, NY
12233-3502
518-402-8170

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
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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.
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WQIP funded project before...



Photo credit: Jared Popoli

WQIP funded project after.





Thank You!

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