Trout Unlimited
Pennsylvania Coldwater Habitat Program

Shaun McAdams

Habitat Coordinator

Addressing Aquatic Connectivity at Road-Stream Crossings

- *Background*
  - US Forest Service: working on National Forests across the nation (including Allegheny NF)
  - Bucks County Chapter TU - first watershed-wide culvert survey in 2011
- *PA Coldwater Habitat Program*
  - 2012: Initial road-stream crossing inventory and assessment in Cross Fork Creek watershed (Kettle Creek - Potter County)
  - Surveys expanded statewide (wild trout watersheds)
- *Partners and Funding*
  - Greatest opportunities for reconnection on municipally-owned roads
  - State Conservation Commission (SCC) – Dirt, Gravel & Low-Volume Roads Program
    - Undersized culverts increase flood risk, frequency and associated impacts
  - National Fish & Wildlife Foundation
  - PA Fish & Boat Commission

TROUT UNLIMITED

Our Approach

- *Inventory and assessment*
  - What's out there…?
  - North Atlantic Aquatic Connectivity Collaborative (NAACC) protocol
    - Qualitatively determines degree of aquatic organism barrier (minor, moderate, severe, etc.) based on physical characteristics.
    - Triage (prioritization) tool

- *Training opportunities*
  - Natural resources professionals
    - Conservation Districts
    - PA DCNR - Bureau of Forestry
  - Volunteers
    - Academia
    - Environmental / Outdoor professionals and enthusiasts
    - TU Chapter members

Technical Assistance

- *Requests for technical assistance*
  - From Conservation District - through CDGRS or direct to TU
  - Field visit with CDGRS / District / municipal staff / design engineer
  - Project planning, design review and recommendations
    - Structure dimensions and type (bankfull width)
    - Survey of channel profile and dimensions to support continuity design (slope and grade control)
    - Instream habitat / sediment reduction
    - Construction oversight, guidance a
- *Every site visit is a training opportun*

Partners & Opportunities

- *The Power of Partnerships*
  - Penn State University - Center for Dirt & Gravel Road Studies (CDGRS)
    - Joint support of a full-time TU staff position
    - Technical assistance to County Conservation Districts and municipalities (road-stream crossing projects)
    - Adoption of policy to include aquatic organism passage (AOP) as a requirement for funding of culvert replacement projects

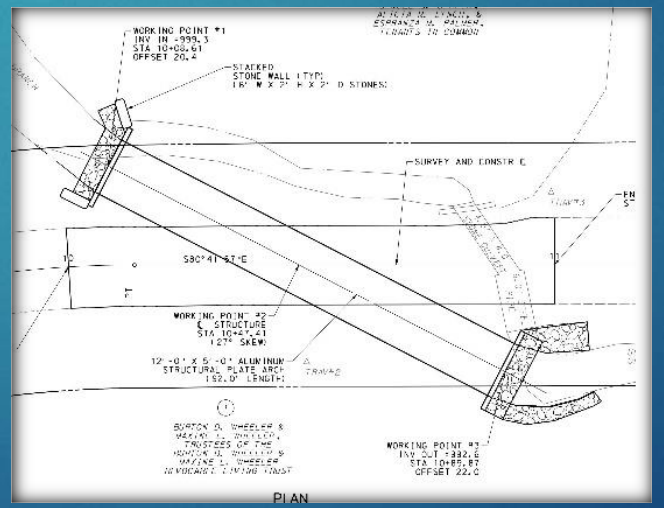
PennState
Center for Dirt and Gravel Road Studies

Pennsylvania SCC
State Conservation Commission

TROUT UNLIMITED

Active Projects

- *Elk County*
  - Existing culvert ~5’
  - Reference bankfull width 12’
  - Replaced with aluminum arch culvert
  - Replicates stable natural channel slope and bed features
  - Realigned to eliminate severe skew
  - ~85’ of additional instream habitat beyond culvert



Ways you can help…

- *Several Chapters are already involved:*
  - Bucks County TU
  - Donegal TU (Lancaster County)
  - Doc Fritchey TU (Lebanon County)

- *Fostering relationships*
  - Township supervisors and roadmasters (can you say "flood resiliency?...)
  - Conservation District staff (Watershed Specialist / DGLVR technician)
  - Game Commission and Bureau of Forestry personnel

- *Keep your eyes and ears open*
  - Recent flood damage / culvert failure
  - Pending culvert replacement projects

- *Participate to provide local capacity / expertise*
  - NAACC training for Chapters or groups of TU members
  - Assist our staff with fieldwork in your watersheds

TROUT UNLIMITED

What to look for…

- *Symptoms of undersized culverts / AOP (trout) barriers*
  - Ratio of culvert width to bankfull width
    - Should be 1:1 minimum (1.2:1 is better)
  - Culvert is at streambed grade
    - No waterfall or abrupt cascade at outlet
  - Streambed in pipe similar to natural channel
    - Substrate type and bed features (riffle, step/pool, etc.)
  - Continuity upstream, through, and downstream of culvert
    - No significant slope / feature spacing change
    - No substantial sediment wedge (upstream) or scour pool (downstream)

TROUT UNLIMITED

Thank You !

To contact a member of TU's Pennsylvania Coldwater Habitat Program regarding road-stream crossings:

- Amy Wolfe - *Director*
  amy.wolfe@tu.org
- Jake Tomlinson - *Manager*
  jacob.tomlinson@tu.org
- Phil Thomas - *Habitat Coordinator*
  phil.thomas@tu.org
- Shaun McAdams - *Habitat Coordinator*
  shaun.mcadams@tu.org

TROUT UNLIMITED

EPCAMR
Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

COLDWATER HERITAGE PARTNERSHIP

Utilization of Geographic Information System (GIS) in the Development of CHP Watershed & Culvert Assessments with the NAACC

Photo Credit: Joseph Simons, Wild Brown Trout caught on Toby Creek

Presentation by:
Bobby Hughes
Executive Director-EPCAMR

September 8, 2018
PATU Annual Meeting
PA F&BC Centre Region Office, Bellefonte, PA

EPCAMR

- Eastern Pennsylvania Coalition for Abandoned Mine Reclamation
- 501 (c)(3) non-profit, educational, scientific, public, charitable organization founded in 1995
- Main office in Ashley, PA co-located with the Earth Conservancy
- Restore streams impacted by AMD, a water pollution problem that affects over 5,500 miles of PA streams
- Reclaim abandoned mine lands scarred from from past mining practices
- Assess watersheds within the Coal Regions of PA to develop watershed conservation plans and implementation plans to protect and improve existing water resources & cold-water and warm-water fisheries
- Provide environmental education opportunities, outdoor learning experiences, field tours and opportunities for youth and students to become engaged and learn about local watersheds, problems, & solutions to protecting our environment

www.epcamr.org

EPCAMR
Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

Our Mission

"The general purpose of the EPCAMR is to encourage the reclamation and redevelopment of land affected by past mining practices. This includes reducing hazards to health and safety, eliminating soil erosion, improving water quality, and returning land affected by past mining practices to productive use, thereby improving the economy of the region."

"EPCAMR prides ourselves on the professional quality of ourwork created by our highly skilled, passionate Staff, who arecommitted to watershed restoration, land reclamation, andproviding education and awareness of our efforts to reclaimAnthracite and Bituminous Coalfields and mining impactedareas to those communities that are often underrepresented."
—Robert E. Hughes, Executive Director

Technical Assistance & Provided Services

Grant Writing & Administration

Interpretation of Historic Surface & Underground Mine Maps

Building Broad Coalitions Throughout the EPCAMR Region

EPCAMR is looking to continue to build partnerships with all of the Conservation Districts in NC and NE PA that have impacts from not just abandoned coal mines but also abandoned quarries, limestone, sand and gravel, and other mines where mineral extraction has occurred. We encourage membership from other organizations and Conservation Districts to become involved with our regional organization to address the important issues associated with achieving clean water, land reclamation, economic development, job opportunities, and environmental education and outreach opportunities throughout the region.

Now, more than ever, EPCAMR would like gain the local support of community groups, local governments, educational institutions, conservancy groups, Conservation Districts, reclamation related organizations, land trusts, historical societies, cultural organizations, Trout Unlimited Chapters, co-generation plants, coal companies, and private sector industries. These partnerships will allow EPCAMR to provide the necessary resources, information, data, first-hand knowledge, anecdotal evidence, technical resources, mapping, historic mine maps (both surface and underground), and institutional knowledge from community leaders and volunteers who want to achieve the same goal of restoring our watershed impacted by past mining practices.

A large majority of EPCAMR's work has focused on areas impacted by both bituminous and anthracite coal mining. We are willing to assess and provide technical assistance in other areas. Contact us today to find out how to become a partner!

Who We Are

EPCAMR is a regional non-profit environmental organization that works throughout NE and NC Pennsylvania Coalfields with community groups, local governments, schools, colleges and universities, as well as Conservation Districts, reclamation-related organizations, watershed groups, TU Chapters, and regional non-profit coalitions to support the reclamation of abandoned mine lands and the remediation of rivers and streams impacted by past mining practices and polluted abandoned mine drainage (AMD).

Our staff and organization is interested in developing relationships and partnerships with community leaders and organizations that would like to work together on seeking opportunities for the leveraging of funding from various levels of government, foundations, corporate donations, and volunteer matching funds from individuals interested in becoming involved in local projects within their own community that has been impacted by abandoned mine lands.

EPCAMR is interested in creating new partnerships and building on existing ones to raise the awareness of our mission and goals in the EPCAMR Region. EPCAMR would like to continue to support reclamation and remediation efforts in these areas on abandoned mine land reclamation, AMD, and watershed restoration projects with community groups, conservation groups, co-generation plants, coal companies, Conservation Districts, TU Chapters, and watershed groups covering these areas.

The main intent of the development of this brochure is to allow us to: 1) reach out to additional partners and make them aware of our Coalition's efforts in the region, in these two respective counties where we work; 2) update them on regional projects and technical assistance of importance to their watersheds; 3) provide them information on events, conferences, workshops, trainings, legislation, and advocacy opportunities; and 4) offer additional technical assistance and services to those community leaders and groups with similar goals and desires to clean up their mining impacted watersheds and areas suffering from past mineral extraction industries that have been abandoned.

Overview of Programs

Watershed and Urban Outreach Programs

Mine Map Scanning, Georeferencing, & Digitizing for the PA Mine Subsidence Insurance Program

- Professional Services for Water Quality, Flow, Borehole Monitoring, & Maintenance & Operation of AMD Treatment Systems

- Environmental Education Program to Underserved School Districts and Environmental Justice Coalfield Communities

- Visual Habitat, Biological Fishery and Macro-Invertebrate Assessments, Trout Stream Coldwater Conservation & Watershed Assessment Plan Development

- 3D Mine Pool Mapping & Modeling of Underground Mine Pool Complexes throughout the State

Coldwater Heritage Partnership (CHP)

- Provides funding support for evaluation, conservation, & protection of PA's coldwater streams
- Dedicated to preserving natural fisheries

Photo Credit: EPCAMR

Partners

- PA DCNR
- PA Fish & Boat Commission
- PA Council of Trout Unlimited
- Foundation for PA Watersheds

Visit www.coldwaterheritage.org for application forms & additional information

NAACC: North Atlantic Connectivity Collaborative

- NAACC: collaboration between conservation organizations, universities, and state/federal transportation and natural resource departments
- Focus on fish passage as well as infrastructure
- Main participants in Pennsylvania
  - Trout Unlimited (mostly central PA)
  - EPCAMR (mostly Lackawanna & Luzerne County)
  - Other organizations, Conservation Districts, and individuals slowly becoming involved

Partners

UMASS AMHERST

U.S. FISH & WILDLIFE SERVICE

The Nature Conservancy
Protecting nature. Preserving life.

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

VERMONT
AGENCY OF NATURAL RESOURCES
Respect. Protect. Enjoy.

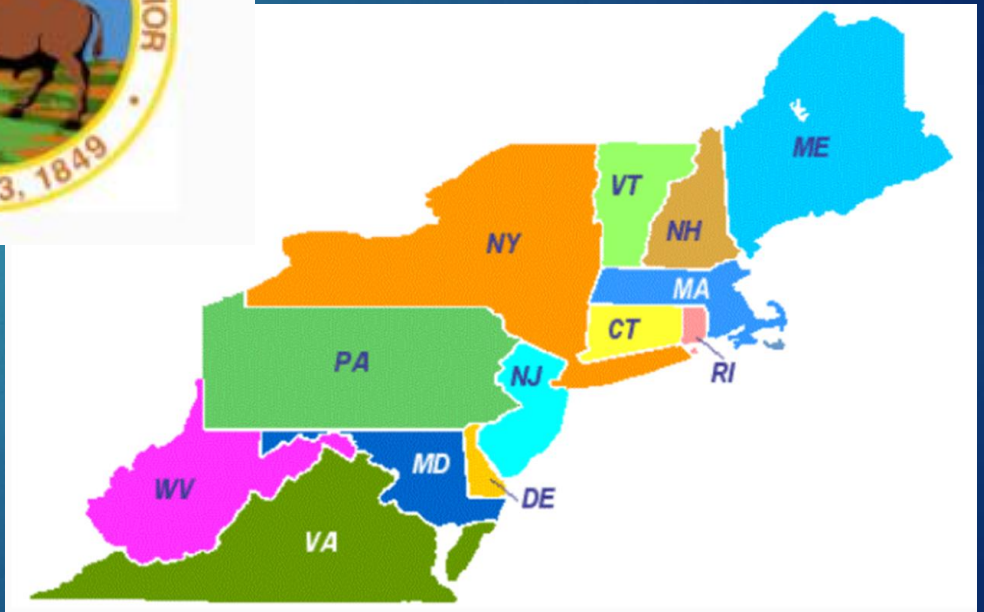
North Atlantic LCC
North Atlantic Landscape Conservation Cooperative

Funders

North Atlantic LCC
North Atlantic Landscape Conservation Cooperative

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

Participating States



Connecticut - Delaware - Maine - Maryland - Massachusetts - New Hampshire - New Jersey - New York - Pennsylvania - Rhode Island - Vermont - Virginia - West Virginia

NAACC Lead Observers: EPCAMR Staff

- Lead Observers
  - Rachael Grube
  - Bobby Hughes
  - Gavin Pellitteri

Photo Credit: EPCAMR

EPCAMR

Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

Photo Credit: EPCAMR

Photo Credit: EPCAMR

Photo Credit: EPCAMR

Potential GIS Applications to Identify within a Watershed while conducting CHP Assessment

Concerns:

- Flooding issues
- Pipeline Crossings under streams
- Riparian Corridor Restoration Needs
- Culvert Damage Assessments and Need for Replacement
- Streambank Stabilization & Potential Restoration Areas
- Storm water Management Issues
- Sedimentation Accumulation in the stream channels
- Urban Runoff and Potential Ag Runoff
- Invasive Plants
- Poor Habitat Areas in need of Stream Habitat Improvement
- Incised channels & restriction points within streams
- Fishery Health & Ecology
- Dam removal Projects

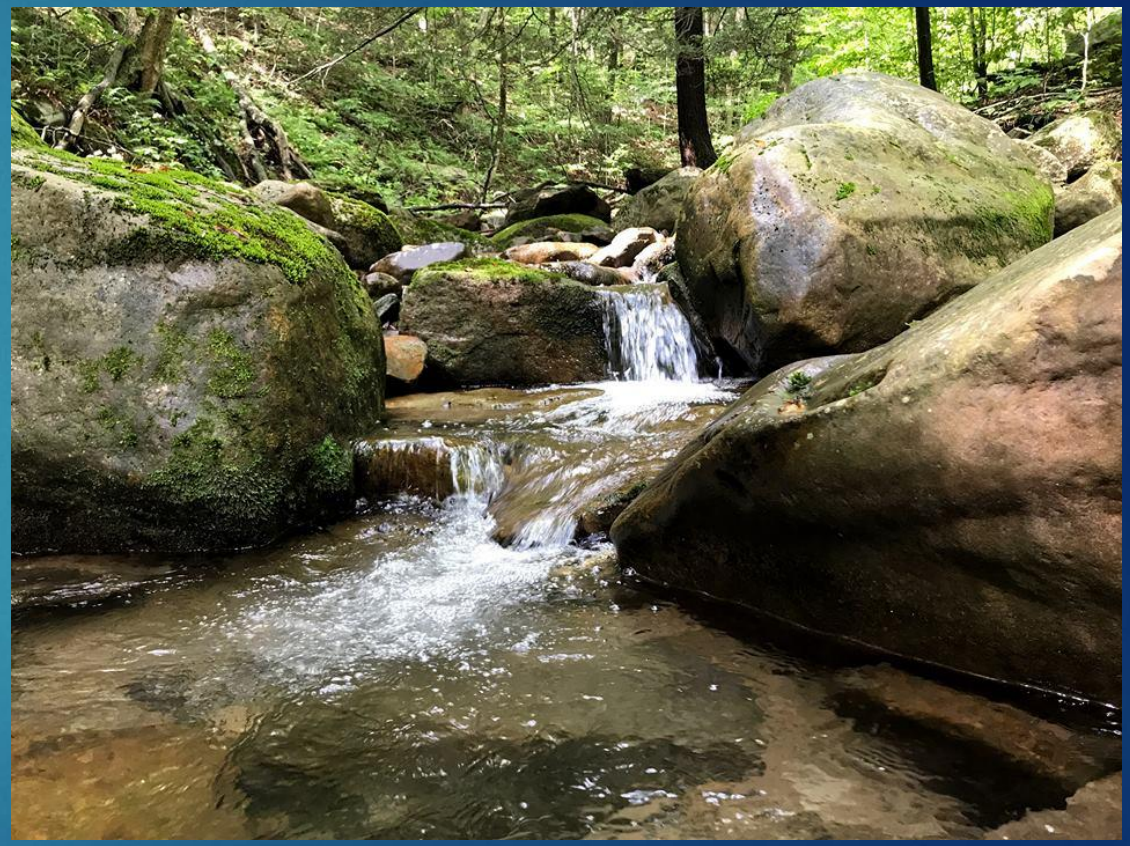


Photo Credit: Joseph Simons, Natural step pool habitat feature along Toby Creek

GIS Applications for the Development of a CHP Watershed Assessment

- Fish surveys: assess populations of Brook Trout and Wild Brown Trout with PA F&BC
- Macroinvertebrate sampling
- Water quality monitoring: water chemistry & flow
- Culvert Assessments for aquatic organism passage (AOP); www.streamcontinuity.org
- Research existing plans & reports available on the Watershed or Conservation Efforts within the identified municipalities; Use Wikipedia as a fallback
- Visual habitat assessment
- Photo documentation
- Creation of various watershed maps using GIS available data layers and EPCAMR data

Photo Credit: Times-Leader

Photo Credit: Citizens Voice

How to get

- Program designed for general public and professionals alike
  - Must be a volunteer, employee, or member of environmental organization (EPCAMR, Regional Non-Profits, TU chapters, watershed groups, etc.)
- Contact a Coordinator
  - Gabby Zawacki-L1 Coordinator or Phil Thomas-Trout Unlimited to obtain an account
    - Gabby.zawacki@gmail.com or Phil.thomas@tu.org
- Take online class (UMass Amherst site)
- Contact Lead Observers or Coordinators in your region for shadowing
  - Must shadow 20 crossing assessments to become Lead Observer
- Lead Observers can train other interested individuals
- Training is FREE

EPCAMR Priorities-NE & NC Region

- Watersheds we are currently assessing/have assessed that are mining impacted:
  - Laurel Run (tributary to Mill Creek); Luzerne County
  - Abraham Creek; Luzerne County
  - Toby Creek; Luzerne County
  - Solomon Creek; Luzerne County

  - Will continue to apply for grants to assess EPCAMR region trout streams
  - Will train any volunteers who want to become certified

  - Received a World Trout Initiative Grant from Patagonia to train and recruit volunteers on culvert assessments and aquatic connectivity for fish passage in the EPCAMR Region

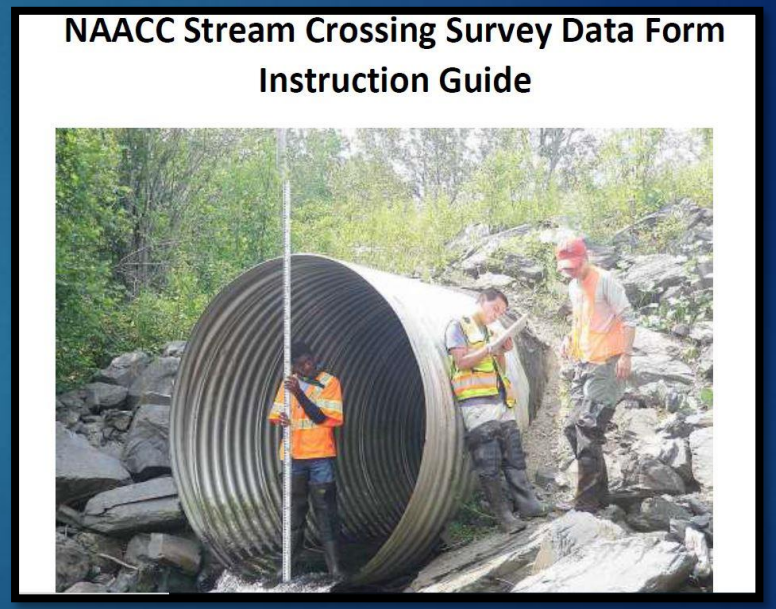
world trout
patagonia

Choosing Assessment Sites

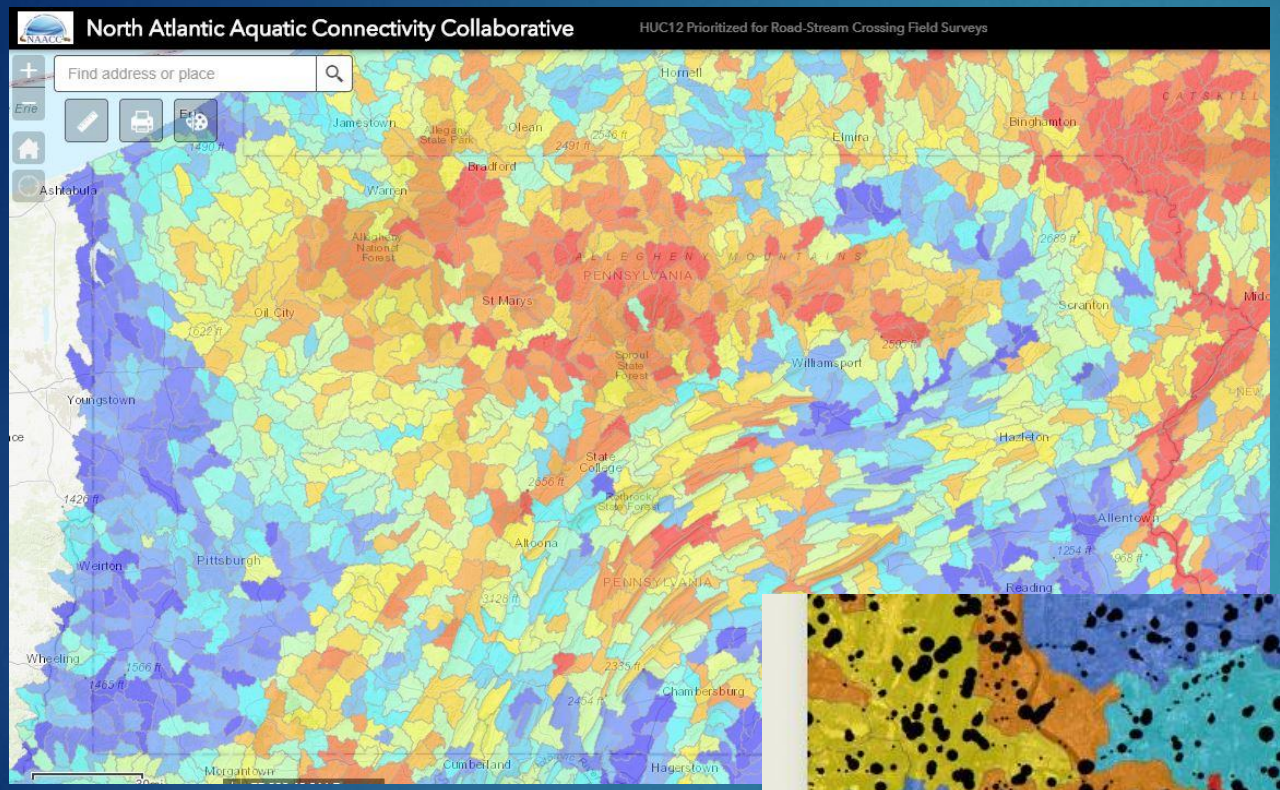
- Prioritization determined by fish populations for entire NAACC network

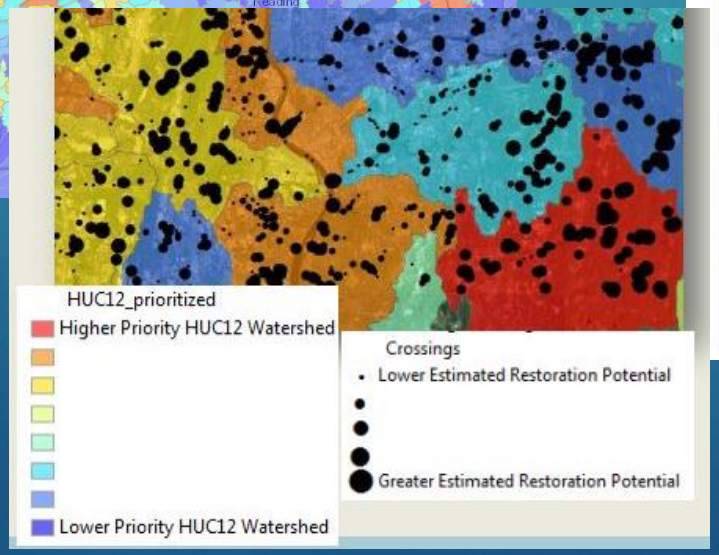
- Organizations prioritize by project and need
  - EPCAMR does culvert assessments when we do CHP projects
  - TU breaks it into quadrangles within watersheds and assess while doing fish surveys and other projects

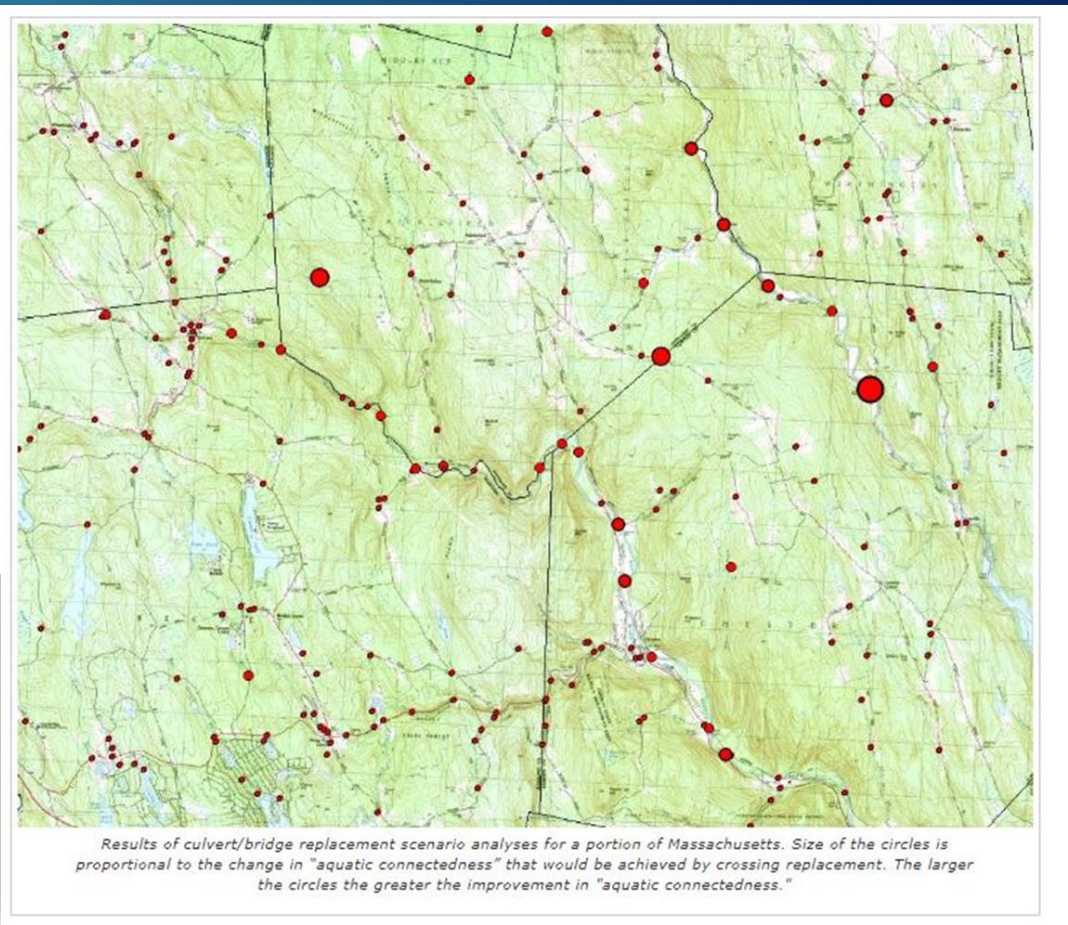
- Interested in participating as an individual?
  - Contact local coordinator who can assign you culverts and road crossings in line with NAACC needs
  - Contact participating local organizations to see if they need help



NAACC Priorities based on data and metrics from the EBTJV & TNC







Results of culvert/bridge replacement scenario analyses for a portion of Massachusetts. Size of the circles is proportional to the change in "aquatic connectedness" that would be achieved by crossing replacement. The larger the circles the greater the improvement in "aquatic connectedness."

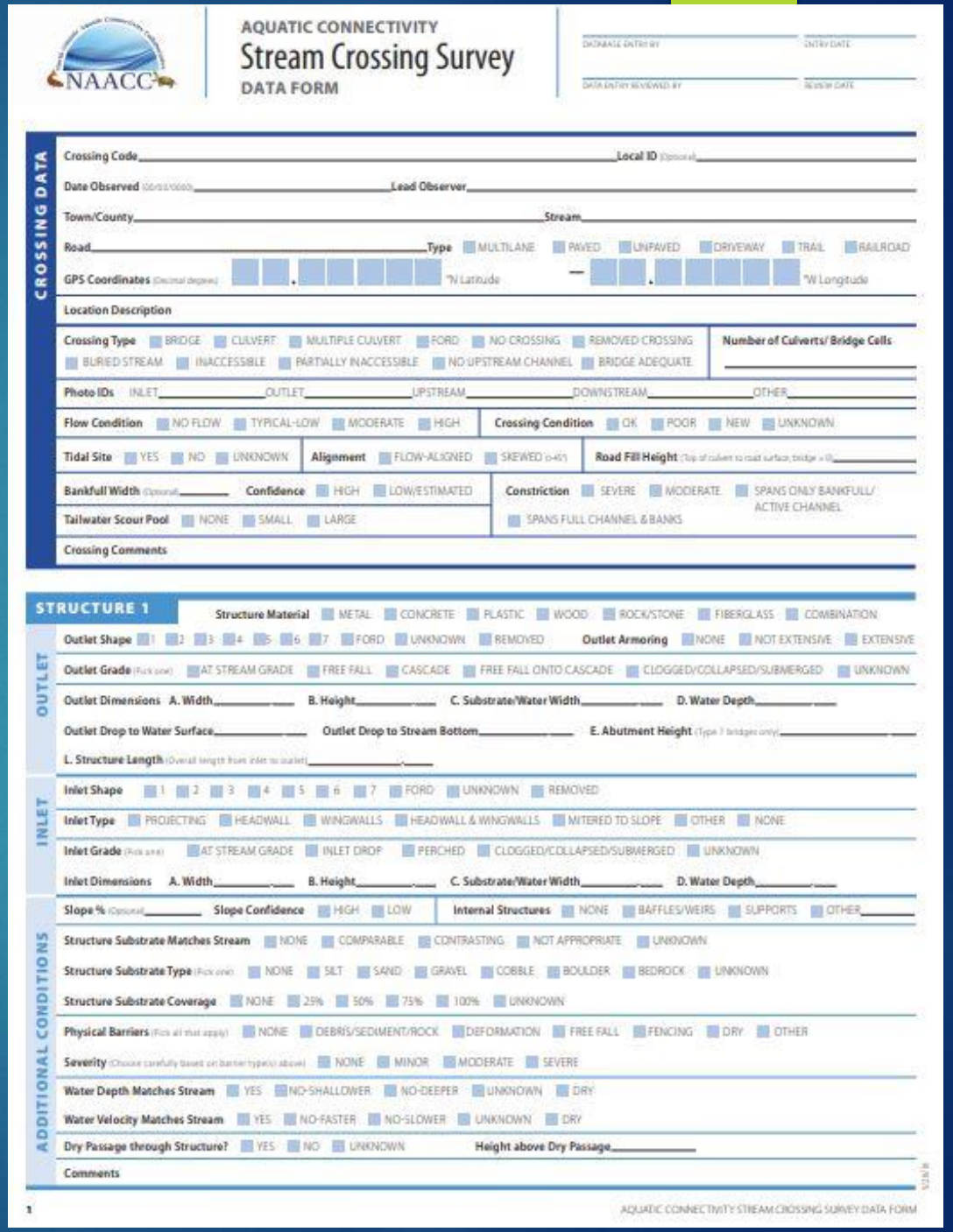
Other Local Assessment Efforts

- Liz Rosser and Gabby Zawacki
  - Volunteer effort to assess local watersheds in Luzerne and Lackawanna Counties
    - Lucky Run and St. John's Creek (Lackawanna County)
- LRCA (www.lrca.org)
  - Conservation Corps – a Lackawanna Watershed volunteer group
  - Volunteers will most likely obtain certification to assess Lackawanna River Tributaries
- Conservation Districts
  - Luzerne Conservation District
  - Over time, others will most likely begin to obtain certification

Recording Data

- Paper forms
  - Fill out paper forms and use your phone or other GPS-enabled device to get latitude and longitude.
  - Enter the data into the online site
- Offline Manager
  - On tablet, laptop, or phone, use offline manager to save data to be uploaded later
  - Upload data to site

once you have internet



NAACC

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

CROSSING DATA

Crossing Code ____ Local ID (Optional) ____

Date Observed (MM/DD/YYYY) ____ 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

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

Tailwater Scour Pool ☐ NONE ☐ SMALL ☐ LARGE

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

1

AQUATIC CONNECTIVITY STREAM CROSSING SURVEY DATA FORM

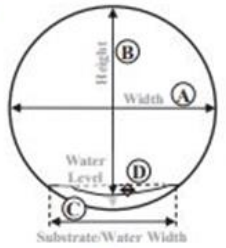
Culverts and Crossings

Structure Shape & Dimensions

1) Select the Structure Shape number from the diagrams below and record it on the form for Inlet and Outlet Shape.
2) Record on the form in the approriate blanks dimensions **A**, **B**, **C** and **D** as shown in the diagrams;
   C captures the width of water or substrate, whichever is wider; for dry culverts without substrate, C = 0.
   D is the depth of water – be sure to measure inside the structure; for dry culverts, D = 0.
3) Record Structure Length (**L**). (Record abutment height (**E**) only for Type 7 Structures.)
4) For multiple culverts, also record the Inlet and Outlet shape and dimensions for each additional culvert.

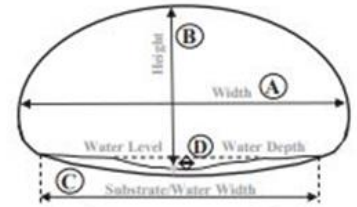
NOTE: Culverts 1, 2 & 4 may or may not have substrate in them, so height measurements (B) are taken from the level of the "stream bed", whether that bed is composed of substrate or just the inside bottom surface of a culvert (grey arrows below show measuring to bottom, black arrows show measuring to substrate).

1



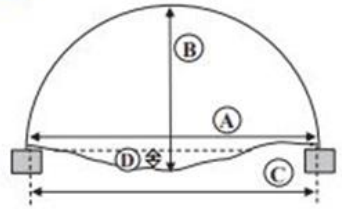
Round Culvert

2



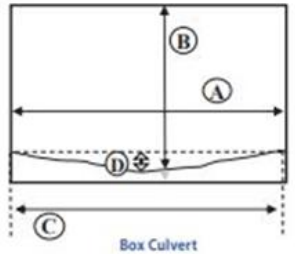
Pipe Arch/Elliptical Culvert

3



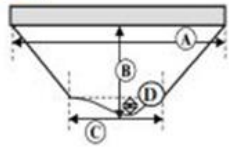
Open Bottom Arch Bridge/Culvert

4



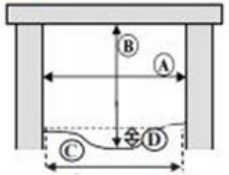
Box Culvert

5



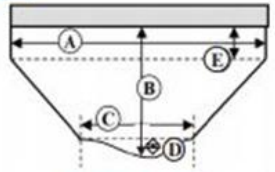
Bridge with Side Slopes

6



Box/Bridge with Abutments

7



Bridge with Abutments and Side Slopes

Tools and Safety Tips!

- Assessment Times and Safety Tips!
  - Typical low flows in Spring, Summer, or Fall
  - NEVER go out during high flows, thunderstorm conditions, or other hazardous conditions
  - NEVER attempt to assess a culvert you cannot see all the way through; if culvert is very long, make sure it has a side walkway for safety (highway culverts)
  - ALWAYS ask permission when trying to assess a crossing on private property. When in doubt, skip these crossings and stick to ones on public roads.
- Tools of the trade
  - Telescoping rod
  - Fiberglass measuring tape (200-300 feet is best)
  - Flashlight or headlamp
  - Tablet or paper forms to record data
  - Camera for photos (inlet, outlet, upstream, downstream, & important features)

Comments or Questions?

EPCAMR
Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

Bobby Hughes
EPCAMR Executive Director
rhughes@epcamr.org
570-371-3523

Contact Us

EPCAMR's Office is centrally located throughout the coalfields off of Inter-State Route I-81; Nanticoke Exit 164 onto State Route 29 Ashley/Sugar Notch Exit 1 onto S. Main Street. 101 S. Main Street, Ashley PA 18706; (Red Brick Building)

Office hours usually 9AM-5PM Monday through Friday; Occasional Saturdays while coordinating community projects.

For updates on future volunteer opportunities and what's going on in the office, sign up for our monthly newsletter in the "Volunteer Registration Form" under the "Get Involved!" tab on our website at www.epcamr.org

570-371-3522
EPCAMR
info@epcamr.org
epcamr
epcamr.org; orangewaternetwork.org; treatminewater.com
@epcamr

Ashley Wilmont
Program Director
c-awilmont@pa.gov
814-359-5233 (o)

Pennsylvania Council of Trout Unlimited
PO Box 5148
Bellefonte, PA 16823

http://www.patrout.org/

Coldwater Heritage Partnership

PFBC Centre Region Office
595 E. Rolling Ridge Drive
Bellefonte, PA 16823

http://www.coldwaterheritage.org/