



State Wildlife Grants Annual Summary-2020

Pennsylvania Fish & Boat Commission



Top Right: Researchers sampling for crayfish.
 Above: Crayfish-undescribed member of the *Cambarus acuminatus* complex. Assessments are being conducted to determine if this is a new species.
 Credits: Mike Perkins and TR Russ (Top Right); David Lieb (Above).

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PENNSYLVANIA
 WILDLIFE ACTION PLAN

March 2020

GUIDING CONSERVATION OF IMPERILED SPECIES AND HABITATS: 2015-2025 PENNSYLVANIA WILDLIFE ACTION PLAN



The 2015 Pennsylvania Wildlife Action Plan is a blueprint for conserving declining and imperiled species and their habitats. Administered by the Game Commission and Fish & Boat Commission, this plan is for all Pennsylvanians who care about Species of Greatest Conservation Need and their habitats.

This 2020 summary document highlights selected State Wildlife Grant projects administered by the Pennsylvania Fish & Boat Commission. Previous annual summaries are available at: [State Wildlife Grants-Program Summaries](#). Support for this document and partial Conservation Opportunity Area Tool are provided by a State Wildlife Grant administered by the U.S. Fish and Wildlife Service, Wildlife and Sportfish Restoration, North Atlantic and Appalachian Office, Hadley, MA.

Project F16AF00394. Implementing & Coordinating the 2015 Pennsylvania Wildlife Action Plan: Pennsylvania Fish & Boat Commission. Diana M. Day, diday@pa.gov

TAXONOMY AND CONSERVATION STATUS OF A RARE, UNDESCRIBED PENNSYLVANIA CRAYFISH

SUMMARY

In 2000, an undescribed species of crayfish belonging to the *Cambarus acuminatus* complex, *Cambarus (Puncticambarus) sp.*, was discovered in Pennsylvania (Lieb et al. 2008). Subsequent surveys show that *Cambarus (Puncticambarus) sp.* only occurs in five small drainages in the southeastern part of the state (Lieb et al. 2011a, b; Lieb, unpublished data). With numerous environmental threats and stressors, including exotic crayfishes, urban development and limited distribution, *Cambarus (Puncticambarus) sp.* may be one of the most endangered aquatic species in Pennsylvania. The primary goal of the study is to use genetic analyses in combination with traditional taxonomy to formally describe *Cambarus (Puncticambarus) sp.* and determine its status in Pennsylvania (native or introduced). Surveys were completed to provide estimates of *Cambarus (Puncticambarus) sp.* species trends and identify threats, ultimately informing management decisions. The outcome of this work will help determine if this species should be included as a Species of Greatest Conservation Need (SGCN) in the Pennsylvania Wildlife Action Plan.



An undescribed crayfish from Brandywine drainage, Southeast Pennsylvania. Credit: David Lieb

OBJECTIVE

The purpose of this project is to utilize genetic techniques along with traditional taxonomy to resolve the status (introduced or native) and formally describe the undescribed member of the *Cambarus*

acuminatus complex that occurs in southeastern Pennsylvania and is potentially one of the states rarest aquatic species.

BACKGROUND

Crayfishes in North America display high rates of imperilment due to narrow distributions compounded by the effects of invasive species and habitat alteration. Although Pennsylvania's crayfish fauna has received considerable attention in recent years, one of the state's most imperiled crayfishes [*Cambarus (Puncticambarus)* sp.] remains undescribed. Conservation and management actions targeting the species are not possible until it is formally described and named, and its status determined (native or introduced). Because *Cambarus (Puncticambarus)* sp. may occur only in Pennsylvania, the commonwealth may have global responsibility for the preservation of the species.



Valley Creek in Southeast Pennsylvania was sampled for crayfish. Credit: David Lieb

Members of the *Cambarus acuminatus* complex were collected in at least one site in each Hydrologic Unit Code (HUC) 10 within which it occurs, from southeastern Pennsylvania southward to Columbia, South Carolina. Over 2000 crayfish specimens from 800+ sites were collected. Genetic and taxonomic analyses have been completed with most specimens.

We confirmed that the member of the complex occurring in Pennsylvania [*Cambarus (Puncticambarus)* sp.] is in fact an undescribed species.

STATUS

Preliminary analyses revealed distinct genetic structure throughout the range of the *Cambarus acuminatus* complex indicating the potential for numerous undescribed species (possibly over a dozen). We confirmed that the member of the complex occurring in Pennsylvania [*Cambarus (Puncticambarus)* sp.] is in fact an undescribed species. In

2020, additional taxonomic and genetic analyses will be conducted, ultimately resulting in the formal description and status determination of the undescribed Pennsylvania species. This will allow for management and conservation actions targeting extant populations in the commonwealth.

REFERENCES

- Lieb, D.A., R.F. Carline, J.L. Rosenberger, and V.M. Mengel. 2008. The discovery and ecology of a member of the *Cambarus acuminatus* complex (Decapoda: Cambaridae) in Valley Creek, southeastern Pennsylvania. *Journal of Crustacean Biology* 28: 439–450.
- Lieb, D.A., R.W. Bouchard, R.F. Carline, T.R. Nuttall, J.R. Wallace, and C.L. Burkholder. 2011a. Conservation and management of crayfishes: lessons from Pennsylvania. *Fisheries* 36: 489-507.
- Lieb, D.A., R.W. Bouchard, and R.F. Carline. 2011b. Crayfish fauna of southeastern Pennsylvania: distributions, ecology and changes over the last century. *Journal of Crustacean Biology* 31: 166-178.

Project F16AF01305: Taxonomy and Conservation Status of *Cambarus (Puncticambarus)* sp. in Pennsylvania. Dr. Bronwyn W. Williams (North Carolina Museum of Natural Sciences), Dr. David A. Lieb (Western Pennsylvania Conservancy), Dr. Zachary J. Loughman (West Liberty University), Christopher A. Urban (Pennsylvania Fish & Boat Commission).

MERGING CONSERVATION PLANNING AND TECHNOLOGY: THE PENNSYLVANIA CONSERVATION OPPORTUNITY AREA TOOL

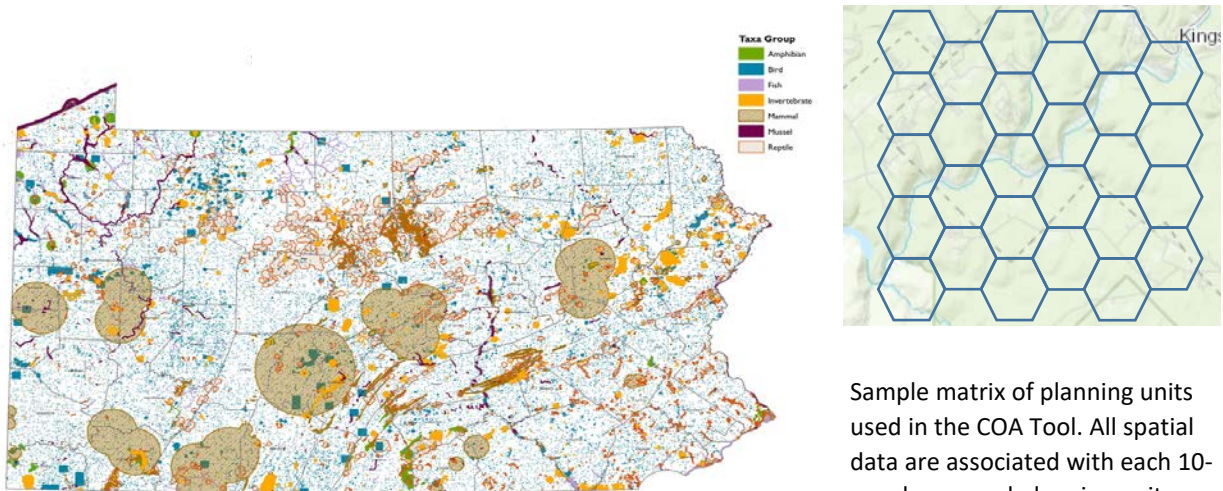
In August 2019, the Game Commission and Fish & Boat Commission introduced a new era of conservation planning and support for implementing the Pennsylvania Wildlife Action Plan by launching of the Pennsylvania Conservation Opportunity Area (COA) Tool.

Why a Conservation Opportunity Area Tool?

The 2015-2025 Pennsylvania Wildlife Action Plan is comprehensive and includes 664 Species of Greatest Conservation Need and more than 300 specific conservation actions. Recent years have seen great advances in technology and public accessibility to web-based platforms. Merging features of the Pennsylvania Wildlife Action Plan with web-based technologies now allows delivery of information in a format and scale that can more easily support on-the-ground conservation planning. This transformation is accomplished in the Conservation Opportunity Area Tool through data compilation and organization that supports a user project report.

Data-driven

At its core, the COA Tool is data-driven, currently with over 300,000 records. To expedite processing, data (e.g., habitat, species occurrences) are associated to a non-viewable statewide grid of more than 2.9 million, 10-acre hexagons (planning units). Thus, the finest data resolution in the tool is the 10-acre planning unit (image above). When an Area of Interest (AOI) is delineated by the user, information within the planning units selected by the AOI is then compiled, analyzed and submitted to a report.



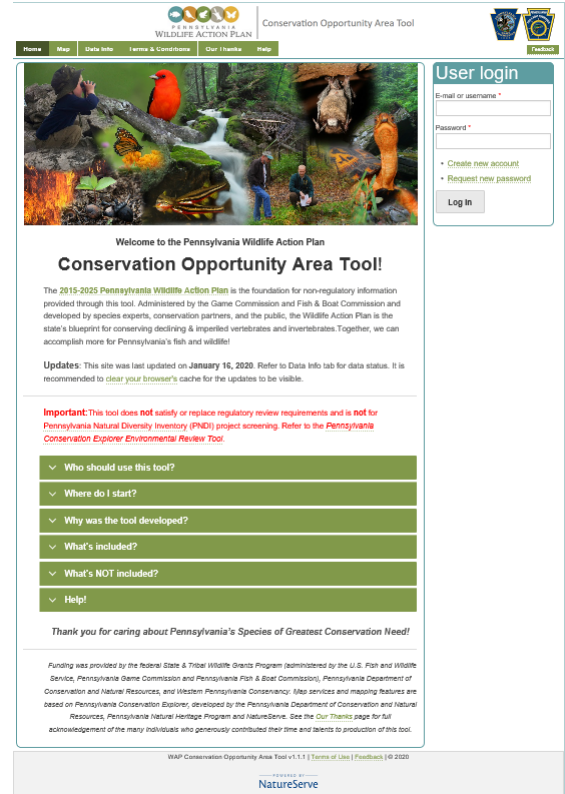
Sample distribution of data used in the Conservation Opportunity Area Tool.

Sample matrix of planning units used in the COA Tool. All spatial data are associated with each 10-acre hexagonal planning unit

A Brief Tour of the Tool

Here we provide a brief look at the tool (not intended as a tutorial). Users can access step-by-step “Quick-Start” instructions and detailed “Help” guidance on the website.

1. Find the tool at <https://wildlifeactionmap.pa.gov>
2. First-time users, and returning users who are not logged-in, will be provided a user login prompt (right).
3. Learn more about the tool in the green pull-down sections on the tool main (i.e., landing) page.
4. Primary tool navigation is available through the tabs at the top of the landing page (below).
5. After logging-in users will then be able to create and save Area of Interest (AOI) projects, and use the Statewide Search function.



Navigation Tab Descriptions

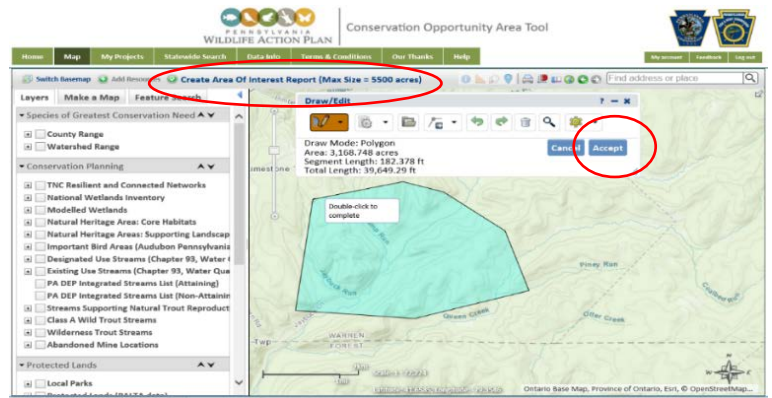
<p>Home: Main tool landing page</p>	<p>Data Info: Find data sources and update status.</p>	<p>Terms & Conditions: The legal conditions for using the tool.</p>	<p>Our Thanks: Contributors to tool development and support.</p>	<p>Help: Detailed instructions for tool use.</p>
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<p>Map: Allows development of a user-defined Area of Interest (AOI), and contains numerous conservation and reference layers.</p>	<p>My Projects: Lists projects created using the “Create Area of Interest Report” function in Map. Project reports can be managed in this tab, including updating, deleting and other functions.</p>	<p>Statewide Search: Provides county or watershed distributions for Species of Greatest Conservation Need.</p>	<p>Feedback: Allows users to provide comments</p>
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THE BASICS

Creating an Area of Interest Report

1. Select the “Map” tab.
2. Left mouse-click “Create Area of Interest Report”.
3. Use the Draw/Edit feature to delineate your Area of Interest. When completed, <double-click to complete> the polygon.
4. If acceptable, left mouse-click the “Accept” button.



Viewing an Area of Interest Report

1. Click the “My Projects” Tab.
2. A Portable Document Format (pdf) file of the report will be generated. (Sample of Page 1-right).



Conservation Opportunity Area Tool Results

Project Name: Example
 Project Date: 14 February 2020
 Project Area: 3,897.64 acres (438 planning units)
 Project Coordinates: 40.608975 / -77.098915 (centroid)

Counties: Juniata County, Perry County
 Municipalities: Emlenton Borough, Greenwood Township, Jamestown Borough, Lewis Run Borough, Liverpool Township, Packer Township
 Physiographic Provinces: Ridge and Valley
 Ecoregions: Central Appalachian Forest
 Major Drainage Basin (HUC8): Lower Juniata, Lower Susquehanna-Penns
 Watershed (HUC12): Lower Cocolamus Creek, Lower West Branch Mahantango Creek
 Natural Heritage Areas: None detected
 Protected Land: Farmland Preservation Easement
 *Note: At least one of the 10-acre planning units overlaps the above protected conservation land.

Species of Greatest Conservation Need

Species of Greatest Conservation Need are at-risk, threatened, or endangered species as well as common species of conservation concern for which Pennsylvania has stewardship responsibility.
 Number of SGCN: 15
 Number of Sensitive Species: 0 (0 PFBC; 0 PGC; 0 Invertebrates)

Sensitive species count included in total number of SGCN. Sensitive species may or may not be displayed in the table, subject to permissions. All projects should be entered into the [Pennsylvania Conservation Explorer Environmental Review Tool](#) to avoid and minimize sensitive species conflicts.

Potential uses and users of the COA tool?

The tool is for everyone interested in the conservation of at-risk species and their habitats. Whether to become more informed or to plan for on-the-ground conservation actions, the tool can be a ready source of information. A few possible scenarios for tool use are provided in the table (below).

Use Case Scenarios (Examples)

NEED	POTENTIAL USER
A private landowner wants a management plan to improve habitat for Species of Greatest Conservation Need	Landowner, natural resources manager
Research and survey needs are identified for an area.	Researcher, resource manager
A willing landowner is seeking to sell a parcel with ecological importance.	Land Trust, Conservancy
An urban-suburban homeowner wants information on species in their area and ways to conserve them.	Homeowner



Need assistance? Contact: RA-FBSWAP@pa.gov.

Maintenance and enhancement of the Conservation Opportunity Area Tool are supported by a State Wildlife Grant from the North Atlantic and Appalachian office of the U.S. Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program. This grant is administered by the Game Commission and Fish & Boat Commission. Data management is provided by Western Pennsylvania Conservancy. Web-accessibility is supported by NatureServe.

SEARCHING PENNSYLVANIA’S STREAMS TO ASSESS DISTRIBUTION AND STATUS OF THE EASTERN LAMPMUSSEL AND BROOK FLOATER

SUMMARY

The Brook Floater (*Alasmodonta varicosa*) and Eastern Lampmussel (*Lampsilis radiata*) require informed conservation measures to ensure their future in the Commonwealth. Recent evaluations of Brook Floater in the eastern U.S. show its range has significantly declined. Brook Floater is considered globally vulnerable (G3) and is ranked as critically imperiled (S1), imperiled (S2), or extirpated in 12 states. The Eastern Lampmussel has strongholds in New England, but it is ranked critically imperiled (S1) or imperiled (S2) in the Mid-Atlantic states. The information obtained in this project will help guide their management and recovery in Pennsylvania.



Snorkeling may be required to search for mussels. Credit: Western PA Conservancy-Mary Ann Furedi.



Eastern Lampmussel (top); Brook Floater (bottom) Credit: Western PA Conservancy.

OBJECTIVE

To address concerns about declining populations of both species in Pennsylvania, this project was designed to: Increase knowledge about the current status of Eastern Lampmussel and Brook Floater by conducting surveys to fill data gaps, analyzing population status, and developing distribution models for both species.

APPROACH

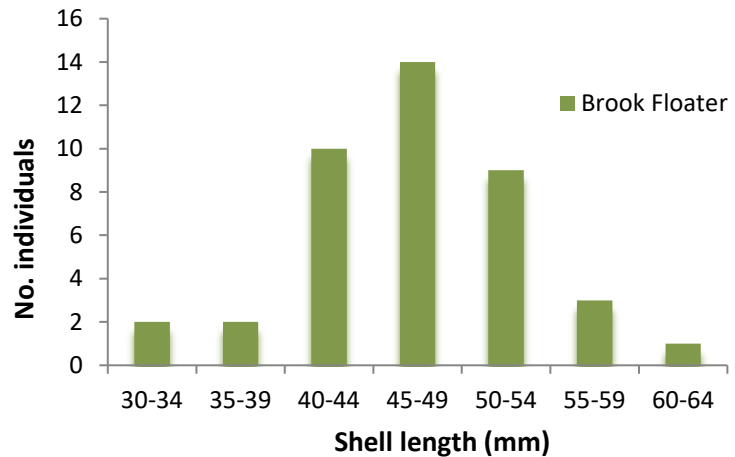
To achieve the objective, we conducted snorkel surveys for Eastern Lampmussel and Brook Floater in streams of the Susquehanna, Potomac, and Delaware River watersheds in Pennsylvania. In these surveys, the team searched riffles, runs, and pools, overturning rocks, and raking the stream bottom. The most common mussel encountered was the Eastern Elliptio, comprising 89% of the mussels encountered, with twelve other species also observed. Of these surveys, the number of Brook Floater mussels was a very small portion (5%) of all mussels counted.

STATUS

Many streams formerly occupied by Eastern Lampmussel and Brook Floater no longer support these mussels. Of the 20 sites surveyed for Brook Floater, we encountered populations in three streams. For sites surveyed, Eastern Lampmussel populations were not found at historic sites of occurrence, and this species has a very limited distribution in other streams in the Susquehanna River watershed. We analyzed factors related to range reduction, habitat size, and susceptibility to extirpation in Pennsylvania for a statewide assessment of both species.

Another measure of population health is the age distribution of individuals. For this we used shell length, which reflects the age of a mussel. The presence of many small mussels (<35 mm) indicates that the population is reproducing and young individuals are present. In our surveys the length distribution of Brook Floater suggests there are few young mussels in the populations (Graph). A variety of factors can prevent populations from successfully adding many young to new generations. Young mussels are more susceptible than older mussels to poor water quality or adverse conditions, like floods.

Project F16AF00452. Distribution and Status of Brook Floater and Eastern Lampmussel in Pennsylvania’s Atlantic Slope. Mary Walsh, Western Pennsylvania Conservancy, Project Lead-Christopher Urban, Pennsylvania Fish & Boat Commission.



Distribution of shell length measurements for Brook Floater suggests there are few young mussels in the populations.
(see graph above)

Distribution models predict stream sections that have conditions similar to species occurrences of Brook Floater and Eastern Lampmussel. For both mussel species, the distributions in models were associated with landscape, watershed, and climate variables. The models identify combinations of variables that occur in reaches with freshwater mussels. The variables related to geology, hydrology, and watershed size best predicted mussel habitat.

Maps of mussel habitat can identify sites for future surveys and can apply to prioritizing restoration sites. The distribution models, survey results, and information about the range of both species can be integrated into management plans and conservation actions for each species.

