

Association of Mid-Atlantic Aquatic Biologists (AMAAB)
2021 Virtual Meeting Agenda
Presentations and Abstracts

*Denotes Speed talk

Agenda

Wednesday, March 31 – 8 – 11 am

Time	Presenter	Title
8:00 - 9:00	Mark Southerland	Vertebrate Community Trajectories in Regenerative Stream Conveyances
	Lou Reynolds	A comparison of fish assemblages estimated from eDNA and electrofishing at NRSA wadeable streams
	Nathaniel (Than) Hitt	Accounting for thermal resiliency in brook trout restoration planning
	Kelly Maloney	Towards an assessment of fish habitat for nontidal streams in the Chesapeake Bay watershed
	Nick Walker	Evaluating the Impacts of Climate Change on American Eel (<i>Anguilla rostrata</i>) in streams of the northeastern United States
9:00 - 10:00	Andrea Kautz	Macroinvertebrates.org: A digital teaching collection of aquatic macroinvertebrates created with gigapixel image technology
	Erica Weir and John Wenzel	Predicting Stream Water Quality via an EPT Genera Based Rapid Assessment
	Ashlee Widener	Restoring Streams to Pre-Colonization Conditions in Pennsylvania: What Periphyton, Macroinvertebrates, and Fish can tell us about the Release of Legacy Nutrients
	Daniel Mondale	Estimating macroinvertebrate biomass from digital images captured by smart phone cameras: effects of camera lens, specimen size and body form
10:00 - 11:00	Leslie O. Rieck	Challenges, barriers, and misunderstandings for implementing small-municipality MS4 programs
	Matthew Shank	Long-term trends to quantify recovery from abandoned mine drainage and Freshwater Salinization Syndrome impacts in Pennsylvania.
	Kevin Krause	Leveraging an inter-organizational dataset and joint species distribution modeling to understand inland fish communities within the Chesapeake Bay Watershed
	Danielle Wynne	Using Videos to Communicate Science to New Audiences

Thursday, April 1, 2021 – 8 – 12 pm

Various workshops

Vertebrate Community Trajectories in Regenerative Stream Conveyances

Abstract:

This study assessed the trade-offs inherent in stream restorations using the Regenerative Stream Conveyance (RSC) or restored stream-wetland technique. Specifically, it quantifies the aquatic vertebrate community changes that should be expected from RSC restorations implemented in lowland Coastal Plain streams with nutrient-rich waters. We defined the reference conditions (least disturbed) for Coastal Plain aquatic vertebrate communities in both single-thread streams and stream-wetland complexes, using a literature review, existing Maryland Biological Stream Survey (MBSS), and other data. We sampled and analyzed the aquatic vertebrate communities (fish and herpetofauna) in 11 streams that have been converted to RSCs, along with 24 comparable references of three types. In general, RSC fish communities are more similar to low-quality single streams than to high-quality single streams or stream wetland complexes. These results may help practitioners and regulators develop realistic expectations of biotic resource changes that occur when defined-channel stream systems are transformed into less-defined stream wetland complexes.

A comparison of fish assemblages estimated from eDNA and electrofishing at NRSA wadeable streams

Abstract:

Presence and relative abundance of common fish species in an assemblage can be estimated by electrofishing wadeable streams and is the primary sampling method used in the National Rivers and Streams Survey. Environmental DNA (eDNA) is a molecular genetic technique that can be used to identify species from water samples. eDNA sampling might supplant or supplement electrofishing, particularly to identify the presence of rare species at a site, if not caught in the electrofishing sample. Federal agencies, states, tribes, and river basin commissions will all benefit if fish assemblage metrics can be derived from a sample of water. Sample density can increase and will facilitate better spatial analysis of fish data. This data may be used in aquatic life use assessments, invasive species risk assessments, and distribution studies of threatened and endangered species. There remains, however, much work to evaluate eDNA as a fish assemblage sampling tool. We compared electrofishing samples at MidAtlantic wadeable NRSA sites in 2018-2019 with eDNA extracted from a single 1L water sample at the sites using next generation DNA sequencing (NGS) from two gene loci - 12S and 16S.

***Accounting for thermal resiliency in brook trout restoration planning**

Abstract:

We investigated the role of groundwater-surface water interactions on thermal habitat resiliency and restoration opportunities for native Brook Trout in the Canaan Valley National Wildlife Refuge in West Virginia. We modeled thermal habitat based on stream temperature correspondence to air temperature in summer months of 2018 and 2019 (38 and 33 sites, respectively). Results revealed several discrete zones of high groundwater influence which kept stream temperatures below physiological stress thresholds for Brook Trout. Our study highlights the importance of groundwater dynamics for coldwater fisheries restoration in Appalachia.

***Towards an assessment of fish habitat for nontidal streams in the Chesapeake Bay watershed**

Abstract:

The Chesapeake Bay Program Fish Habitat Action Team has a need to assess fish habitat for all nontidal stream reaches in the Chesapeake Bay watershed. We present preliminary findings from a study that is designed to fulfill this need by using an extensive fishes data set comprising over 25,000 sampling events from 21 sampling programs. All fish data were checked for errors and synthesized into a single data set which was linked to the NHDPlus flowline framework. For samples with fish community data, we calculated 194 site specific metrics and are examining a subset determined by previous national programs (National Fish Habitat Partnership and USEPA NRSA) of use for regions in the watershed. We are further testing 11 metrics based on functional traits not evaluated in these national studies. Initial results suggest some metrics are able to discern least from most disturbed sites, but results varied across aggregated regions. Metrics that pass multiple selection criteria to determine sensitivity will be incorporated into models to predict their values at unsurveyed reaches.

***Evaluating the Impacts of Climate Change on American Eel (*Anguilla rostrata*) in streams of the northeastern United States**

Abstract:

The American Eel (*Anguilla rostrata*) is a catadromous fish affected by a variety of anthropogenic impacts, including climate change. The eel is a Species of Greatest Conservation Need (SGCN), it is economically and culturally significant, and is a management focus by the Atlantic State Marine Fisheries Commission and U.S. Fish & Wildlife Service. A climate-induced shift in the water temperature and salinity can affect the range, distribution and density of migratory fishes. To address this, we propose the development of a decision framework for assessing the response of American Eel to climate change and other factors for the inland portion of its range in the northeast. This framework will include the capability to build out information on passability metrics in order to simulate the impacts on the American Eel population based on potential climate-induced changes in land use, stream metrics, biological interactions, and accessibility (dams and barriers). There is a significant lack of data concerning American Eel across its range so this work will additionally build out information on eel density data, fishway locations and the use of mitigation measures at hydropower facilities (i.e., shutting off turbines during migration times) and assisted migration (trucking around dams).

Macroinvertebrates.org: A digital teaching collection of aquatic macroinvertebrates created with gigapixel image technology

Abstract:

Aquatic macroinvertebrate surveys are key in biomonitoring studies used to assess water quality in freshwater rivers and streams. Reliable identification of these aquatic taxa is necessary for the legitimacy of these studies and may be difficult to achieve if not done by a trained entomologist. One obstacle to training workers at any level is the relative difficulty of providing appropriate reference material (the teaching collection) for learning the taxa. The use of dichotomous keys involves rejecting many alternatives to arrive at the correct ID, so having a collection of possible taxa to reference can be very useful. Macroinvertebrates.org is a web-based tool designed to complement pictorial or descriptive keys, ultimately serving both the beginner and the expert. The invertebrates are photographed using gigapixel image technology, which combines hundreds or thousands of individual photos into one very high-resolution image. The images are annotated to direct the learner to diagnostic characters needed for various levels of identification (order, family, and genus). The site includes ~160 total taxa found across the eastern U.S. and is freely accessible to the public.

Predicting Stream Water Quality via an EPT Genera Based Rapid Assessment

Abstract:

***Restoring Streams to Pre-Colonization Conditions in Pennsylvania: What Periphyton, Macroinvertebrates, and Fish can tell us about the Release of Legacy Nutrients**

Abstract:

Past anthropogenic activities have severely impacted stream function and lateral connectivity with floodplains. At Ryerson State Park and Robinson Run in Pennsylvania, the Department of Environmental Protection is reconnecting smaller stream channels with their floodplain to restore streams to pre-settlement conditions and increase water and nutrient retention. However, this method is controversial because it can lead to nutrient enrichment through exposure to legacy sediment resulting from floodplain grading which can impact biological communities. We investigated responses of periphyton, macroinvertebrates, and fish to nutrient levels (total N and P) at N=6-9 restored and unrestored sites in western Pennsylvania. Summertime nutrient levels (total N and P) ranged from 0.4 – 2.9 mg/L. Periphyton from erosional rock scrubs was analyzed for ash-free dry mass and chlorophyll a. Macroinvertebrates were sampled using kick, dip and Hess style bucket samplers in order to obtain species richness, abundance, and estimates of biomass in focal grazers and filter-feeders. Fish were sampled along a 100-meter reach using a long-line electrofishing method and seines. Preliminary results and correlations between nutrient level and biomass of periphyton, macroinvertebrates will be discussed.

***Estimating macroinvertebrate biomass from digital images captured by smart phone cameras: effects of camera lens, specimen size and body form**

Abstract:

There is increasing concern about long-term declines in biomass of arthropods in both terrestrial and aquatic ecosystems that are thought to be related to changes in climate and other anthropogenic influences. Aquatic biologists also use biomass to understand how energy and nutrients flow through ecosystems. Measuring biomass of small individual invertebrate specimens, however, is time consuming and requires repeated handling as specimens are transferred from sample containers, viewed under the microscope, sorted, then weighed to obtain wet or dry mass. We explored the efficacy of using smart phones to obtain digital images of preserved macroinvertebrates in mixed samples and then using those images to estimate biomass from body length and head width measurements. Focal taxa included specimens with hard vs soft exoskeletons, and of varying size. Specimens were then removed from 70% ethanol, blotted dry, and weighed to the nearest 0.1 mg. Correlation analyses were used to investigate relationships between morphological measurements from digital images and actual measures of wet mass.

Challenges, barriers, and misunderstandings for implementing small-municipality MS4 programs

Abstract:

Federal regulations for municipal separate storm sewers (MS4) in the United States have been in place since 1990 as part of the National Pollutant Discharge Elimination System (NPDES), aiming to reduce sediment and pollutant loads originating from urban areas. However, small-municipal MS4 permittees face several challenges, barriers, and misunderstandings in their efforts to regulate stormwater. We summarize common challenges concerning MS4 management and offer real-world examples of effective approaches for satisfying MS4 requirements. For example, there is no direct federal funding mechanism for MS4 requirements, and small municipalities are at a particular disadvantage in terms of finding funding sources. Taxes are a potential yet often unpalatable mechanism to local municipalities. Grants or the creation of a stormwater utility can offset costs to local communities but also face barriers to implementation, such as difficulty in finding personnel with the experience and time to apply for grants. Additionally, it can be challenging to identify appropriate BMP types and find suitable sites for those BMPs in densely developed small municipalities. Flexibility and consideration of local social, political, and landscape conditions can help municipalities find unique, innovative, and cost-effective BMPs for their situation. Small municipalities can benefit greatly from a realistic, facts-based clarification of MS4 policies and practices that lay out all the options available to achieve NPDES requirements.

Long-term trends to quantify recovery from abandoned mine drainage and Freshwater Salinization Syndrome impacts in Pennsylvania.

Abstract:

Legacy databases are notoriously difficult to extract meaningful information from, due to differences in analytical tests, reporting limits, and data structure. However, if legacy databases can be linked with their recent counterparts, long-term trend estimation can quantify changes to water quality. Best practices for linking historic and recent data will be briefly covered. Trend estimation results across diverse Pennsylvania watersheds will be detailed. Historically mined watersheds show recovery from metals pollution and acidic conditions. Similarly, agricultural watersheds show decreasing nutrient trends. While these results are encouraging, water chemistry parameters that have not been the focus of management activities are becoming problematic. Specifically, base cations (calcium, magnesium), sulfate, hardness, alkalinity, pH, and specific conductance are increasing steadily. These increases are consistent with the 'Freshwater Salinization Syndrome' that has been documented nationwide. This presentation is intended to give context to discussions surrounding water quality baselines by placing current conditions into historical context. These concepts have implications for anti-degradation programs. Also, the biological repercussions of freshwater salinization are not well understood, and should be the focus of increased research, especially in the mid-Atlantic region where instruments of salinization (e.g., urbanization and agriculture) are ubiquitous.

***Leveraging an inter-organizational dataset and joint species distribution modeling to understand inland fish communities within the Chesapeake Bay Watershed**

Abstract:

To meet management needs within the Chesapeake Bay watershed to assess the biological condition of streams we have compiled a database of fish sampling information compiled from over 20 independent agencies and organizations across the region. These data present a unique opportunity to investigate the distributions and composition of fish communities at a wide spatial scale and to inspect the environmental drivers influencing them. Furthermore, recent advances in the use of applying Bayesian approaches in joint species distribution models (jSDMs), which not only leverage the environmental conditions associated with species observations but also their co-occurrence patterns with other species, may offer a valuable approach to analyze this broad dataset. However, these techniques have yet to be applied widely to modeling distributions of freshwater fishes. Here, we apply a jSDM approach to analyze this unique dataset and use environmental data summarized to the National Hydrography Dataset (NHD). Initial findings suggest that we can use jSDMs to construct reliable estimates of species occurrence across a wide array of fish species when data from multiple sampling programs are combined including for key species of management interest.

***Using Videos to Communicate Science to New Audiences**

Abstract:

If a picture is worth a thousand words, imagine what scientists can communicate using videos? Utilizing video production to help communicate your program goals and results has become more and more attainable in recent years. Our smart phones have allowed all of us to become directors of our own scientific stories. Especially useful during the COVID pandemic, this shift to communicating scientific material through video has the potential to connect audiences who are currently unable to share scientific information via conventional means, such as conferences. While initially daunting, this new media opportunity can be utilized by anyone to help introduce their research to larger audiences and effectively communicate program results. This flash talk will focus on tips and tricks to effectively communicate through the video, how to use equipment, recording devices and video editing software, script writing and beyond.