

STREAM SAMPLES: Updates on Delaware Basin Science

THE ACADEMY
OF NATURAL SCIENCES
of DREXEL UNIVERSITY

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March 5, 2015

It's hard to believe, but in a few short weeks the process of sampling and monitoring the streams and watersheds of the DRWI will start again as we enter the 2015 sampling season.

As we (literally) gear up for the season, ANS, Stroud and other partners are studying maps, conferring with groups doing projects, and choosing sampling sites. Equipment is being inspected and maintained. Operating procedures and quality assurance protocols (the vital step of making sure the data are accurate) are being reviewed.

The payoff for all this preparation is high-quality ecological data that DRWI partners will be able to access and use. To ensure that all the data collected are of high quality, ANS is introducing the 3 Tier approach to data. This approach is designed to standardize the data collected and distinguish among Research (Tier 1), Practitioner (Tier 2), and Citizen Science (Tier 3) data.

By having compatible data standards, the many partners of the DRWI will be able to more effectively observe and characterize their watersheds. In the coming months, there will be more information on how to use the 3 Tier system to support good data collection.

- *Roland Wall*

Upcoming Events

[Tapping our Watershed](#)

ANS' Seminar Series
March 16, 2015
at 6 p.m.

[National Mechanics](#)
22 S. 3rd St.
Philadelphia, PA

For our March [Tapping our Watershed](#)

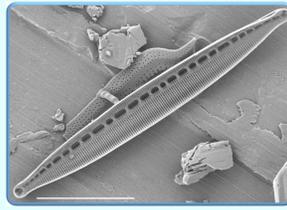
seminar, we look forward to hearing **Adam Levine**, historical consultant at the Philadelphia Water Department, present "From Creek to Sewer: History of Topographical Change in Philadelphia."

Levine will present an overview of the fascinating history of Philadelphia's many lost streams.

Illustrated with a wide range of graphic

Algal Analysis

With this issue of *Stream Samples* we share the third in a series of short reports on **emerging findings** from our cluster analyses, with a focus on algae.



Nitzschia dissipata, a common species associated with high organic pollution. Image from <http://westerndiatoms.colorado.edu>

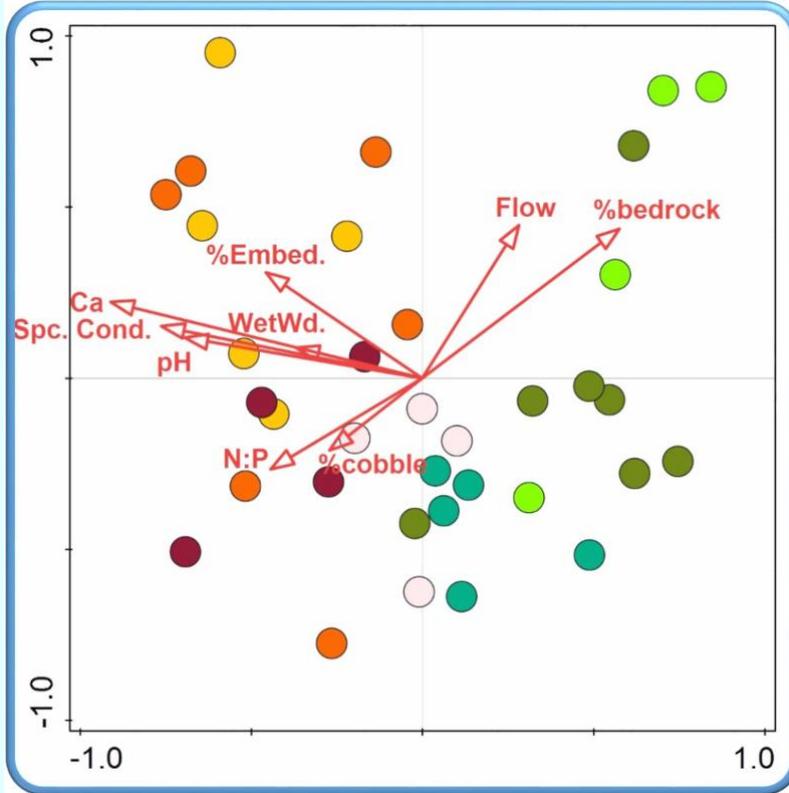
Diatoms and soft algae are two groups of algae that are good indicators of water quality. Certain types of algae are sensitive and only grow in healthy regions. Other algae have a high tolerance to pollution and disturbance and are found in poorer conditions. Alongside other species data as well as direct chemical measures, algae surveys can provide complementary information about the water quality conditions at sites and about potential sources of degradation.

A Canonical Correlation Analysis, or CCA, takes two sets of variables and plots them in an ordination to see what they have in common. These data sets are often multi-dimensional but are plotted in a 2D graph. In this case, algal communities at each site (displayed as colored dots in the graph below) are compared to their environment (displayed as red arrows). Sites that have more algal species in common are plotted closer together.

materials, including paintings and drawings, maps and plans, photographs and surveys, this talk stretches across the breadth of the city's long history and highlights how, over the course of several centuries, most of the city's surface streams have been channeled underground and incorporated into the city's 3,000 mile sewer system.



[Tapping Our Watershed](#) lectures aim to engage students, scientists, and interested citizens in discussions about issues pertaining to the Delaware River Watershed and other aquatic ecology topics. Contact [Allison Stoklosa](#)



- Lime green** – Poconos/Kittatinny
- Forest green** – Upper Lehigh
- Kelly green** – Schuylkill Highlands
- Burgundy** – Upstream Suburban Philadelphia
- Orange** – Middle Schuylkill
- Light pink** – Brandywine/Christina
- Golden yellow** – New Jersey Highlands

Here, a number of variables appear to affect algal composition: faster flowing water ("Flow") and a higher percent bedrock in the stream ("%bedrock") are more strongly associated with sites in the Upper Lehigh and Poconos/Kittatinny clusters, while elevated nutrients (nitrogen:phosphorus ratio, or "N:P" and calcium, "Ca"), higher pH ("pH"), higher conductivity ("Spc. Cond."), and sandier substrate (=higher percent embeddedness, "%Embed.," as well as higher percent cobble substrate, "%cobble") are more influential in the Middle Schuylkill, New Jersey Highlands, and Upstream Suburban Philadelphia clusters.

Because our integrative sites were picked to represent clusters as a whole, we would expect separation between clusters with reference conditions versus those impaired by urbanization or pollutants from other sources. These findings confirm that the majority of sites in the

with questions or suggestions for future speakers.

Youth Engagement Opportunity

The U.S. Fish and Wildlife Service in the Northeast Region intends to award funds to up to five organizations to provide an **introductory developmental educational experience of natural resource careers to young people**, including culturally, ethnically, and economically diverse students, through training, hands-on experience, and mentoring at National Wildlife Refuges and other USFWS programs in the Northeast Region. Application deadline: March 20. Click [here](#) for more information.

DRWI Mapper



"preservation" clusters (Poconos-Kittatinny, Upper Lehigh) have a distinctly different algal community than other clusters, and they are most similar to each other. Schuylkill Highlands sites had many species in common with these clusters as well as the Brandywine-Christina. This appears to be in response to lower nutrient enrichment, lower ionic content, and higher percent forested land use at some sites.

We expected algal communities in the New Jersey Highlands sites to be more similar to Poconos-Kittatinny and Upper Lehigh sites, since we saw similarities in those clusters' fish communities. However, based on a separate analysis relating algal taxa to water quality, New Jersey Highlands sites had more species tolerant of impaired conditions compared to the other clusters.

We're finding that different indicator taxa groups (fish, macroinvertebrates, and algae) can tell a different story about sites and their clusters. For instance, the fish communities in the Upstream Suburban Philadelphia cluster set it apart from other clusters, but its algae communities are similar to other "impaired" clusters (Middle Schuylkill and New Jersey Highlands). What this tells us is that we cannot rely only on one taxonomic group to make assumptions about water quality. Each group can give information about different stressors, related to contamination, flow, habitat degradation and connectivity with other suitable habitat.

For more information about algae surveying or these results, please contact [Alison Minerovic](#). To see summaries of fish and macroinvertebrate results from the January and February *Stream Samples* issues (respectively), check out the [newsletter page](#) of our website.

More Mapping Resources

Quick Link

The [DRWI Mapper](#) is available whenever you need it.

Contact [Lin Perez](#) with any questions or comments.

Stream Samples Archive

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Access past *Stream Samples* updates on the [newsletter page](#) of our website.

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As we described in our November *Stream Samples* issue, [StreamHiker](#) facilitates watershed analysis at the reach scale. Here we're excited to announce some **new additions** to [ReachMapper](#), the online mapping tool built on the [StreamHiker](#) algorithm.

1. Various topographical, soil, and geological attributes derived and obtained from the USDA/NRCS [SSURGO \(Soil Survey Geographic database\)](#) and other sources have been processed at lateral drainage and upstream drainage scales across the Delaware River Basin. These will be added to ReachMapper as additional attributes on top of landcover, which is currently available.
2. All variables have also been assessed within a 100 meter riparian buffer zone and processed at lateral drainage and upstream drainage scales.
3. Model outputs from [NHDPlus Version 2](#), including average stream flows and velocities, are being extrapolated to StreamHiker reaches and will be made available as additional ReachMapper data attributes.
4. A new functionality has been added to StreamHiker to assess watershed conditions at upstream intervals from a point of interest (and eventually each reach). This will soon be incorporated into ReachMapper.
5. Finally, the environmental attributes aggregated at various scales are being used to develop statistical models of in-stream water temperature throughout the Delaware River Basin. Preliminary results will be available in the coming months.

Project partners may find these new data to be useful in assessing how various environmental conditions affect water quality and in prioritizing sites for restoration and protection.

For more information about ReachMapper, contact [Alex Waldman](#).

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