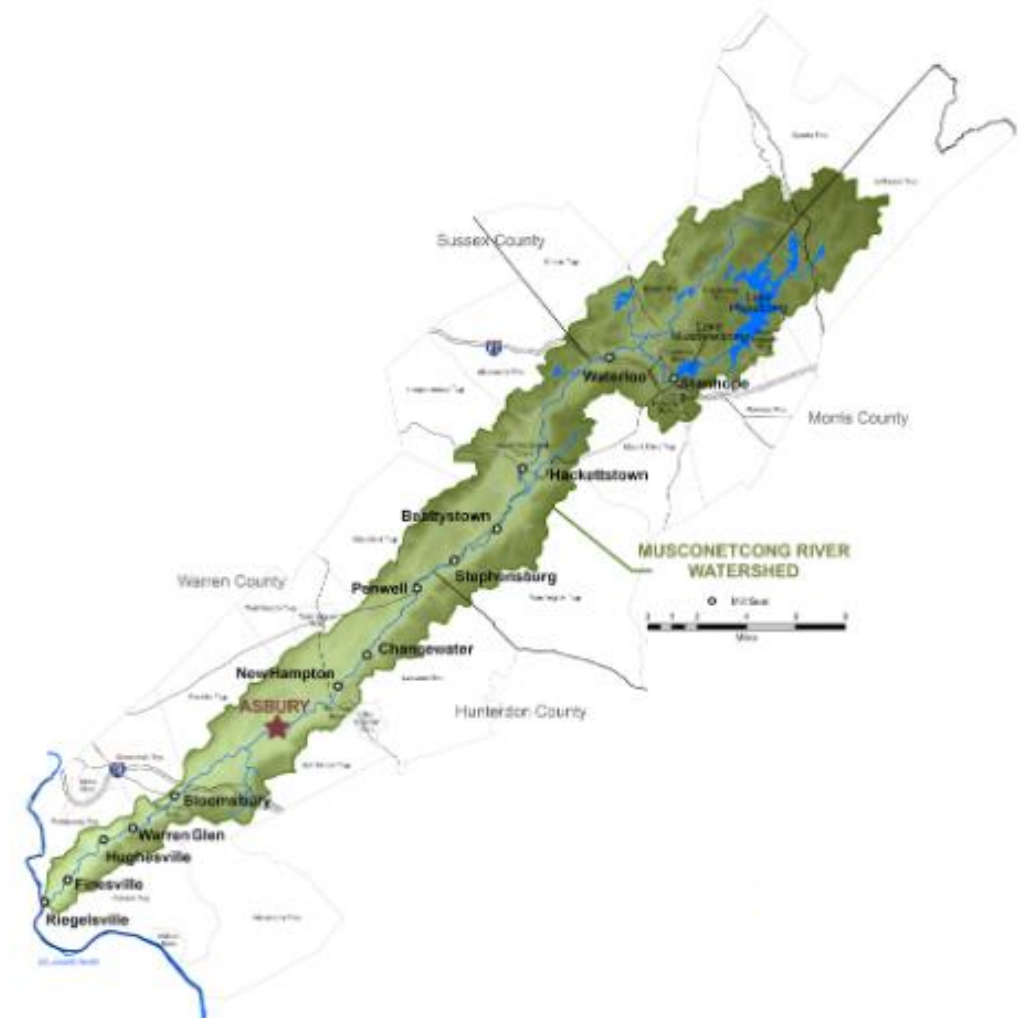


USING ARCGIS STORYMAPS TO DISSEMINATE WATER QUALITY DATA

OUTLINE

- River Watchers and data
- ArcGIS Online
- How to Build an ArcMap
- StoryMap basics
- Elements of a StoryMap (free)
- Data Dashboard (subscription)
- Pulling it all together
- Additional Resources



MWA'S RIVER WATCHERS

- The Musconetcong River is a 42.5-mile-long river, Christa and I can't do it by ourselves!
- In its 18th year of citizen science water quality monitoring.
- They help the MWA monitor for:
 - Macroinvertebrates
 - Road Salts
 - HABs
 - Bacteria (upcoming)

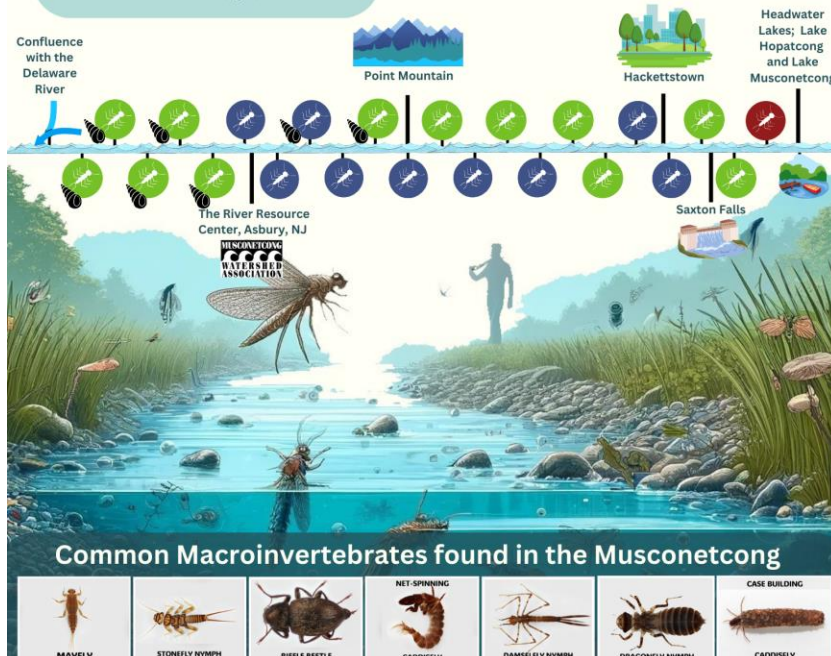


RIVER WATCHERS COLLECT ALL THIS GREAT DATA, NOW WHAT?

MUSCONETCONG AQUATIC INSECT REPORT CARD, SPRING 2024

Macroinvertebrates (riverbed aquatic insects) are crucial indicators of river health because they live their entire lives in the water, react predictably to pollution, and cannot escape environmental stressors. Their consistent presence in specific stream reaches and ease of identification make them valuable for biologists, who have used them for decades to monitor river health. Thus establishing an industry standard within Water Quality Monitoring (USEPA).

The graphic below highlights the macroinvertebrate monitoring sites throughout the Musconetcong River, starting at the confluence (left) all the way up to the headwaters (right).



MUSCONETCONG AQUATIC INSECT REPORT CARD, SPRING 2024

Frequently Asked Questions

• What causes a poor macroinvertebrate score?

There are a variety of factors which could lead to a poor macroinvertebrate score such as pollution, habitat loss, or rising temperatures, to name a few. However, the exact cause of degradation isn't always apparent, thus habitat assessments are also conducted along with macroinvertebrate sampling to try to isolate the cause of a poor score.

• What can be done to improve a macroinvertebrate score?

Habitat restoration is one of the best ways to improve a macro score. Habitat restoration can be in the form of in-stream efforts such as implementation of logs for habitat or riparian restoration to reduce pollution making its way into the stream. Pairing habitat restoration with continued monitoring to track improvements or lack of improvements will ensure that a site is receiving the appropriate treatment.

• How do I volunteer to help the MWA with future macroinvertebrate collections?

By scanning the QR code below, you can sign up to volunteer for the MWA with not only macroinvertebrate monitoring, but a wide array of other volunteering efforts!



Questions or concerns please email Christa (christa@musconetcong.org) or Craig (craig@musconetcong.org)

- 22 macroinvertebrate and habitat assessments.
- Over 100 pre and post storm road salt data points.
- 80+ salt snapshot data points.
- Over 500 HAB data points.



ARCGIS ONLINE

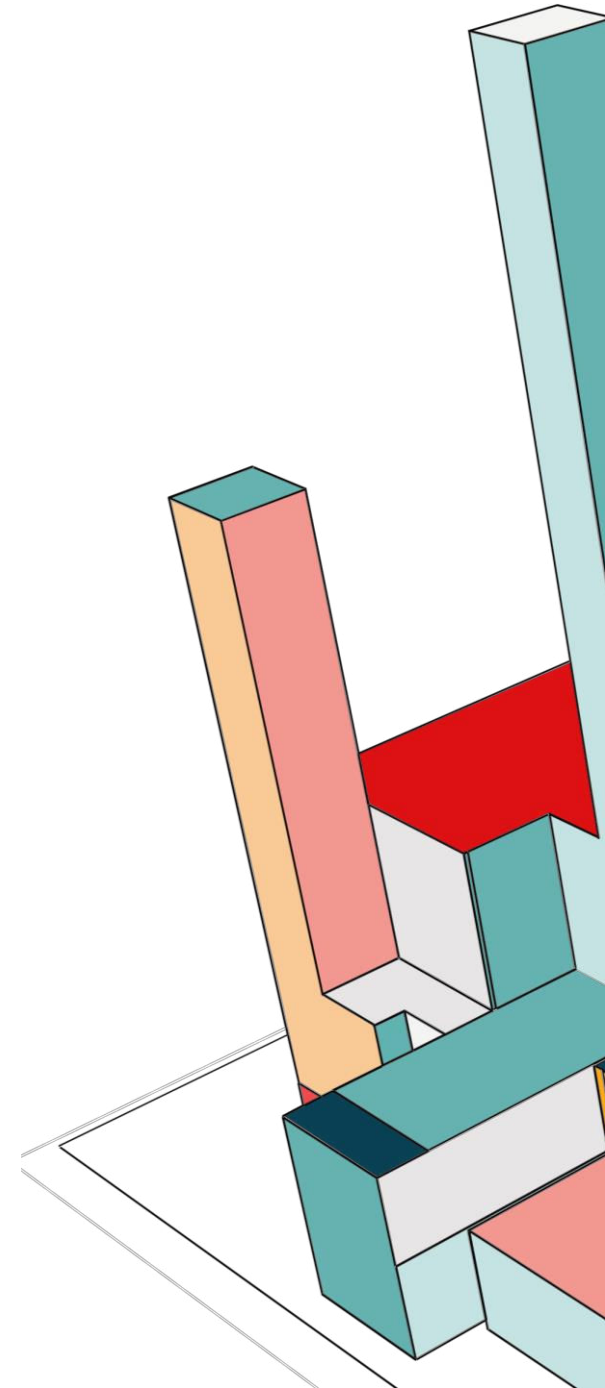


Create a public account

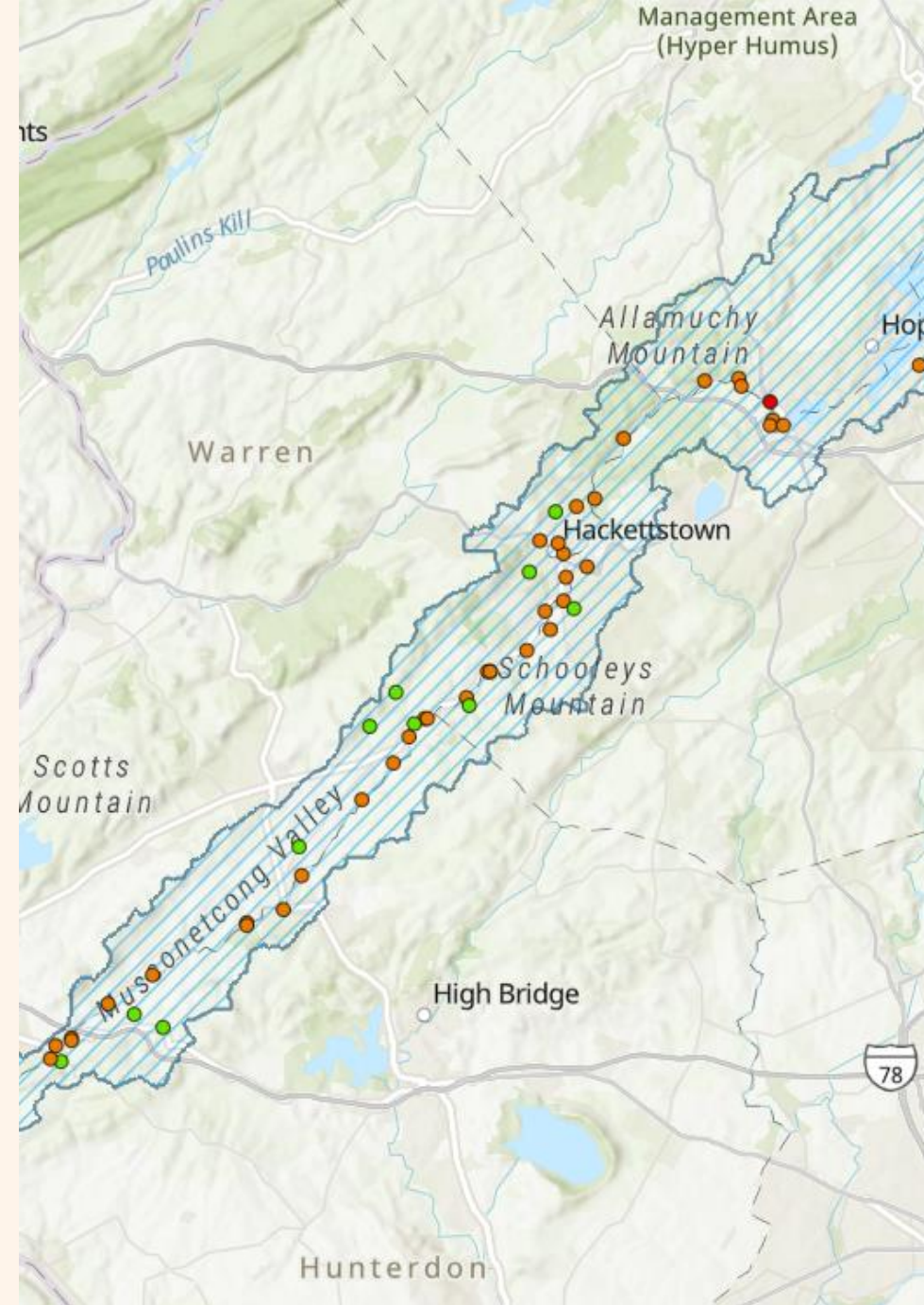
This free, limited-functionality account gives you permanent access to create and share basic maps.

[Create an ArcGIS Public Account →](#)

- Free
- Work with data
- Analyze data
- Share
- Google “ArcGIS online free” > Find and select “Create an ArcGIS Public Account” (Do not select the free trial option, they’ll try to feed that to you, but you can bypass and just create the free online public account)



HOW TO BUILD AN ARCMAP



huc14

Water Withdrawals Categorized by Return Class and Aggregated by HUC 14 Boundaries for New Jersey

Feature Layer

NJDEP Burea... Remove

2020 NJDEP Stormwater 303d List Impairments for New Jersey HUC14s

Class and Aggregated by HUC 14 Boundaries for New Jersey

Feature Layer

Thumbnail

Overview

Summary

This data is designed to support the sharing of water supply planning information with the public and is a component of

Waterbury Rhode Island

Bridgeport

New York

Scranton

Allegheny

Phila

Atlantic City

Use the selector above to switch between layers in the map.

Information

Symbology

Show in map legend

Water Withdrawals Categorized by Return Class and Aggregated by HUC 14 Boundaries for New Jersey - Water Withdrawals Categorized

Open in Map Viewer Classic

Craig Fleming craigflem55

Untitled map

Add layer

ArcGIS Online

huc14

Water Withdrawals Categorized by Return Class and Aggregated by HUC 14 Boundaries for New Jersey

Feature Layer

NJDEP Burea... Remove

2020 NJDEP Stormwater 303d List Impairments for New Jersey HUC14s

Feature Layer

NJ Dept. of Envir... Add

Water Returns Categorized by Return Class and Aggregated by HUC 14 Boundaries for

Scranton

State Game Lands 127

2009 ft

Wallkill River National Wildlife Refuge

Harriman State Park

Delaware National Scenic River

1305 ft

Paterson

Parsippany

Allentown

968 ft

D&R Canal State Park

Edison

State Game Lands 217

512

State Game Lands 315

Water Withdrawals Categoriz...

Filter

Any of the following ar...

Condition

HUC11

is

02040105160

OR

Condition

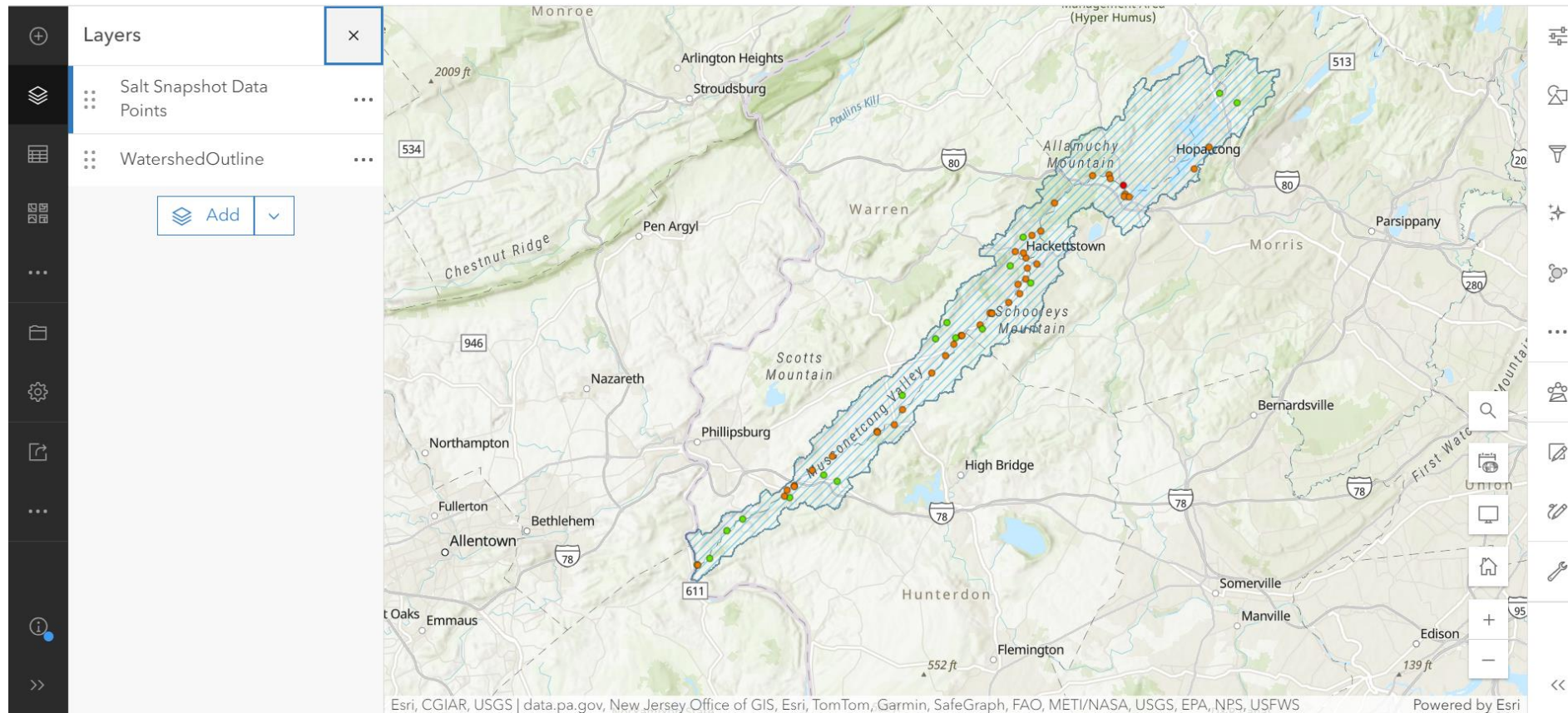
HUC11

is

+ Add new

Save Cancel

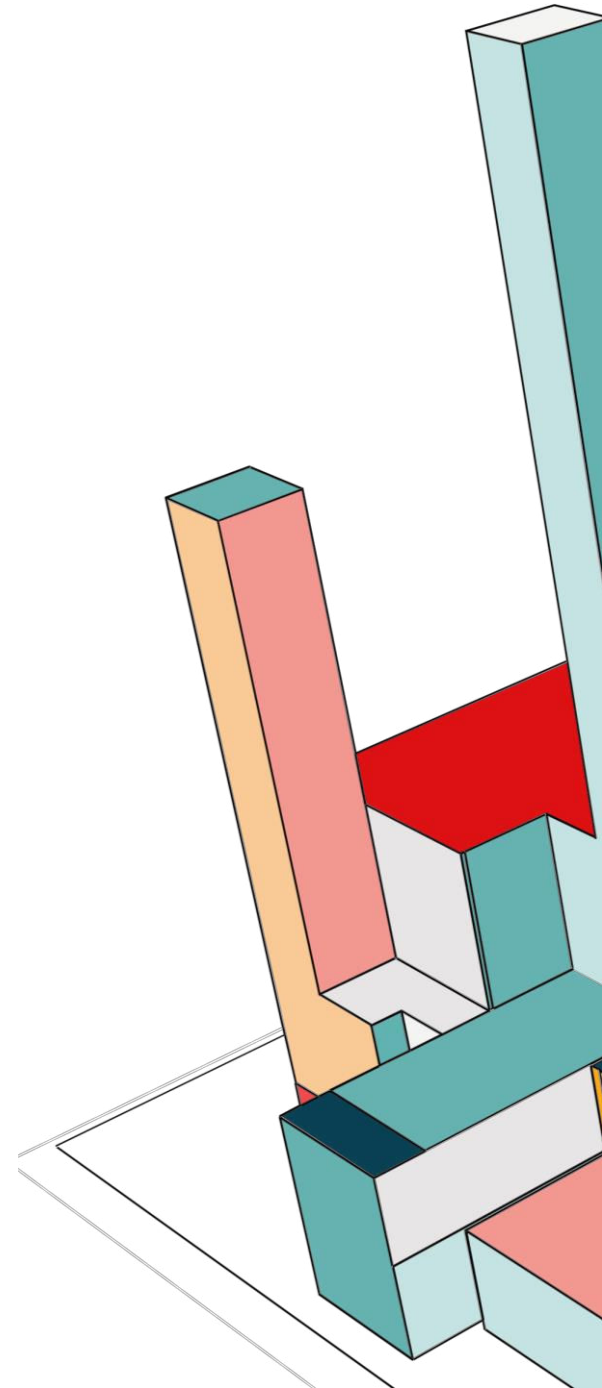
FINISHED MAP



STORYMAP BASICS



- Allows you to present data in a narrative format
 - Clean and precise presentation
- Data can be presented in a variety of different ways, with ArcGIS Online maps being an easily integrated favorite.
- Allows for embedded links and other relevant content
- Can be easily updated and republished

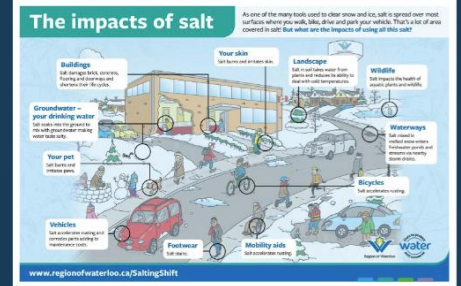


ELEMENTS THAT GO INTO A STORYMAP (FREE)

- Data tables
- Maps (Google)
- Videos
- Social media links
- Organizational links
- Call to action links

Why conductivity and chloride?

You may be asking yourself, what's so bad about road salts? The salt from road salts can contaminate drinking water, kill or endanger wildlife, increase soil erosion, and damage private and public property (USEPA).



Road Salt Monitoring

Road salt roundtable 2022

QUANTAB

Quantab Units	ppm(mg/L) Cr	Quantab Units	%NaCl	ppm(mg/L) Cr	
1.5	0.029	4.5	0.034	295	
1.6	0.035	4.8	0.036	224	
1.8	0.007	42	5.0	0.039	239
1.8	0.008	49	5.2	0.042	257
2.0	0.009	56	5.4	0.045	276
2.2	0.011	64	5.6	0.049	296
2.4	0.012	73	5.8	0.052	318
2.6	0.013	82	6.0	0.056	341
2.8	0.015	91	6.2	0.060	365
3.0	0.017	101	6.4	0.065	391
3.2	0.018	112	6.6	0.069	419
3.4	0.020	123	6.8	0.074	449
3.6	0.022	136	7.0	0.079	482
3.8	0.024	149	7.2	0.085	517
4.0	0.027	161	7.4	0.092	556
4.2	0.029	175	7.6	0.099	599
4.4	0.031	189	7.8	0.107	646

QUANTAB® Test Strip

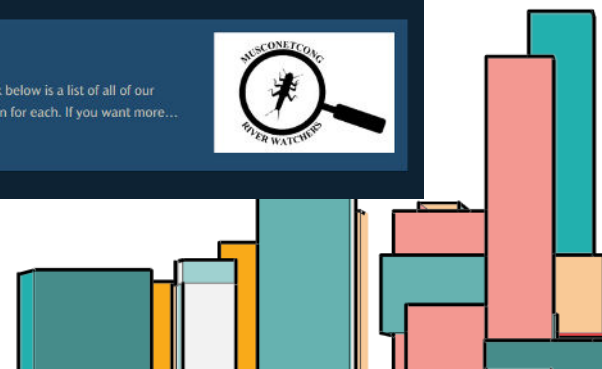
Road salt roundtable 2022

If you're interested in becoming part of the MWA's volunteer monitoring team, follow the link below to join the River Watchers!

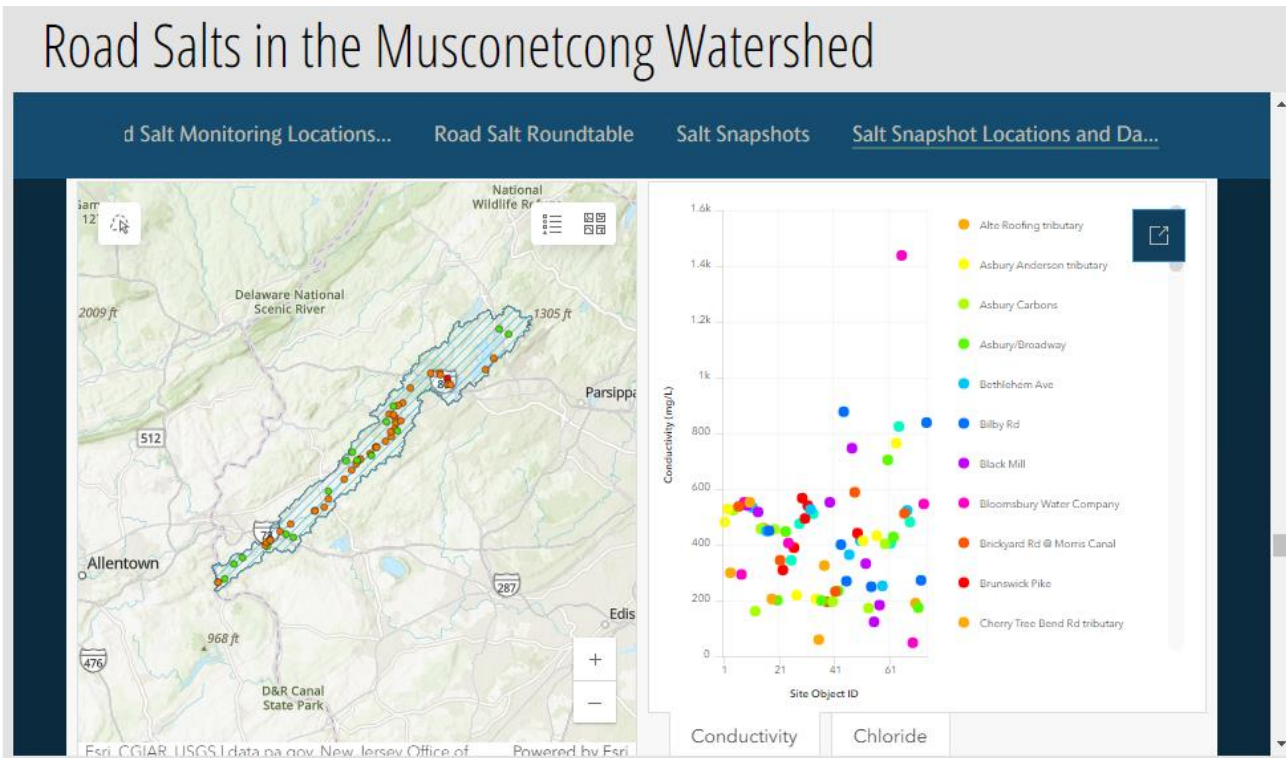
Get Involved | MWA

Volunteering with the MWA is easy. At the link below is a list of all of our volunteer opportunities with a short description for each. If you want more...

<https://www.musconetcong.org>



DATA DASHBOARD (SUBSCRIPTION REQUIRED)



- Thank you to previous presenter, Anna Willig from Willistown Conservation Trust, for showing me how to put together a data dashboard.
- Was able to reorganize data to be much more interactive and digestible.
- Subscription also allows you to add:
 - Audio
 - Embed
 - Timeline
 - Image gallery



PULLING EVERYTHING TOGETHER

- Before creating your StoryMap it is a good idea of first understanding the message that you are trying to send along with who will be viewing the StoryMap.
- This helps you cater the presentation to the audience to further increase the value of the StoryMap.

INFOGRAPHIC 2-PAGER

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STORYMAP

In the winter of 2021, the Musconetcong Watershed Association began working to reduce salt pollution in the watershed. By reaching out to the NJ Watershed Watch Network to gather the necessary supplies, and recruiting the River Watchers as a way to collect data, the MWA sparked a series of monitoring efforts to isolate and identify the impacts road salts are having on the region's ecosystems. The initial effort encompassed pre-storm and post-storm sampling of conductivity and chloride.

Conductivity is an industry standard measurement for water quality monitoring, so the MWA has continuous monitoring stations that report out conductivity every 5 or 10 minutes. Chloride is the main ingredient in the majority of road salts used (sodium chloride (NaCl), magnesium chloride (MgCl₂), and calcium chloride (CaCl₂)). The term salt is used to describe the mix of chemicals within the road salts mentioned above. Salt carries a negative ionic charge which is what conductivity measures and thus the relationship between the two can be identified.

How may we asking yourself, what's so bad about road salts? The salt from road salts can contaminate drinking water, kill or endanger wildlife, increase soil erosion, and damage private and public property (USEPA).

Since their inception, the road salt monitoring teams, led by volunteer team leaders, have collected well over 200 conductivity and chloride data points. These data are not only utilized within the MWA, but also shared with NJ Watershed Watch so that change can occur at the local level as well as regionally.

A year later in 2022, after the second year of road salt monitoring, the MWA put together a round table discussion to begin the conversation on the use, monitoring, management and successes of sustainable winter road salt use. Guest speakers included Phil Boston from WTA Adirons, Erin Street from the Watershed Institute, Debbie Kratzer from NIDEP, Alison Madison from WI Salt Wise and the MWA's very own Water Quality Program Coordinator, Christa Reeves.

The year 2022 was the one that the MWA began a complementary monitoring effort to the road salt monitoring: salt snapshots. Stony Brook Research Center pioneered the salt snapshot methodology, which the MWA adopted as a way to identify the river's chloride and conductivity levels at base flow conditions. The reason for this is twofold: it allows us to determine aquatic life's salt exposure for the majority of time in streams and, second, isolate the influence winter road salt application has on the ecosystem by identifying areas which may be contributing or preventing salt contamination.

This year's long venture began at one of the larger urban centers within the watershed, Hackettstown. In this region, we were able to spread the word about the impacts of road salt and the upcoming snapshot series to draw up interest and involvement! We also asked volunteers to bring in tap water samples so we could start to identify salt intrusion in to groundwater - an important analysis especially considering the human health impact chronic exposure to elevated salt can have for those with heart conditions.

Next we moved a little further south in the watershed and sampled the Mansfield region. This region is home to a number of large contributing tributaries to the Musconetcong River, making it a

critically important region. One of those tributaries, Hences Brook, has been a focus area for other elevated water quality parameters, so being able to characterize the extent of impairment is crucial in understanding how to move forward with best management practices.

Following the trend of moving down the watershed, the next salt snapshot was held in the Asbury/Hampton region. This region can be considered the heart of the Musconetcong Watershed, as it's home to the MWA's offices as well as to some of the most significant groundwater-fed tributaries! Protecting groundwater-fed tributaries is critical because, as summers get warmer, cold water fish, such as trout look to them as a refuge from increasing water temperatures.

Next up in the series, was the furthest south in the watershed, the Bloombury to Confluence region. This region is important because we were able to characterize the water quality right before it exits the Musconetcong and enters the Delaware! Despite this region being dominated by agricultural land use, rather than urban development, pollutants such as road salts can make their way downstream and influence regions which might otherwise be minimally impacted.

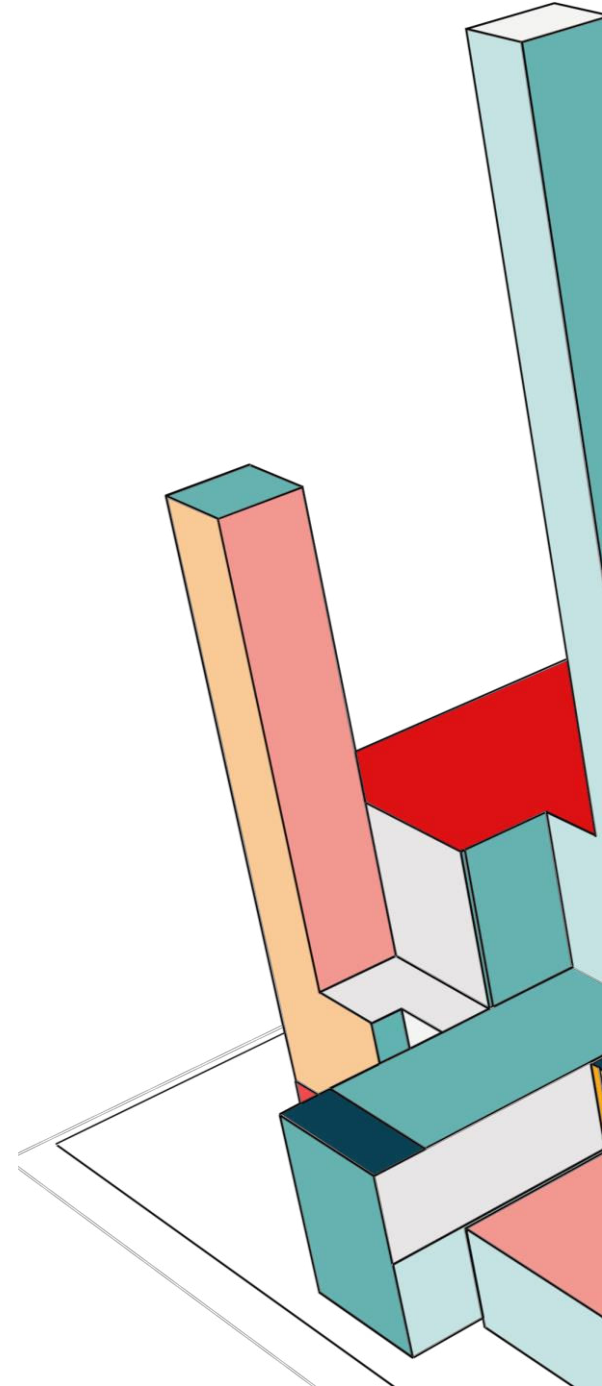
Last but not least, we wrapped up our salt snapshot series with the northern most region, the Byram/Stanhope/Upper Watershed region. For this region, we partnered with Lake Hopatcong Foundation and had guest volunteers from the Foodshed Alliance to successfully depict baseline salt levels of our headwater streams, lakes and tributaries in a similar vein to the importance of characterizing water as it leaves the watershed, understanding the water that feeds into the watershed can help the MWA trace any issues to the source before they move downstream and cause any potential negative effects throughout the whole watershed.

Five snapshots and over 80 data points later, the MWA was able to take the data and visualize it with a map to allow us as well as stakeholders to easily identify points of concern for either preservation or restoration.

Now, the MWA is working on capturing its third year of road salt pre- and post- storm data to finally create regional rating curves which will allow us to utilize our continuous monitoring stations and make future road salt monitoring more accessible.

Not only will creating regional rating curves help make road salt monitoring more accessible, it will provide us with concrete data to present to stakeholders and other invested partners on how to best manage road salt applications so that those invested partners can thrive alongside the environment!

Food for thought: When the snow, sleet, or rain, wash road salts into waterbodies, it is important to understand that salt isn't the only pollutant making its way into the river; other harmful chemicals such as salt from old cars or the debris are also being delivered to the river system. These harsh chemicals, as important as they are, are not as accessible when it comes to monitoring, so community-based monitoring efforts are starting to approach these pollutants through road salt monitoring, with the goal in mind to one day be able to monitor any and all pollutants making their way into a river!



PULLING IT ALL TOGETHER PT.2



You can host your Storymap on an organization website and direct people to it.

By linking in all the pertinent resources, people can navigate through and find any materials they may need: ex. Municipal Outreach template.

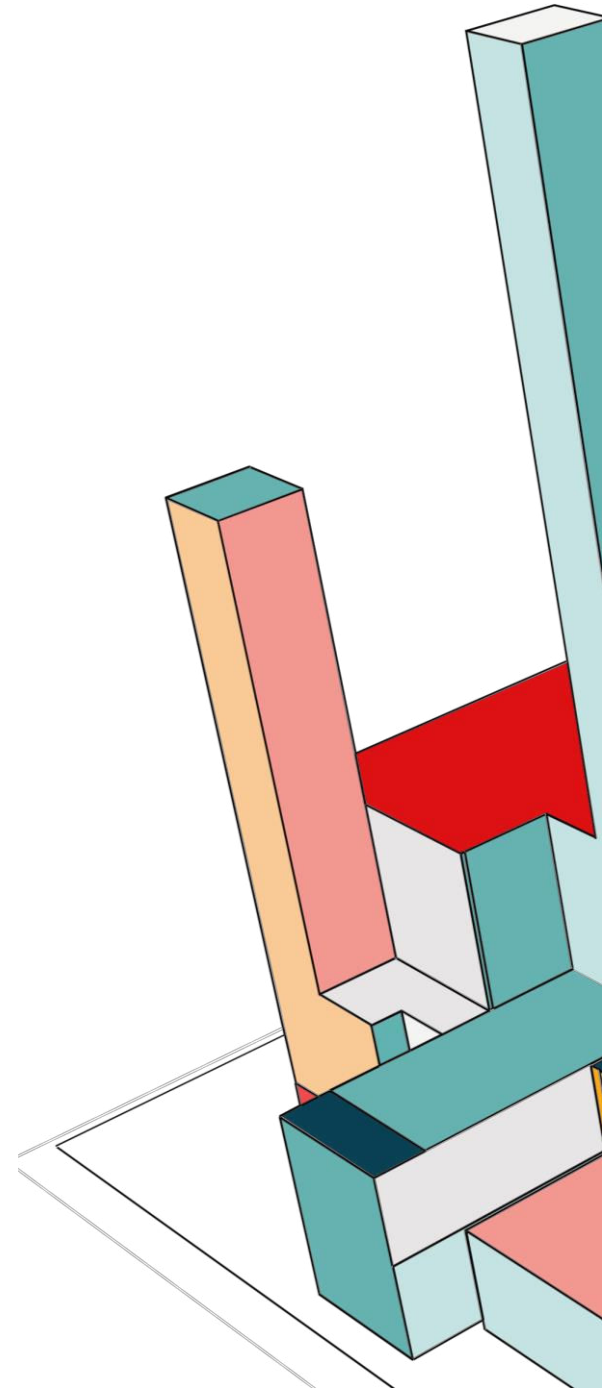
Has view count info so you can see how engage viewers are.

Google Form for viewer feedback.

Because the format is similar across all Storymaps, once people familiarize themselves with the layout, future Storymaps will only become more easily navigable.

ADDITIONAL RESOURCES

- [StoryMap walkthrough](#)
- [StoryMap Tutorial](#)
- [ArcGIS Online Tutorial](#)
- [ArcGIS Fundamentals](#)
- Youtube



THANK YOU

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