

COMMUNICATING TEMPERATURE MONITORING ON THE MUSCONETCONG RIVER

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MUSCONETCONG WATERSHED ASSOCIATION



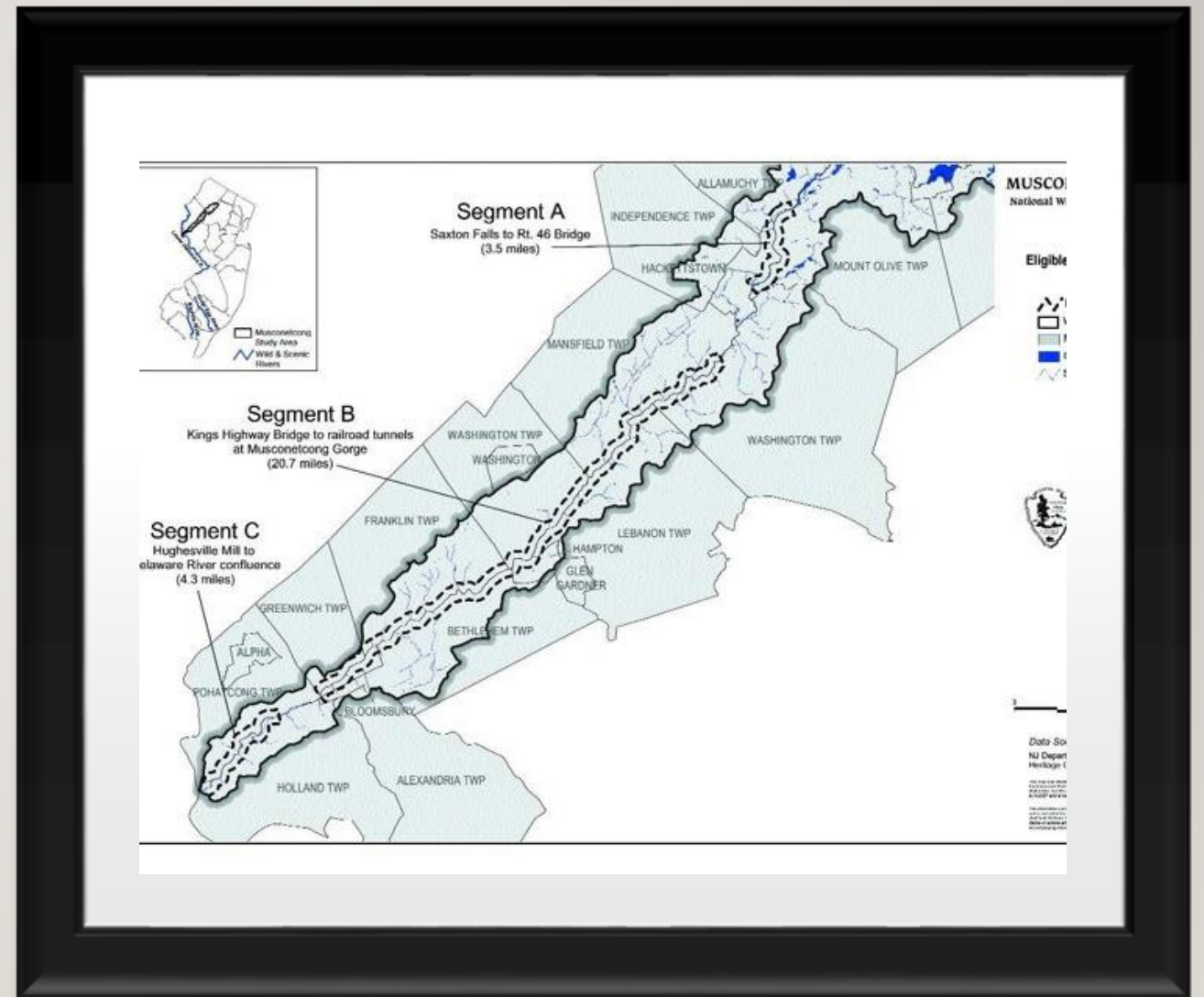
OUR MISSION

- The Musconetcong Watershed Association (MWA) is an independent, non-profit organization dedicated to protecting and improving the quality of the Musconetcong River and its Watershed, including its natural and cultural resources.
- This is accomplished through
 - Advocacy, Protection & Protection
 - Education and Outreach
 - Recreation
 - Restoration
 - Water Quality Monitoring



A LITTLE BACKGROUND...

- Formed in 1992
- River Resource Center built in 2009
- 42 miles from headwaters to Riegelsville boat launch
- Wild & Scenic designation 2006, less than 1% of rivers
- Partnership river
 - MRMC, Musconetcong River Management Council
 - Managed by bringing together State, county, and community managers



WATER QUALITY MONITORING

- Nutrients
- TSS/turbidity
- Conductivity/Chloride
- Macroinvertebrates
- Habitat
- Bacteria, *E.coli*- Microbial source tracking
- Harmful algal blooms (HABs)
- Fish – electroshocking and eDNA
- TEMPERATURE



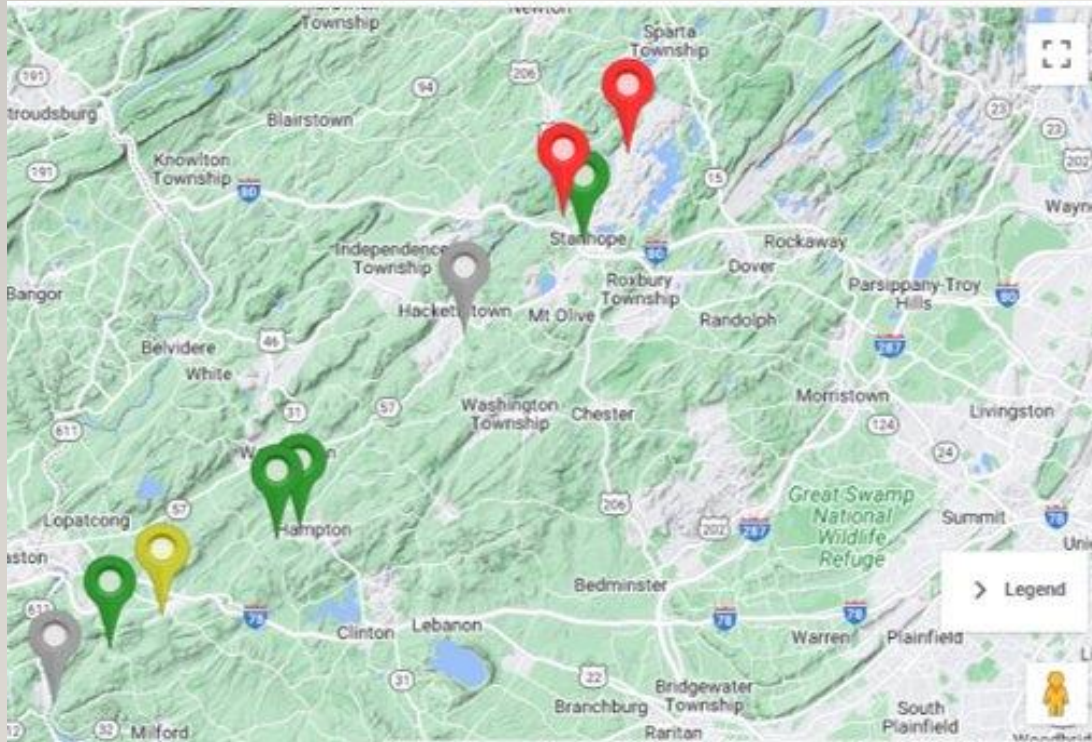
TEMPERATURE

- Tracking restoration efforts
- Pre-Post dam removal monitoring
- Identifying ground water sources for protection/restoration
- Monitoring outlet of headwater lakes





MONITORING STATIONS



- 4 main stem, 1 victim of vandalism
- 2 more set for install on main stem
- 3 Tributary sites

DAM REMOVALS

- Hughesville dam, 15ft dam removed
Summer of 2016
- EnviroDIY station installed after removal
50' above impoundment
- Previous temperature and depth data
from HOBO level loggers



RESTORATION AFTER REMOVAL

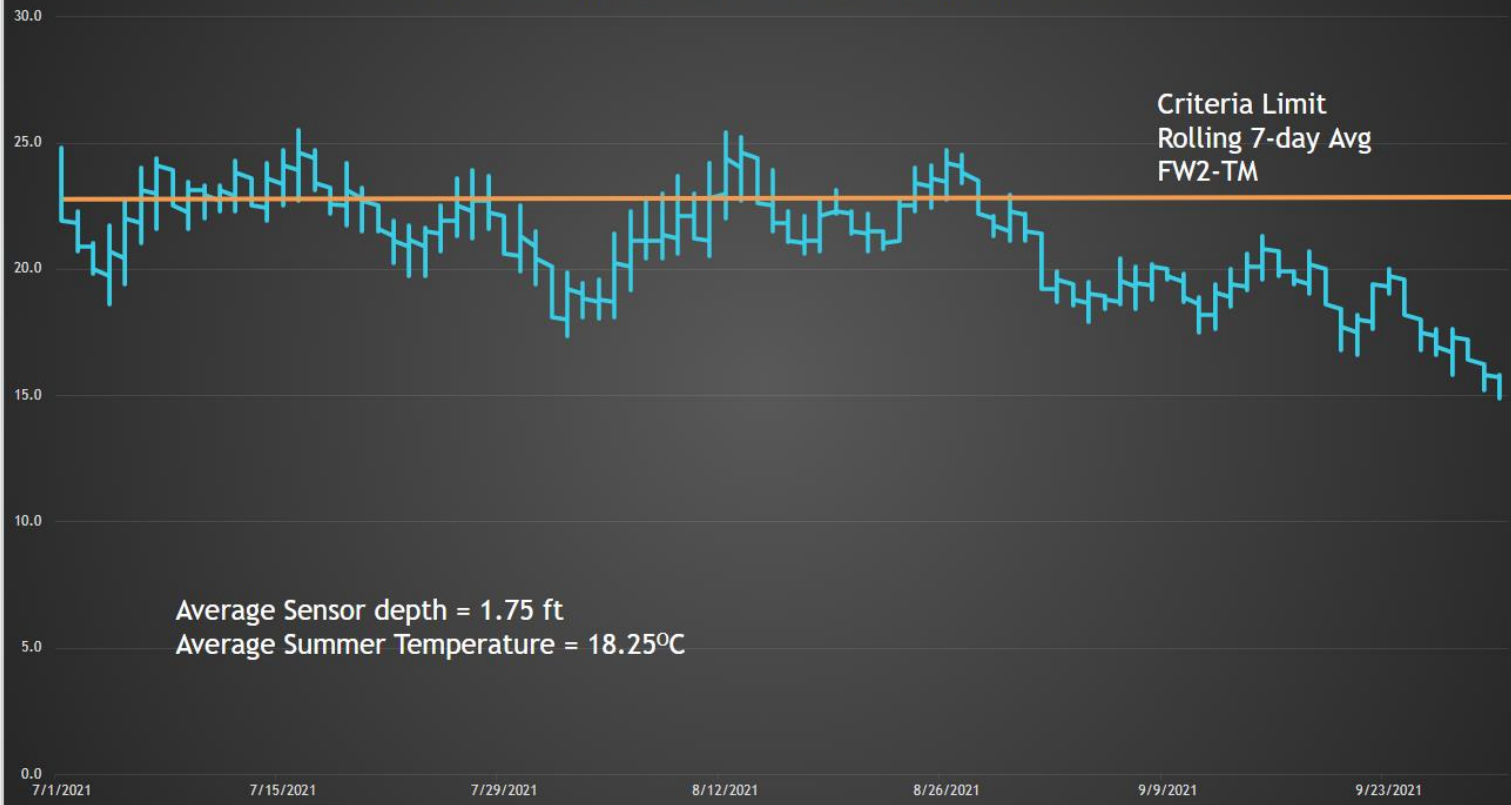


WATER TEMPERATURE STANDARDS SET BY TROUT BIOLOGICAL THRESHOLDS

- Trout Production (FWW-TP)
 - "Temperatures shall not exceed a daily maximum of 22 degrees Celsius or rolling seven-day average of the daily maximum of 19 degrees Celsius, unless due to natural conditions"
- Trout Maintenance (FWW-TM)
 - "Temperatures shall not exceed a daily maximum of 25 degrees Celsius or rolling seven-day average of the daily maximum of 23 degrees Celsius, unless due to natural conditions"



2021 Water Temperature, Hughesville dam removal site



SUMMER AVERAGE, WITH DEPTH AND CRITERIA LIMIT

- Even though the average is below the criteria limit, there are long periods of time that trout are in potentially lethal temperatures

Prior to dam removal, summer averages were 1.4 degC higher and the average depth was 3ft deeper

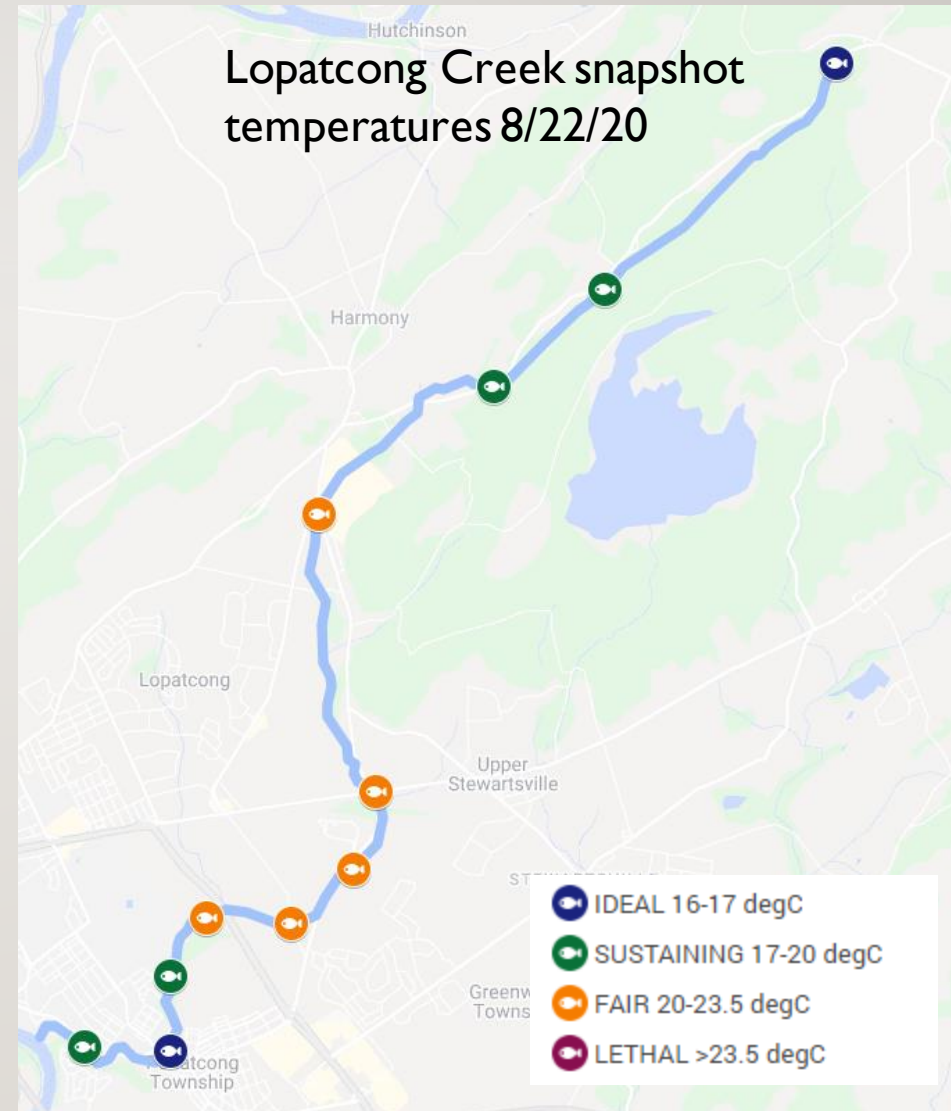
TROUT UNLIMITED SUPPLEMENTAL TEMPERATURE PROJECT

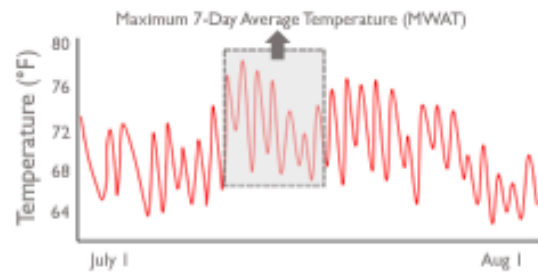
- Snapshot of water temperatures across the entire watershed in a 1-hour window, 2-3pm
- July and August
- Volunteer can hit 3-4 sites
- Tributaries and main stem
- Calibrated thermometers
- Measured in middle of water column, not in direct sun or eddy



CREATING A DATA PRODUCT

- Know your audience
- Define your thresholds
 - Ideal 16-17 degC
 - OK 17-20 degC
 - Fair 20-23.5 degC
 - Poor/Lethal >23.5 degC
- Define the issue
- Offer solutions





Wild trout populations are unlikely to survive where the stream's maximum 7-day average temperature exceeds 74°F*

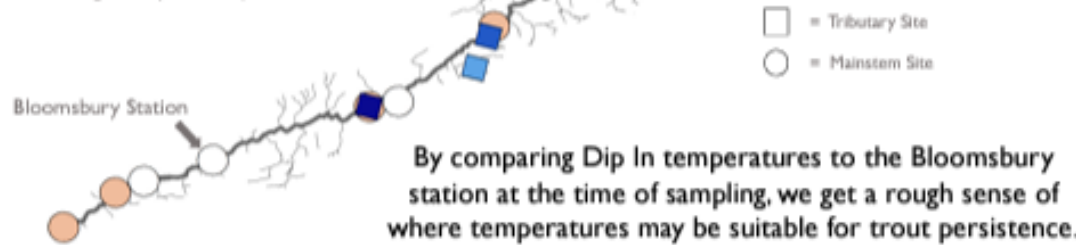


*Wahvi et al. 2007. Field-based Estimates of Thermal Tolerance Limits for Trout Incorporating Exposure Time and Temperature Fluctuation. Transactions of the American Fisheries Society 136: 365-374.

At our continuous monitoring stations, the Musconetcong has been too hot for wild trout at [Stanhope](#) (MWAT = 81.5°F) but marginally acceptable at [Bloomsbury](#) (MWAT = 73.2°F)

8/1/2020 Dip In temperature:

- = warmer than Bloomsbury (probable high MWAT and low trout persistence)
- = similar to Bloomsbury (probable moderate MWAT and moderate trout persistence)
- = cooler than Bloomsbury (probable low MWAT and high trout persistence)



Trout populations *can* persist where MWAT is high *if* they have access to coldwater refuges like:

Tributaries



Groundwater-influenced areas
(e.g. deep pools or bank seeps)



We can increase coldwater areas and trout access to them by:

Monitoring to find thermally (un)suitable habitat (more Dip Ins!)

Removing barriers to fish movement

Improving/removing thermally impactful infrastructure

Protecting groundwater resources through policy and restoration

FIRST DRAFT OF COMMUNICATION PRODUCT

- Appropriate for education and people on the inside of the environmental world
- Uses lingo and data

SECOND RUN FOR A MORE GENERAL AUDIENCE

- Decreased amount of data and lingo
- Gives guidance

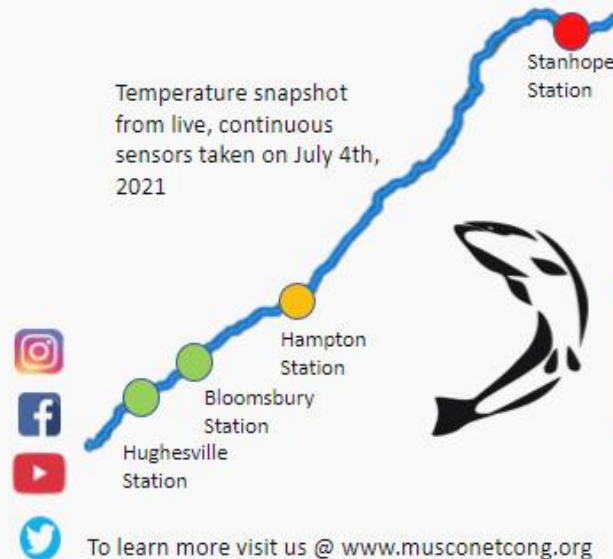
Helping our trout stay out of **HOT** water



- ❖ *Keep them wet and use a net!*
- ❖ *Measure the water temperature or visit monitormywatershed.org for real-time data*

The Musconetcong River

Temperature snapshot
from live, continuous
sensors taken on July 4th,
2021



Catch and release
best practice

16-17 degC
Ideal for fishing
Actively feeding

17-20 degC
OK for fishing
Keep them wet

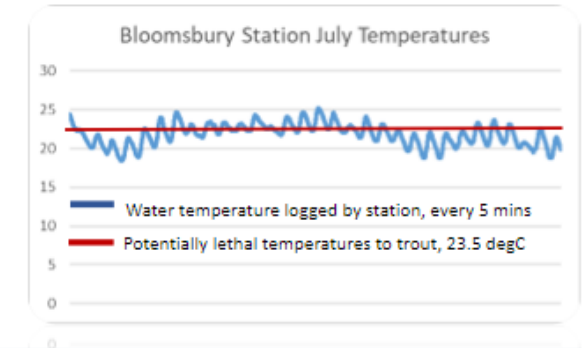
20-23.5 degC
Fish stressed
Growth ceases

>23.5 degC
Avoid fishing
Potentially lethal

EnviroDIY monitoring stations

- ❖ Measure water temperature and other water quality indicators every 5 minutes
- ❖ Data is online, live and free
- ❖ Available in many rivers in the Delaware River Basin

Temperatures can be critical to trout in summer months



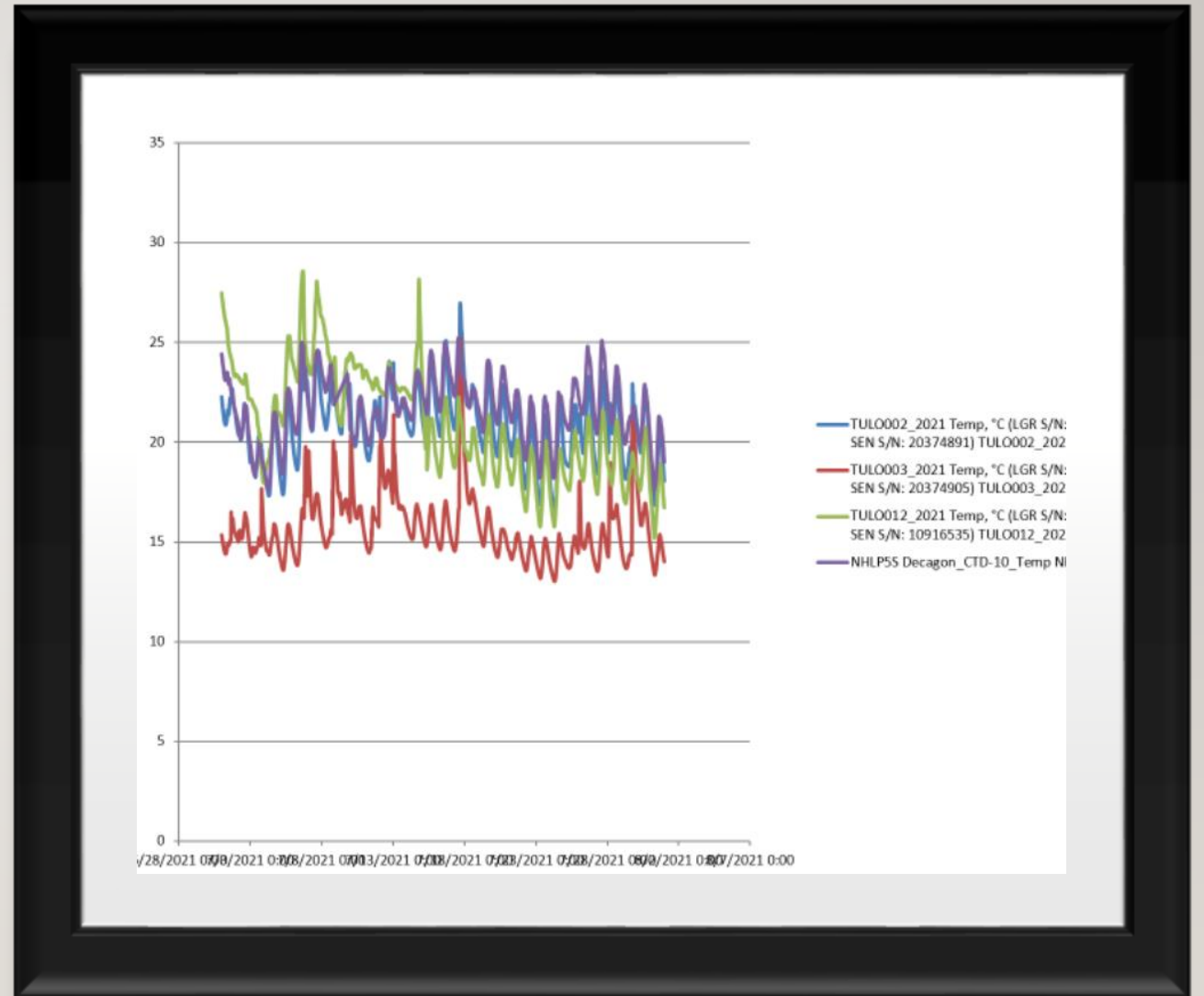
How can you help?

- ❖ Know before you go, visit monitormywatershed.org for real-time temperatures
- ❖ Support habitat and river restoration projects
- ❖ **Climate change** will continue to have negative impacts on our trout streams, but you can help minimize this by volunteering your time and money to support stream restorations with organizations shown here



EDIT AND OBTAIN FEEDBACK

- Have others look and ask questions
 - Colleagues
 - Friends outside of the environmental field
 - Local EC members
- You have been staring at that data and understand it, do others?



RESOURCES AND PROGRAMS

- River Network- how to format data in Excel for optimal use and then layout using Canva
- https://drive.google.com/file/d/1oxEA_fY3tFD8yiYrv2y5wiTTIRKXbi9J/view?usp=sharing
- Canva
- PowerPoint- some versions have "Designer" function
- Google maps
- ArcGIS- free online accounts
- Clipartmax.com - free clipart, unlimited downloads