

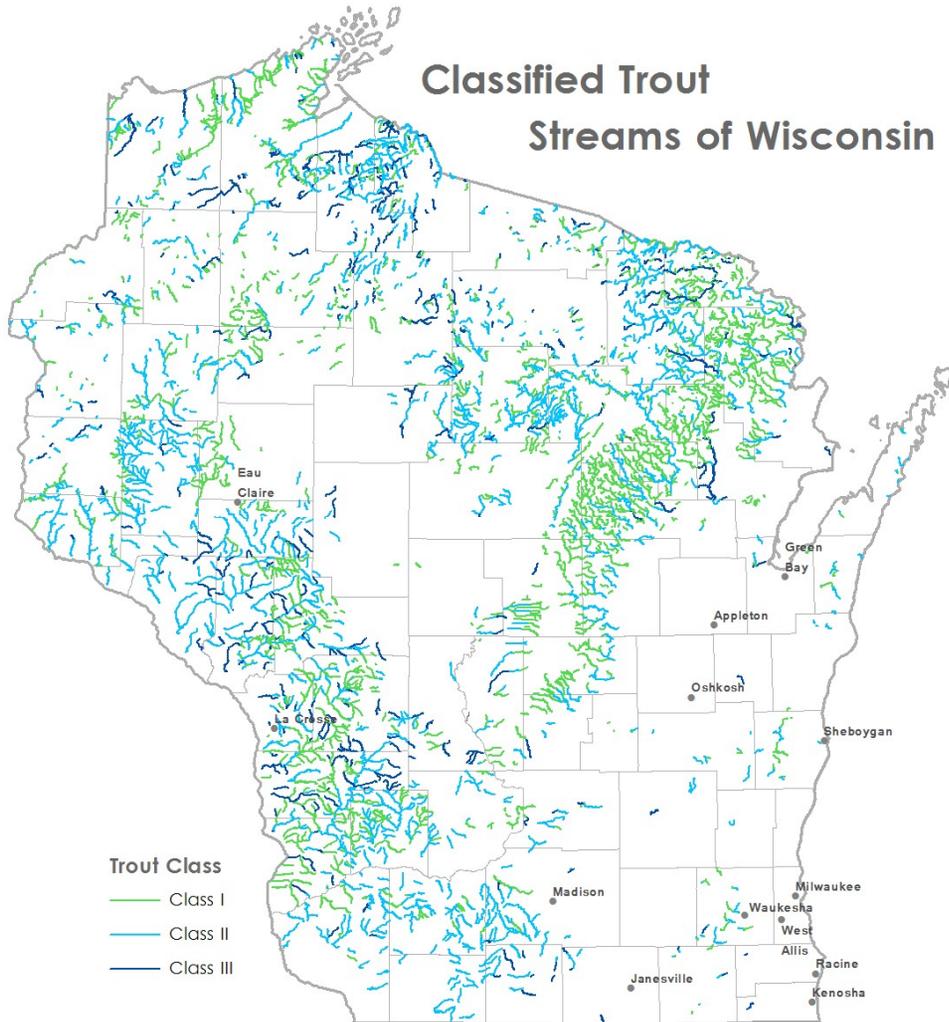


# **Coldwater trout streams in Wisconsin** loss, recovery, and building resilience to adapt to climate change



Matthew Mitro · WDNR, OAS, Madison

## Classified Trout Streams of Wisconsin

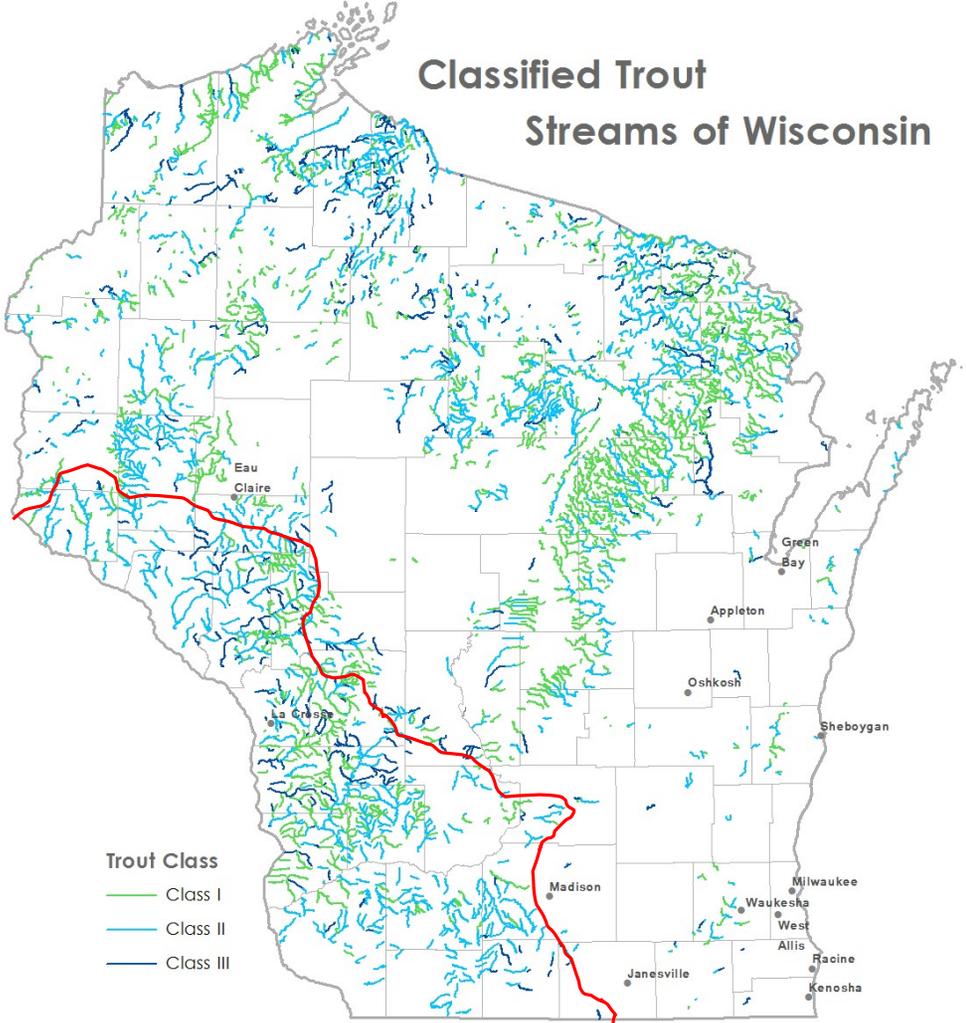


**Class I**  
5,290 miles  
40%

**Class II**  
6,130 miles  
46%

**Class III**  
1,820 miles  
14%

# Classified Trout Streams of Wisconsin

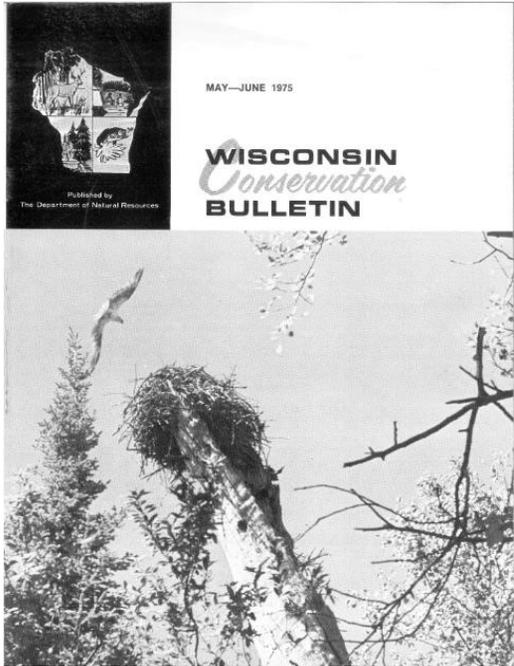


Trout Class  
— Class I  
— Class II  
— Class III

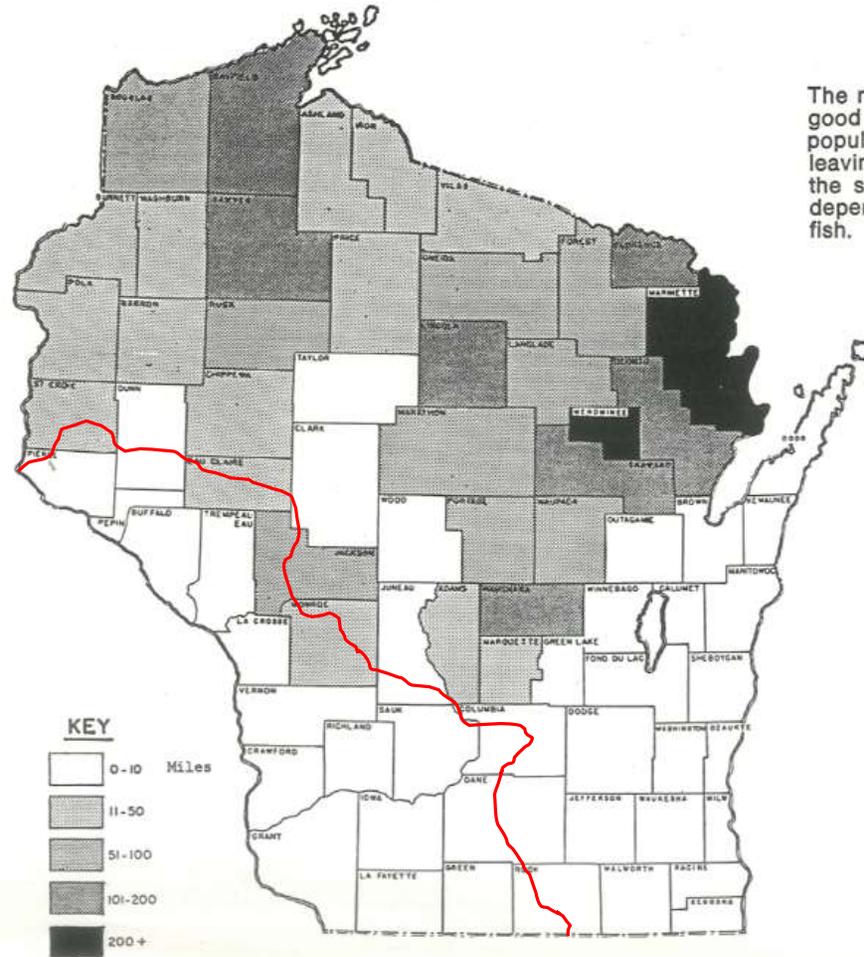
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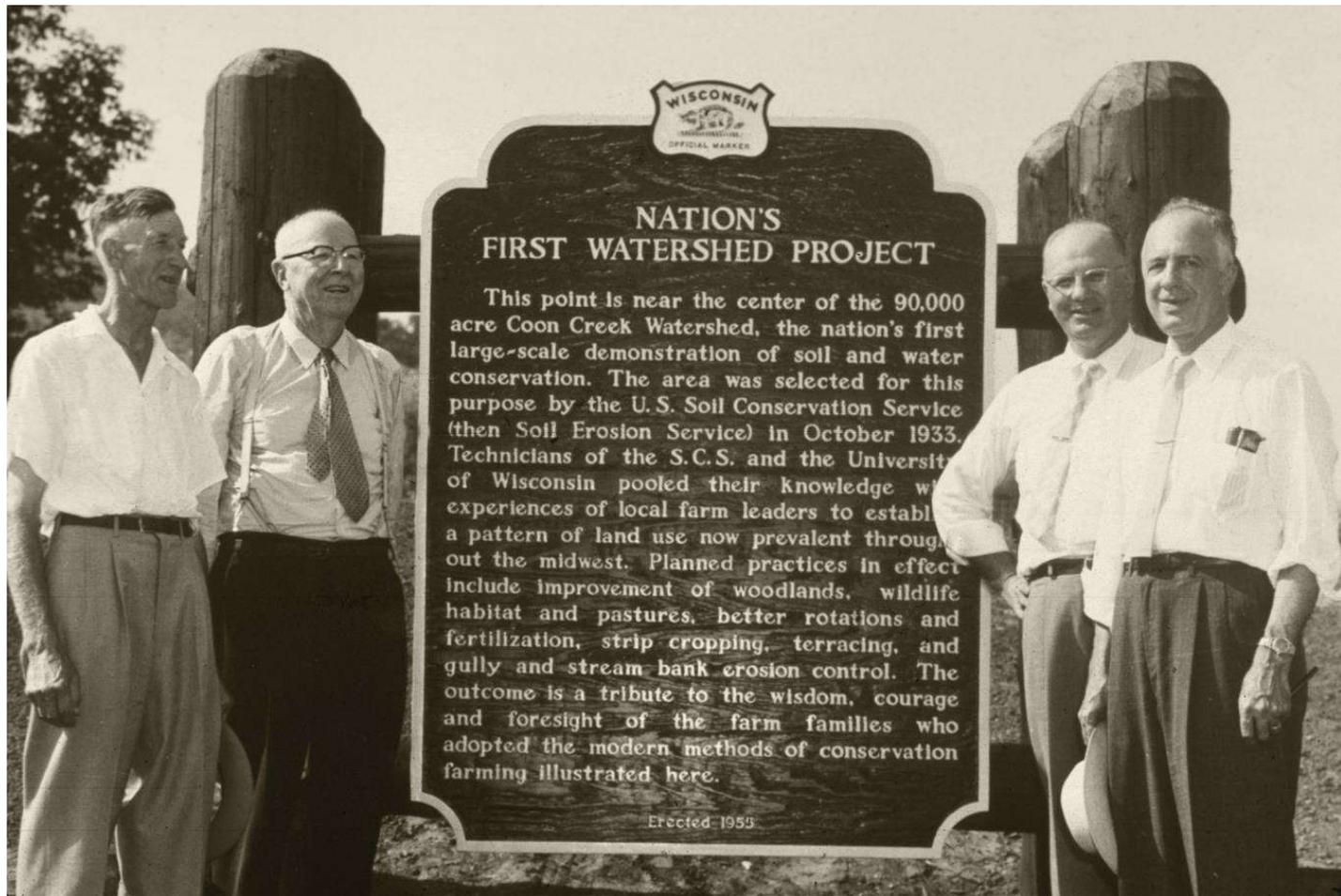
**Class III**  
1,820 miles  
14%



1975



The miles of stream with good natural trout populations are localized leaving large sections of the state heavily dependent upon stocked fish.



**1970**

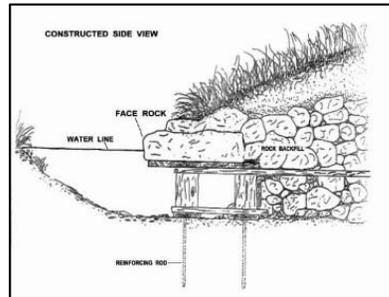
**Driftless Area step increase in baseflow**

Increased precipitation + agricultural conservation practices  
(Juckem et al., 2008, Journal of Hydrology 355:123-130)

**1980s**

**Stream habitat development**

LUNKERS; reconnecting stream to floodplain



**1985**

**Farm Bill**

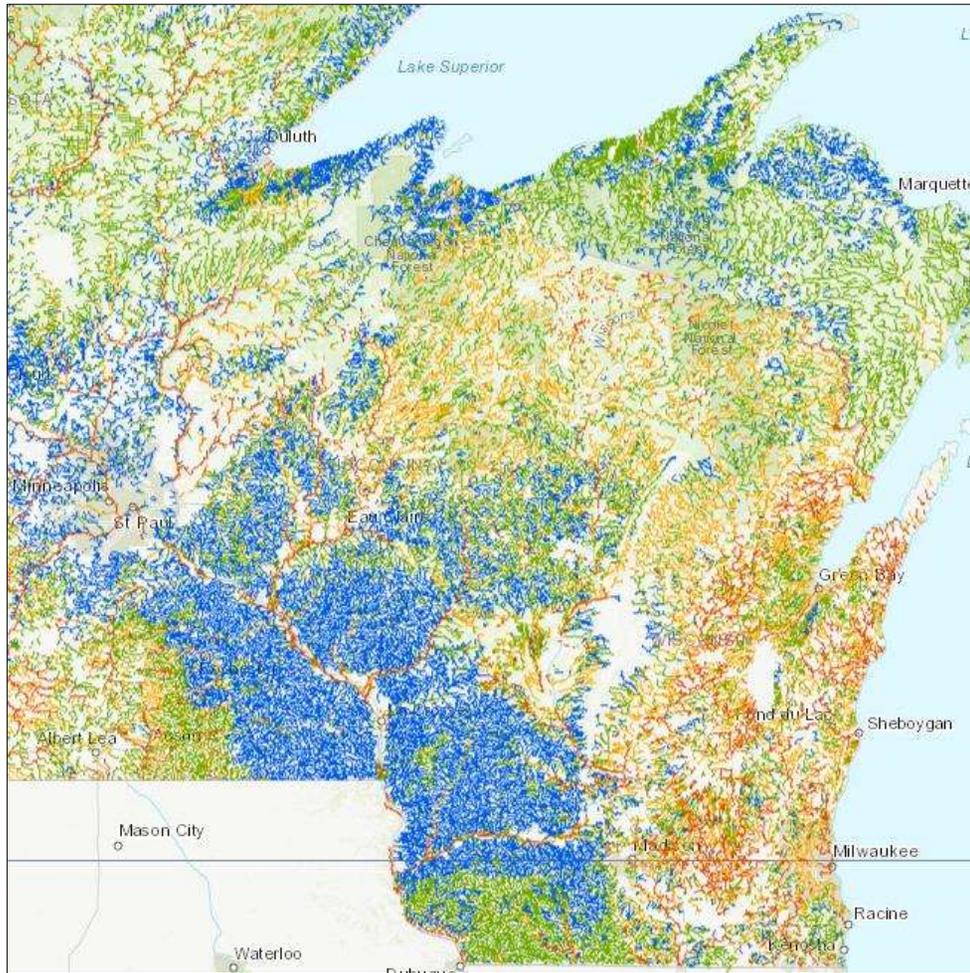
Cross compliance; CRP

**1995**

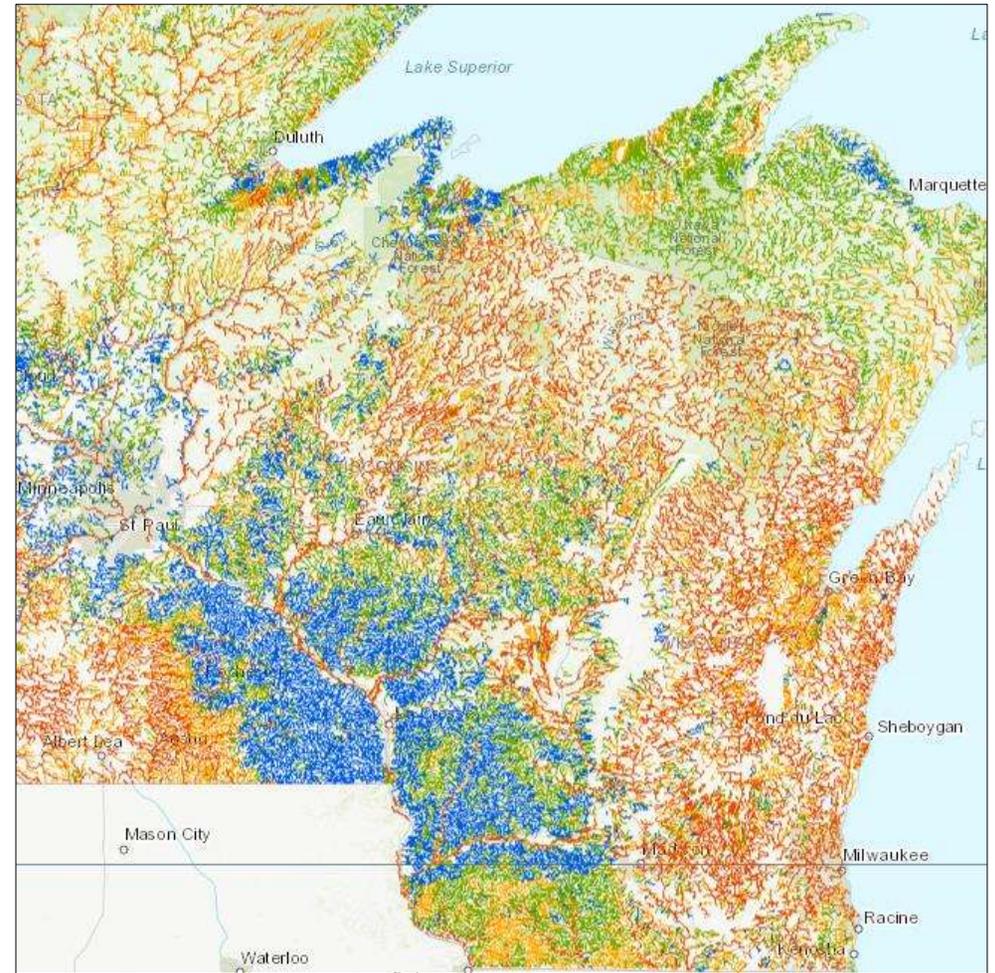
**Wild trout stocking program**

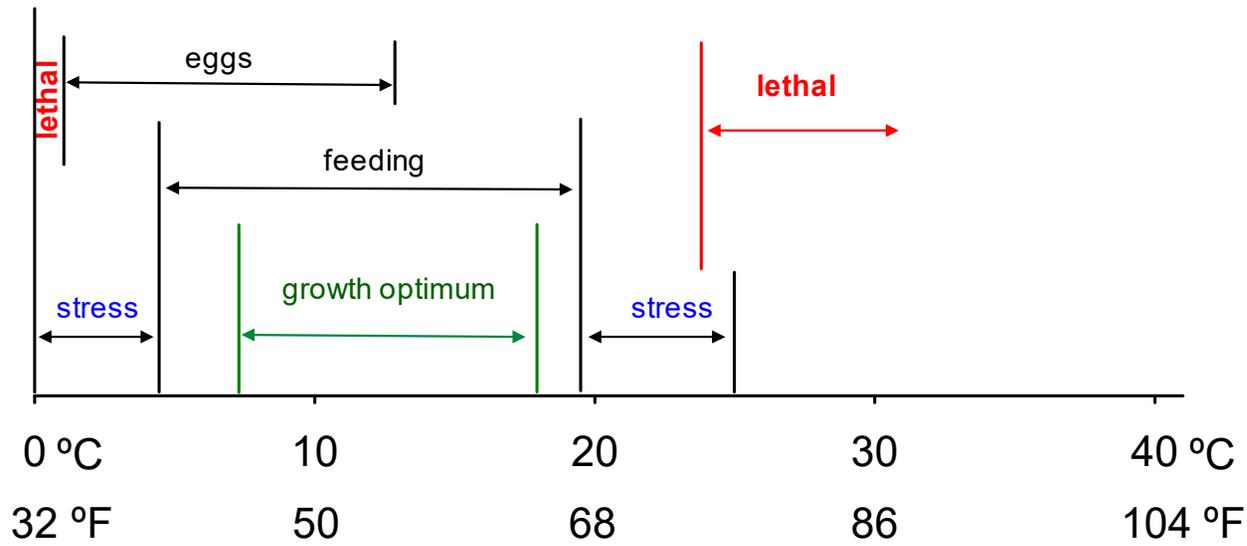
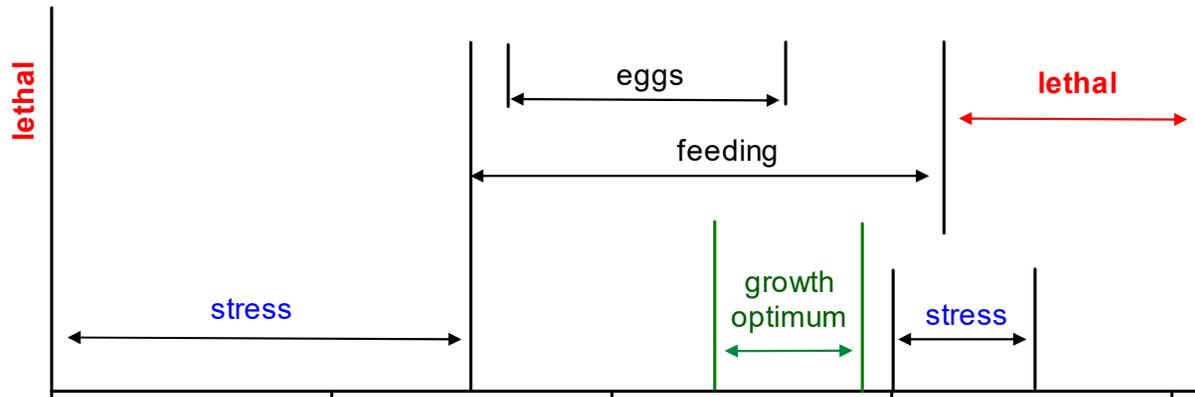


# Late-20<sup>th</sup> century



# Mid-21<sup>st</sup> century

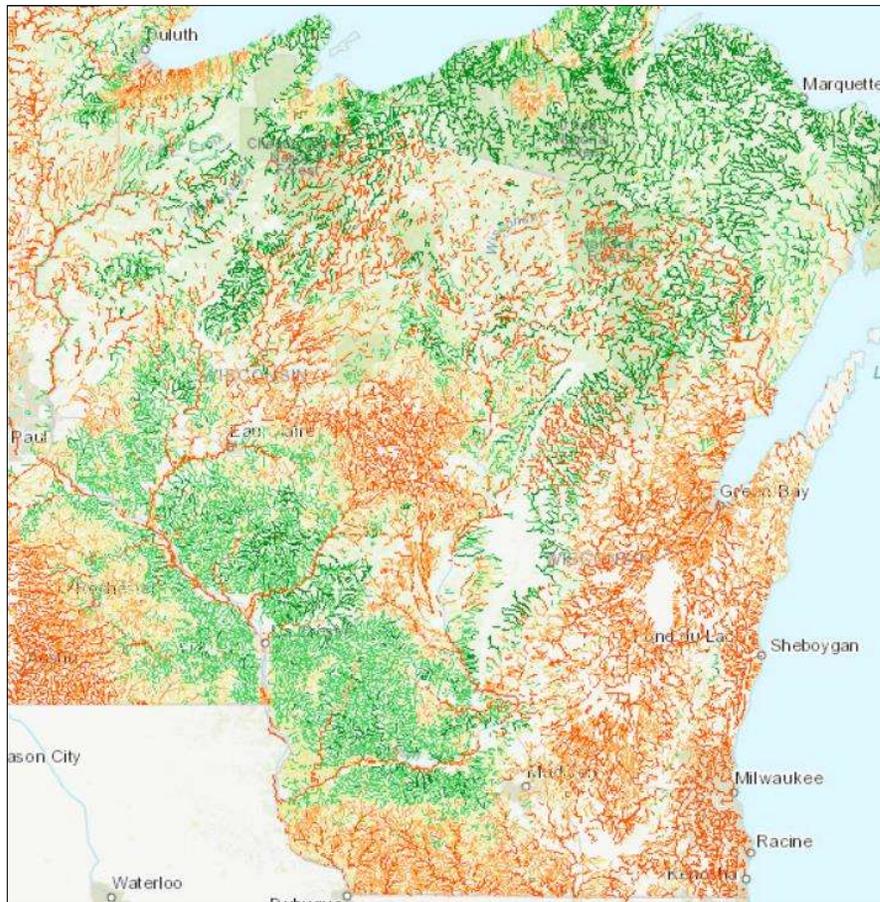




Temperature

J. M. Elliott, 1994

# BROOK TROUT Probability of Occurrence



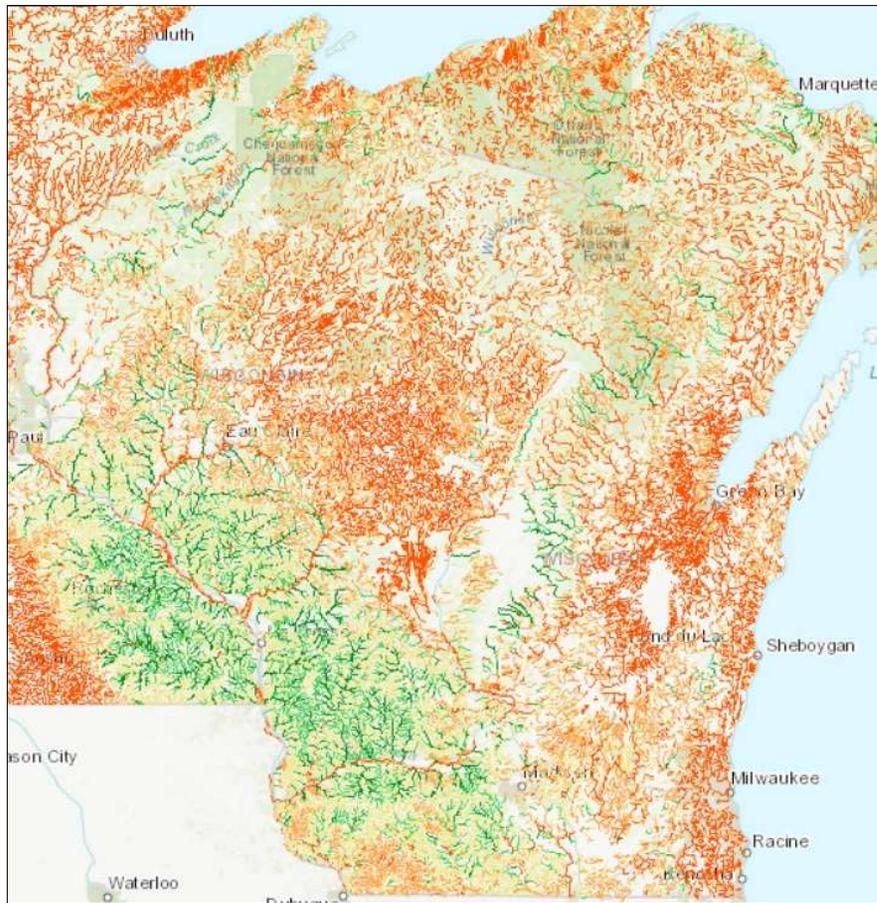
Late-20<sup>th</sup> century 21,300 mi present



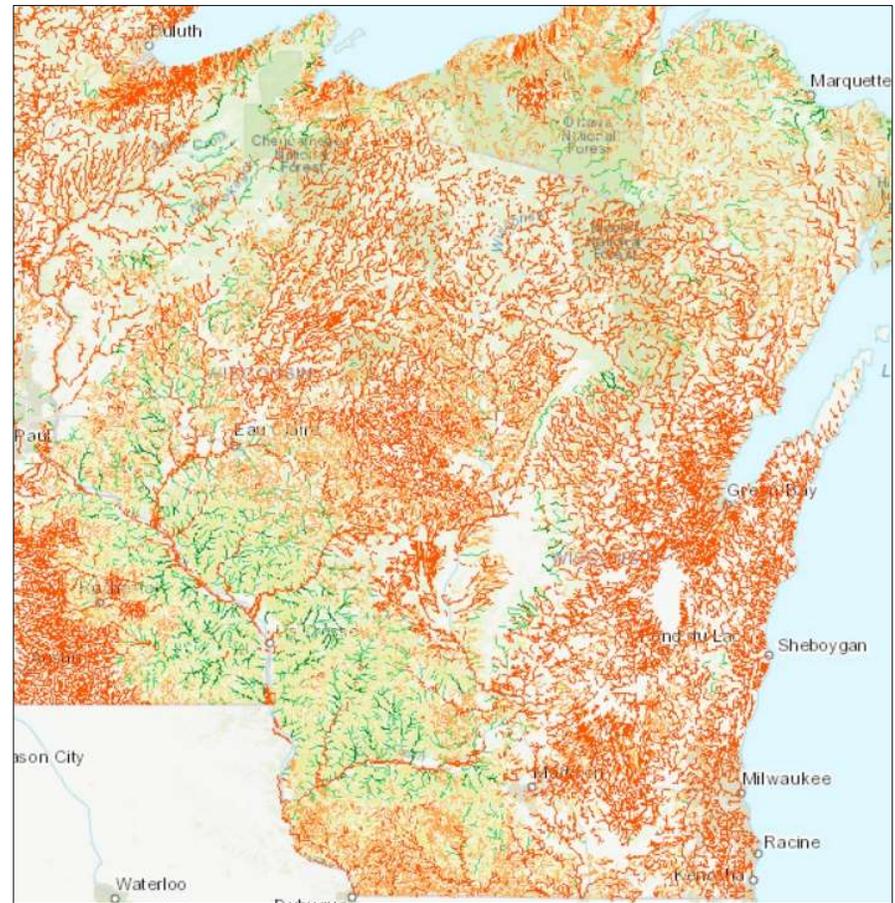
Mid-21<sup>st</sup> century 6,800 mi present **68% loss**



# BROWN TROUT Probability of Occurrence



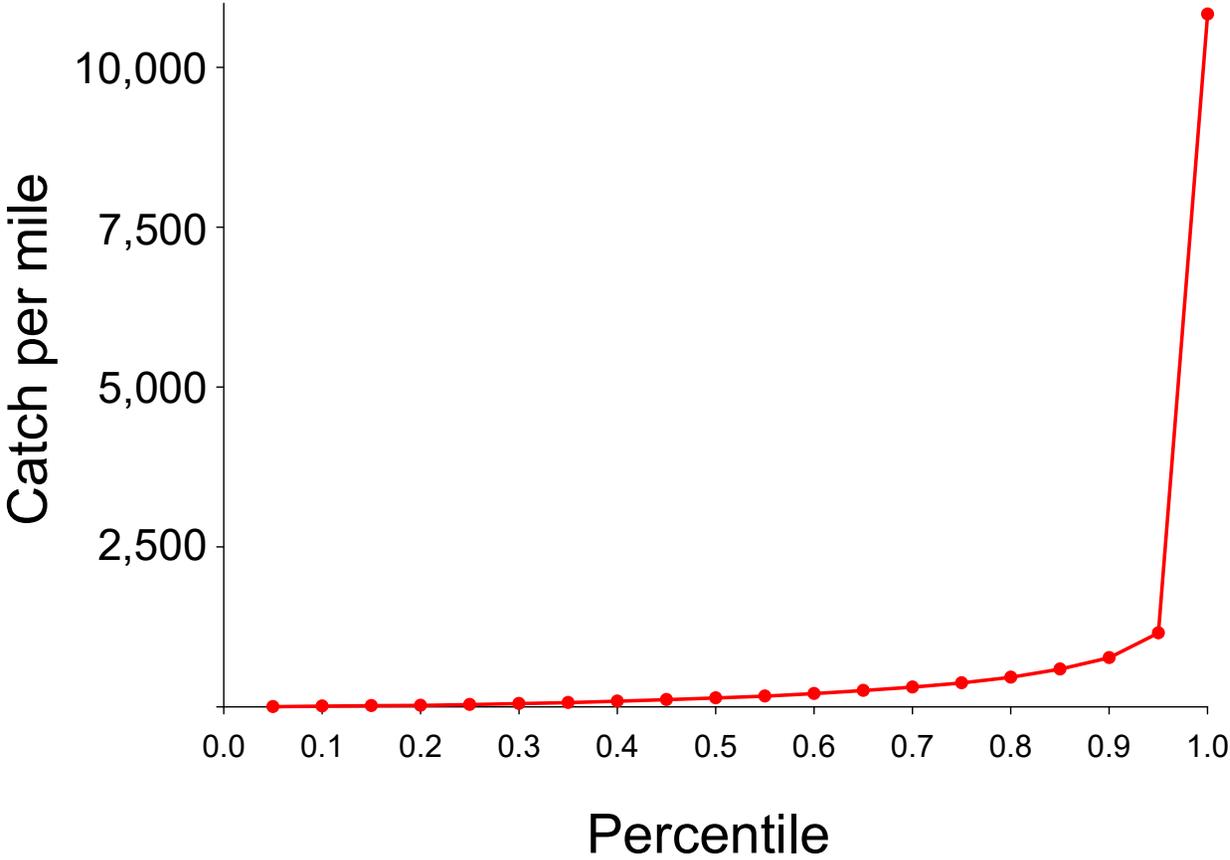
Late-20<sup>th</sup> century 12,400 mi present



Mid-21<sup>st</sup> century 8,500 mi present **32% loss**

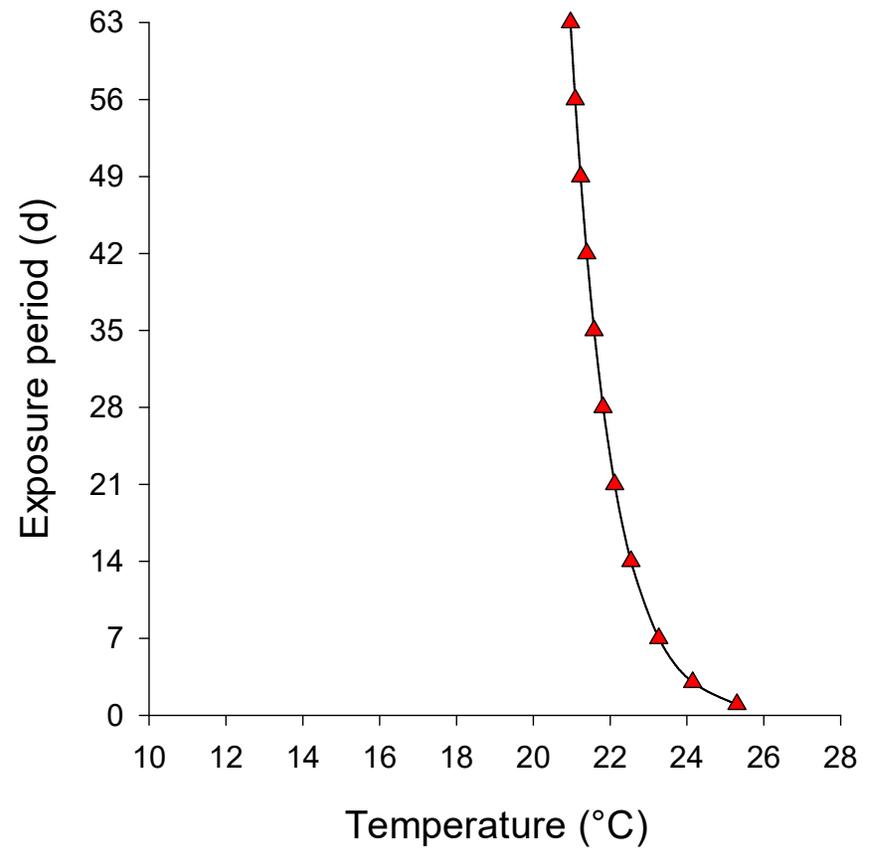
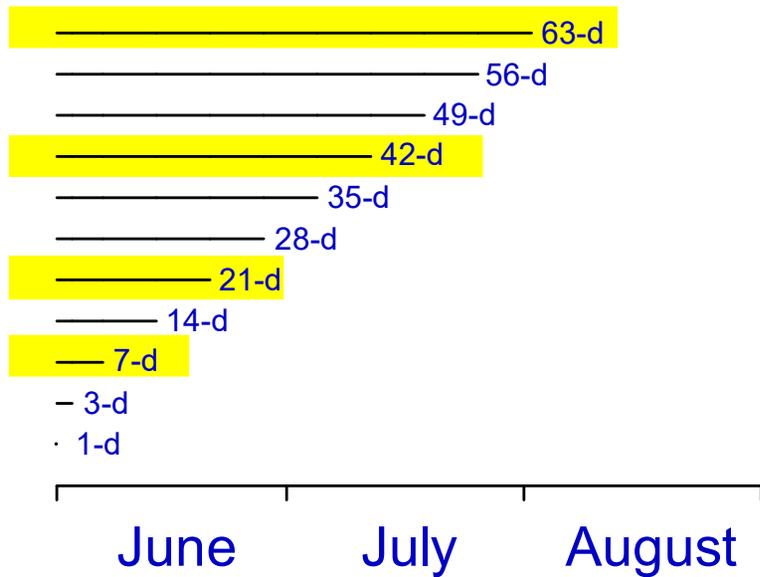


Trout  $\geq 6$ ", statewide 2007-2014



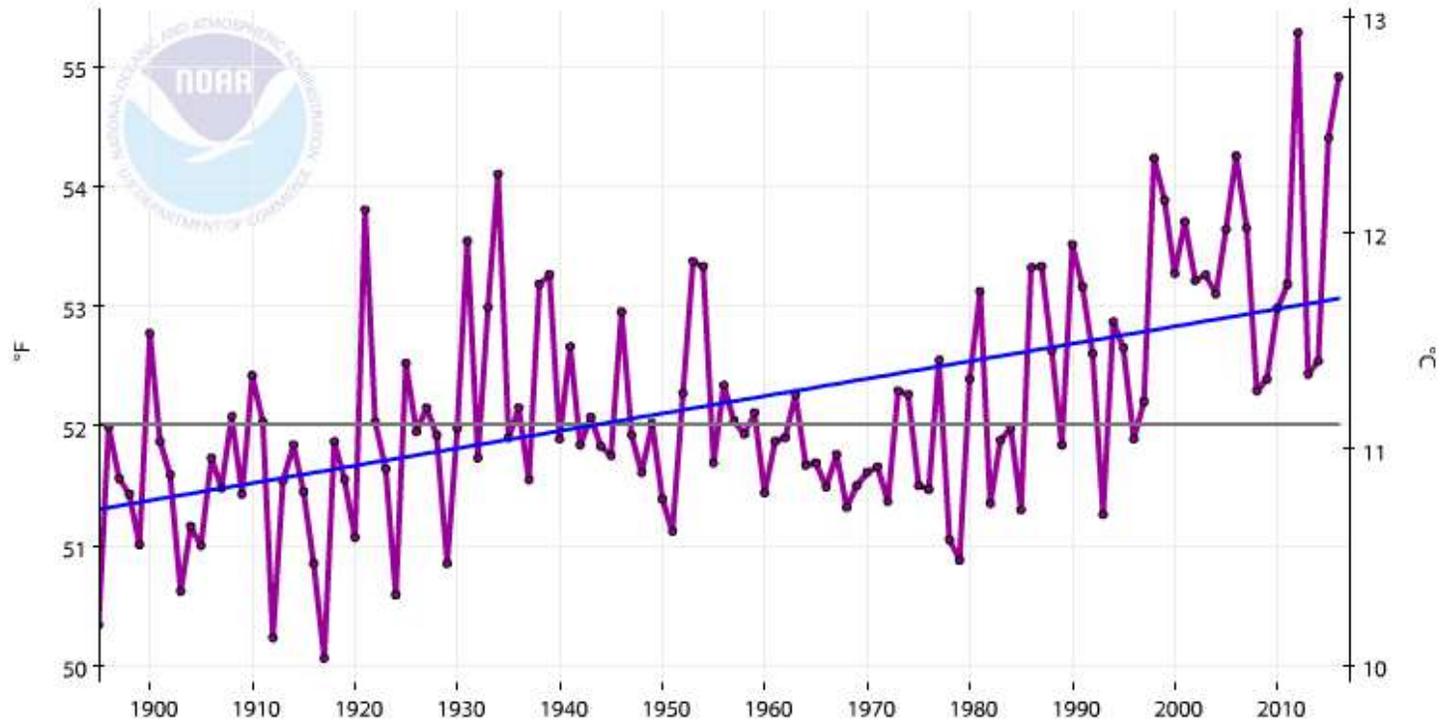
# Trout Thermal Tolerance Limits

Maximum  $n$ -day mean temperature



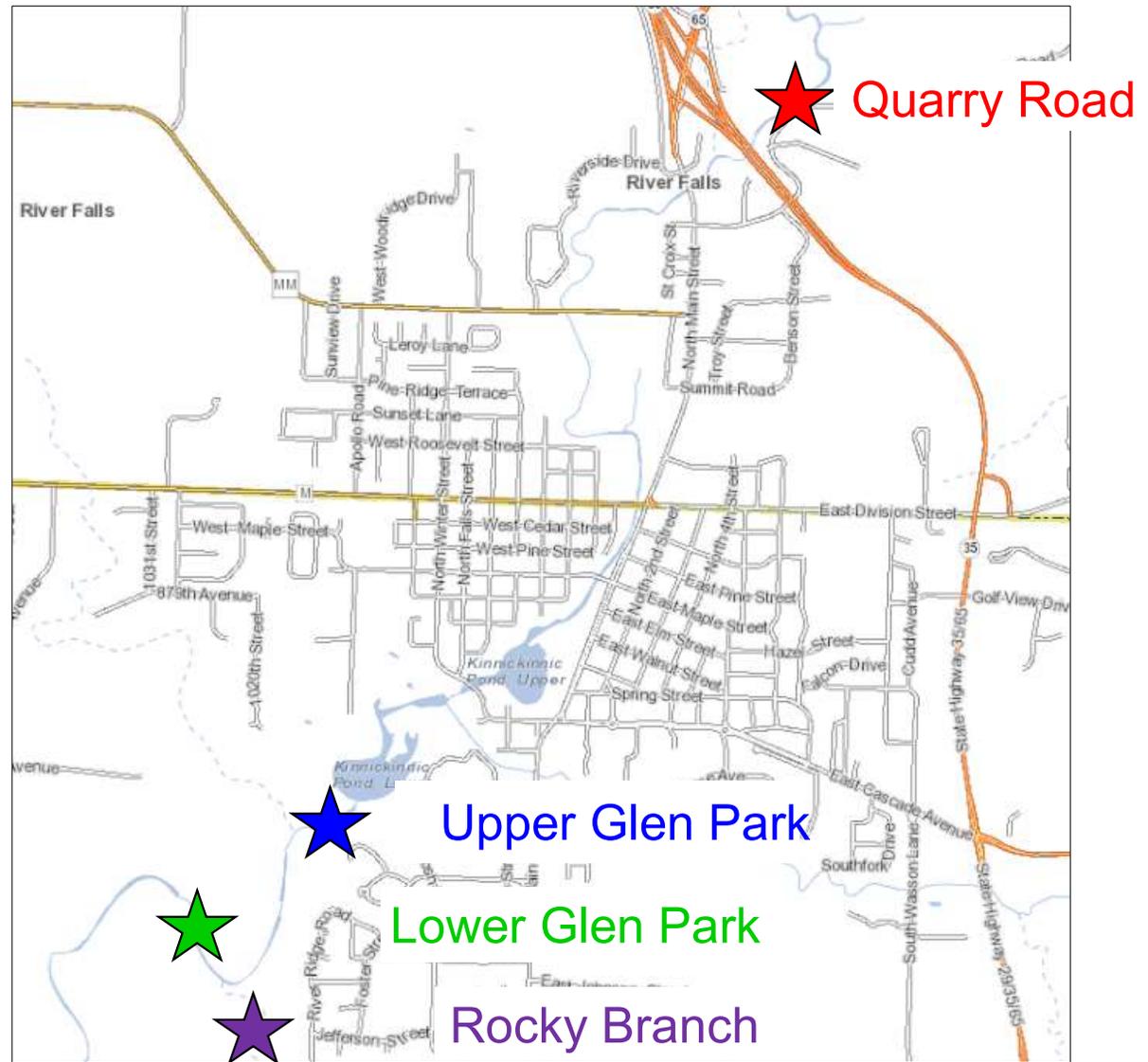
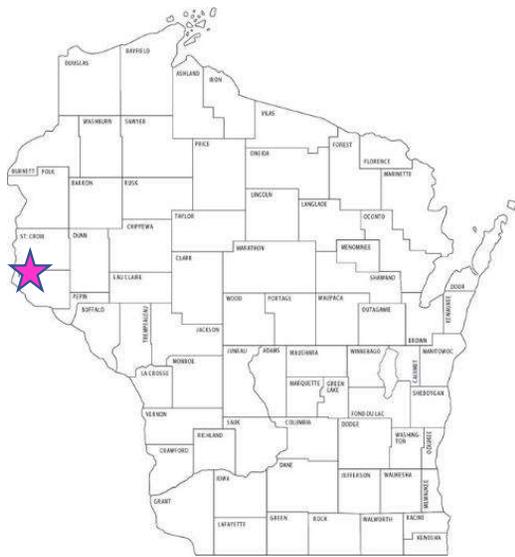
### Contiguous U.S., Average Temperature, January-December

— 1895-2016 Trend +1.45°F/Century    — 1901-2000 Mean: 52.02°F    — Avg Temperature



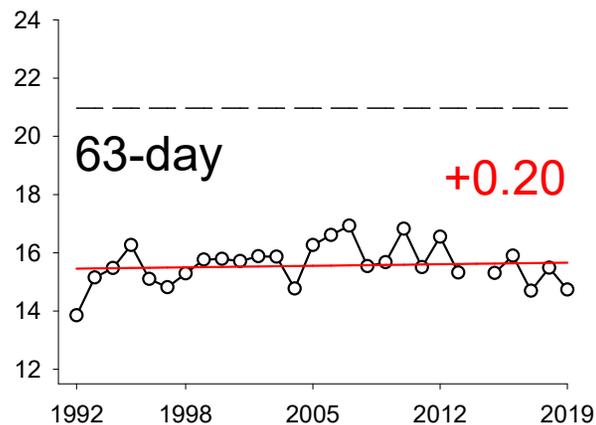
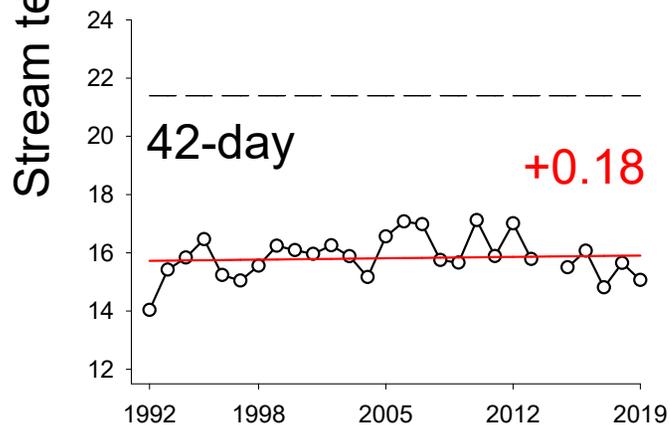
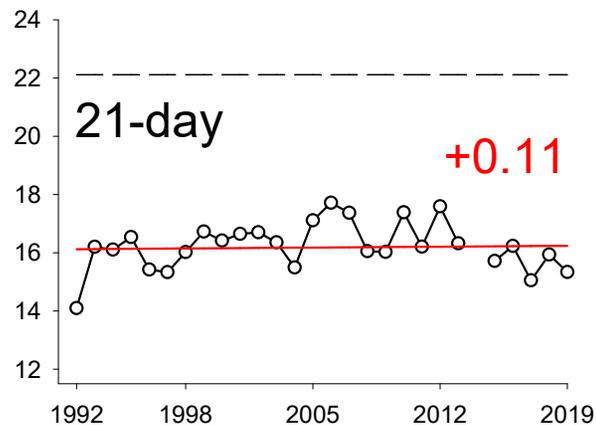
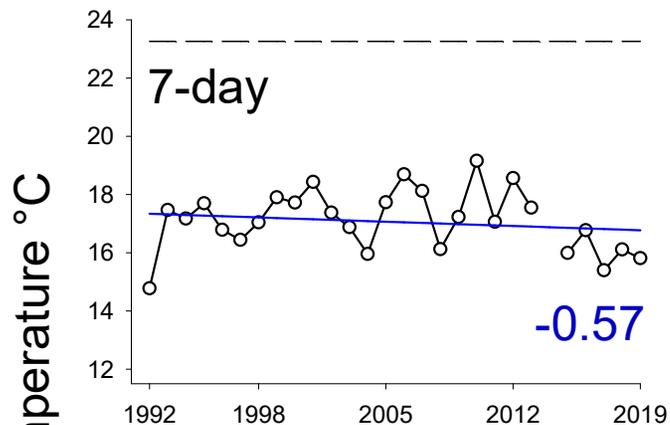
# Kinnickinnic River

Water temperature data  
1992-2019



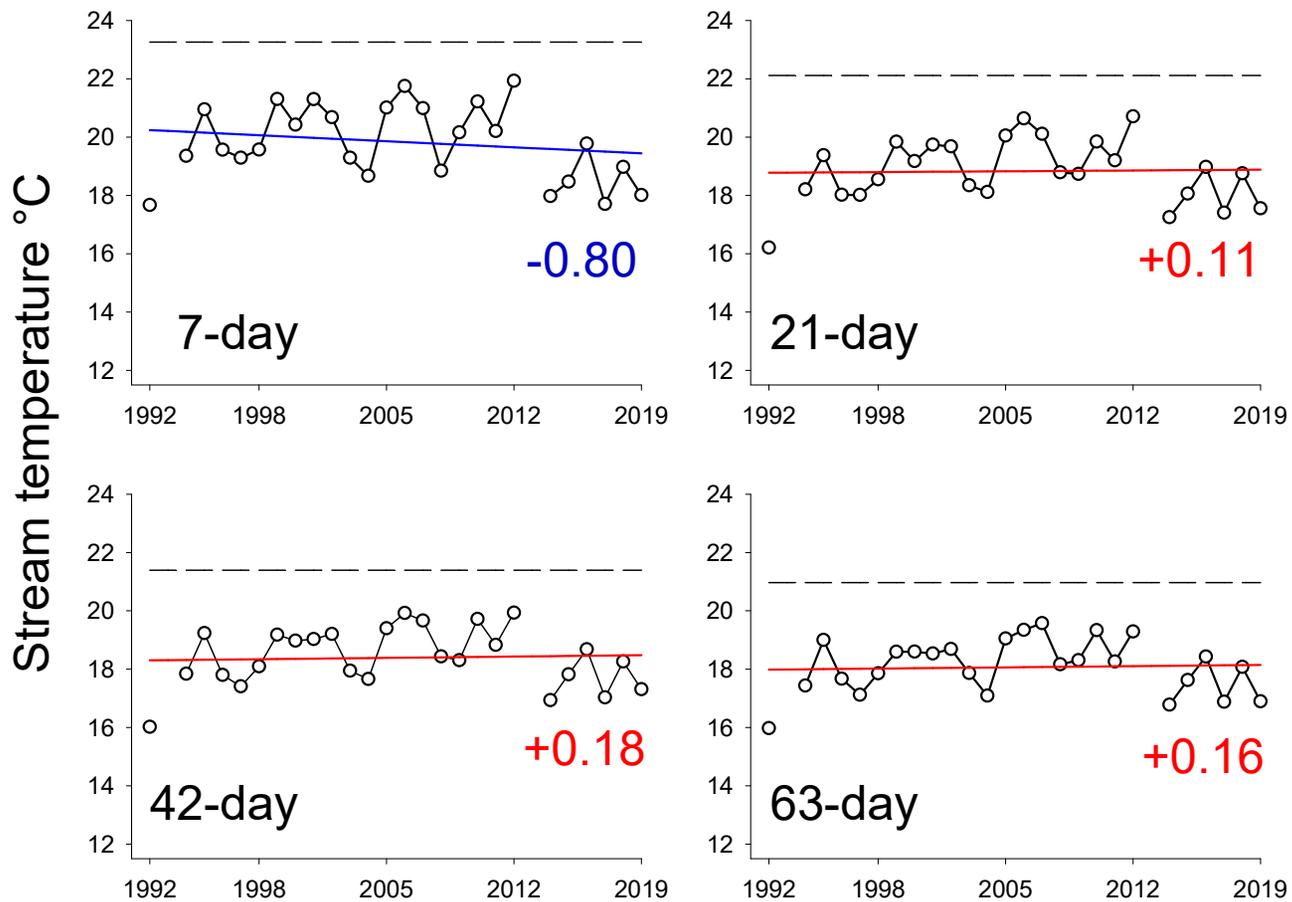
# Quarry Road - Kinnickinnic River, Wisconsin

## Maximum *n*-day mean temperature



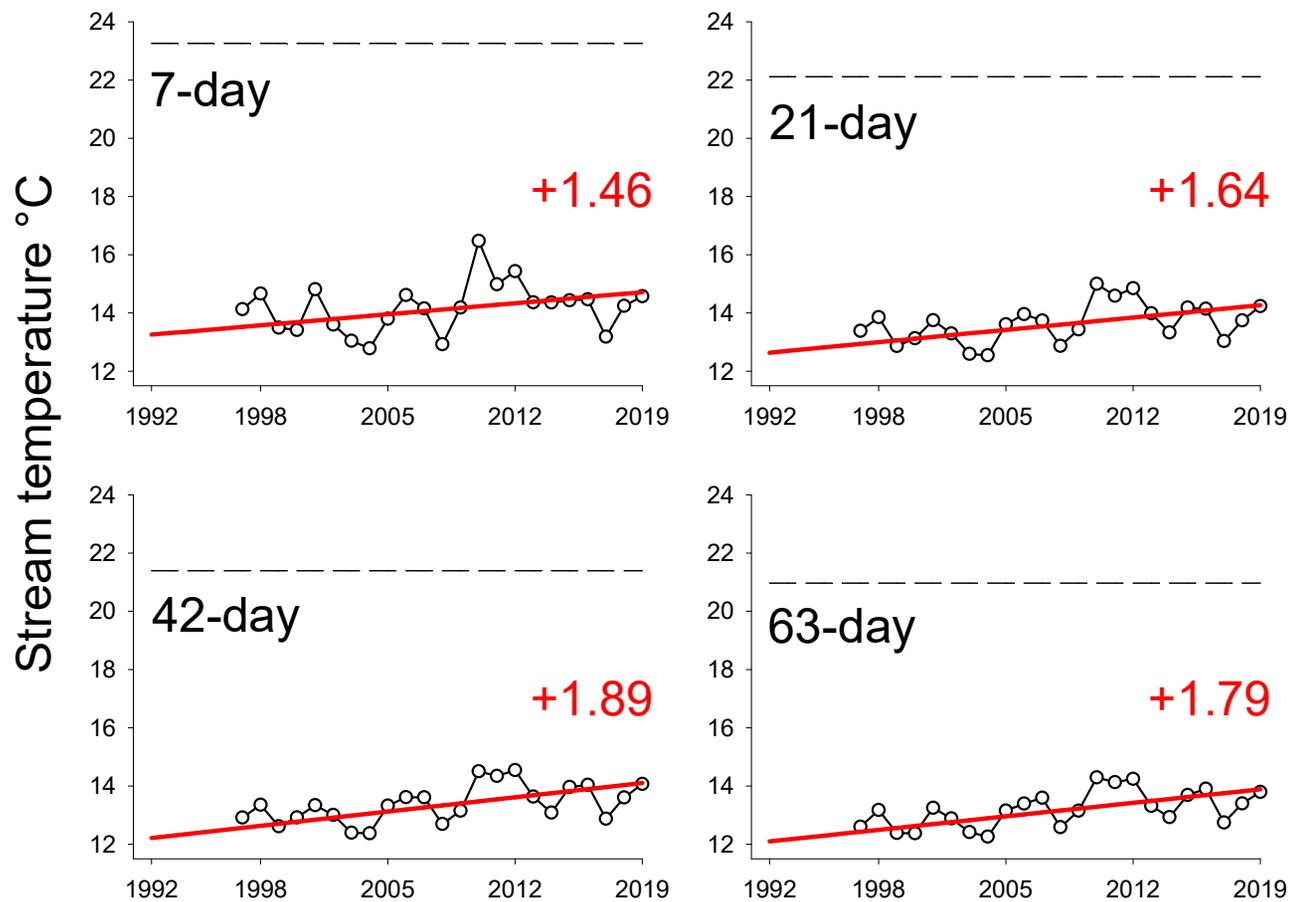
# Upper Glen Park - Kinnickinnic River, Wisconsin

## Maximum *n*-day mean temperature



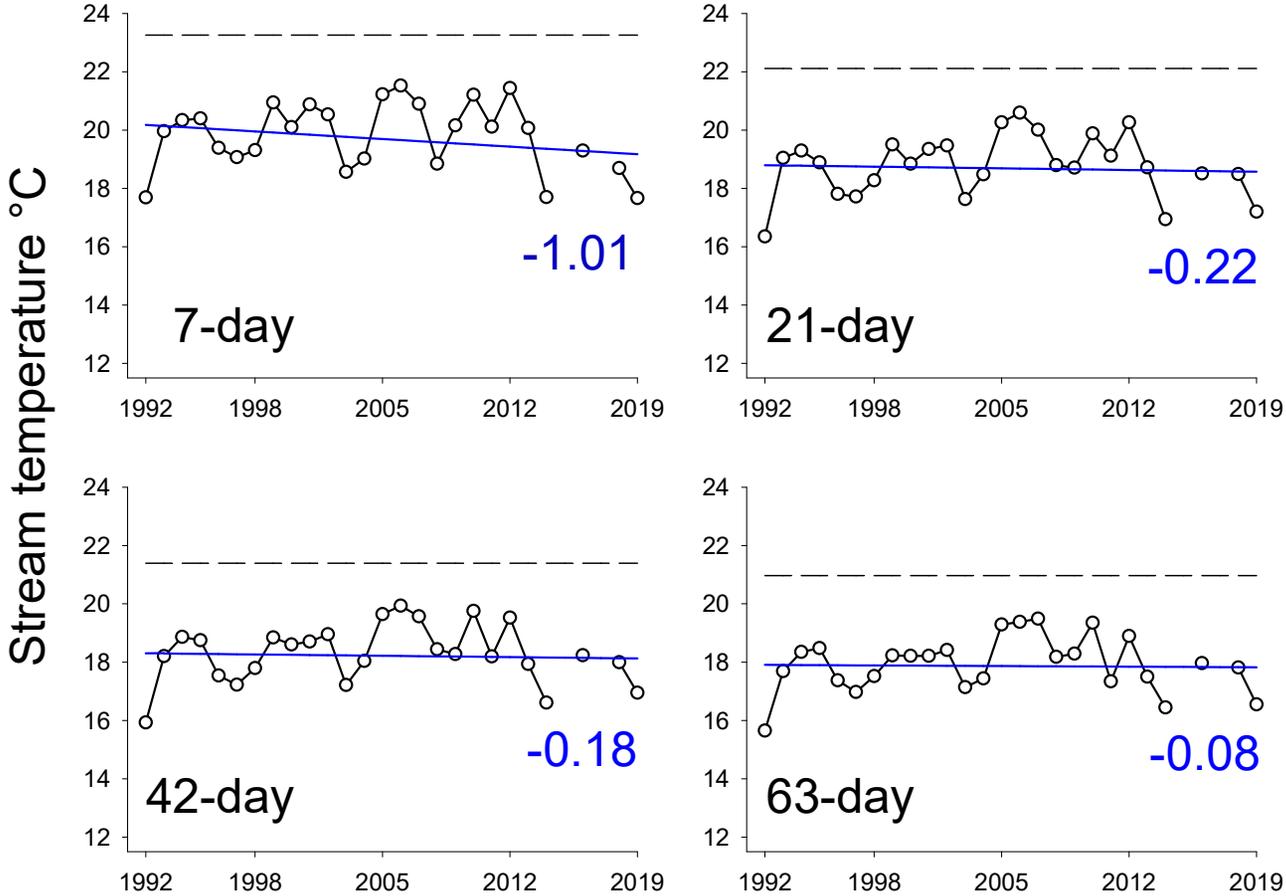
# Rocky Branch Creek - Kinnickinnic River, Wisconsin

## Maximum *n*-day mean temperature



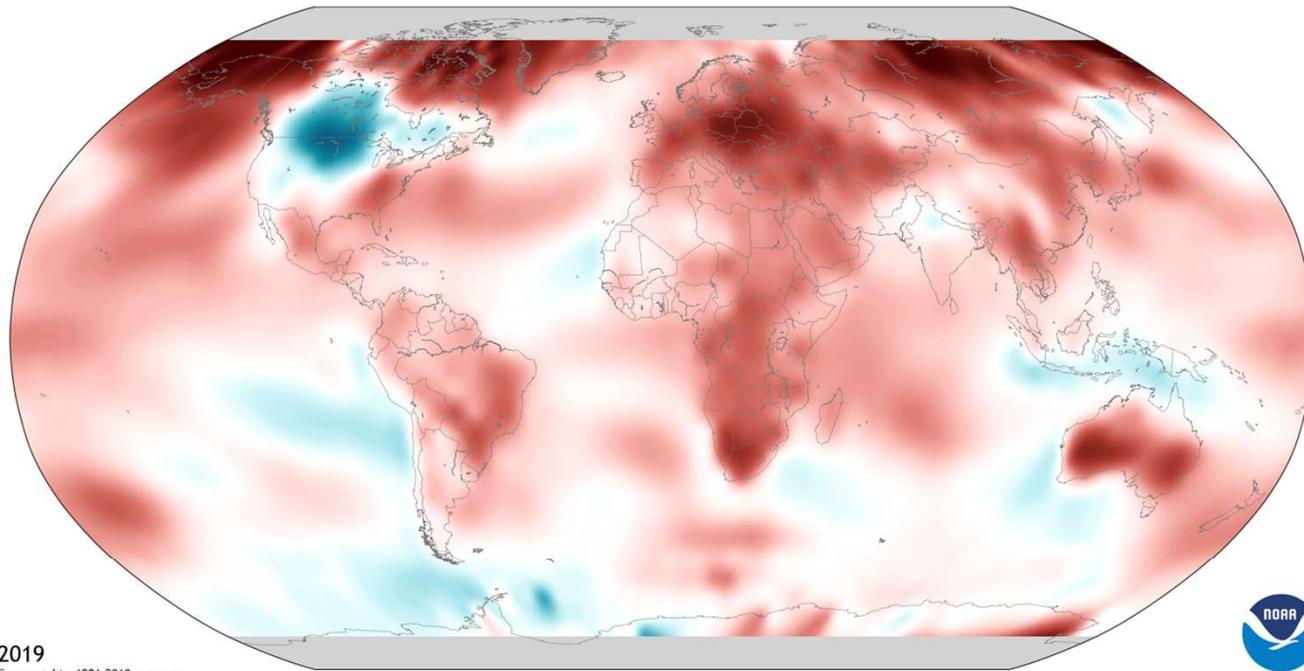
# Lower Glen Park - Kinnickinnic River, Wisconsin

## Maximum *n*-day mean temperature



# Difference from average temperature (compared to 1981-2010 average)

**2019**



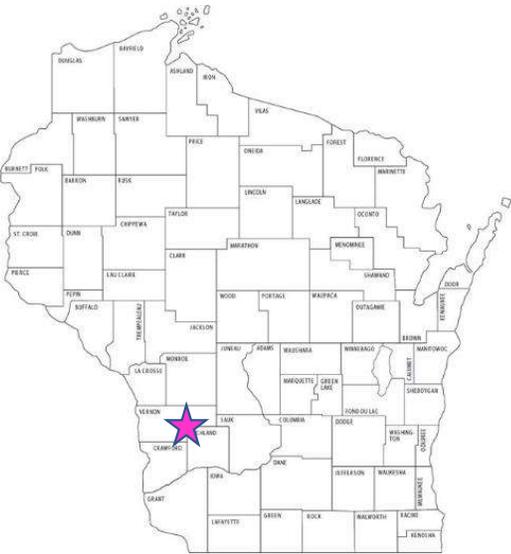
2019  
Compared to 1981-2010 average



◀ Cooler

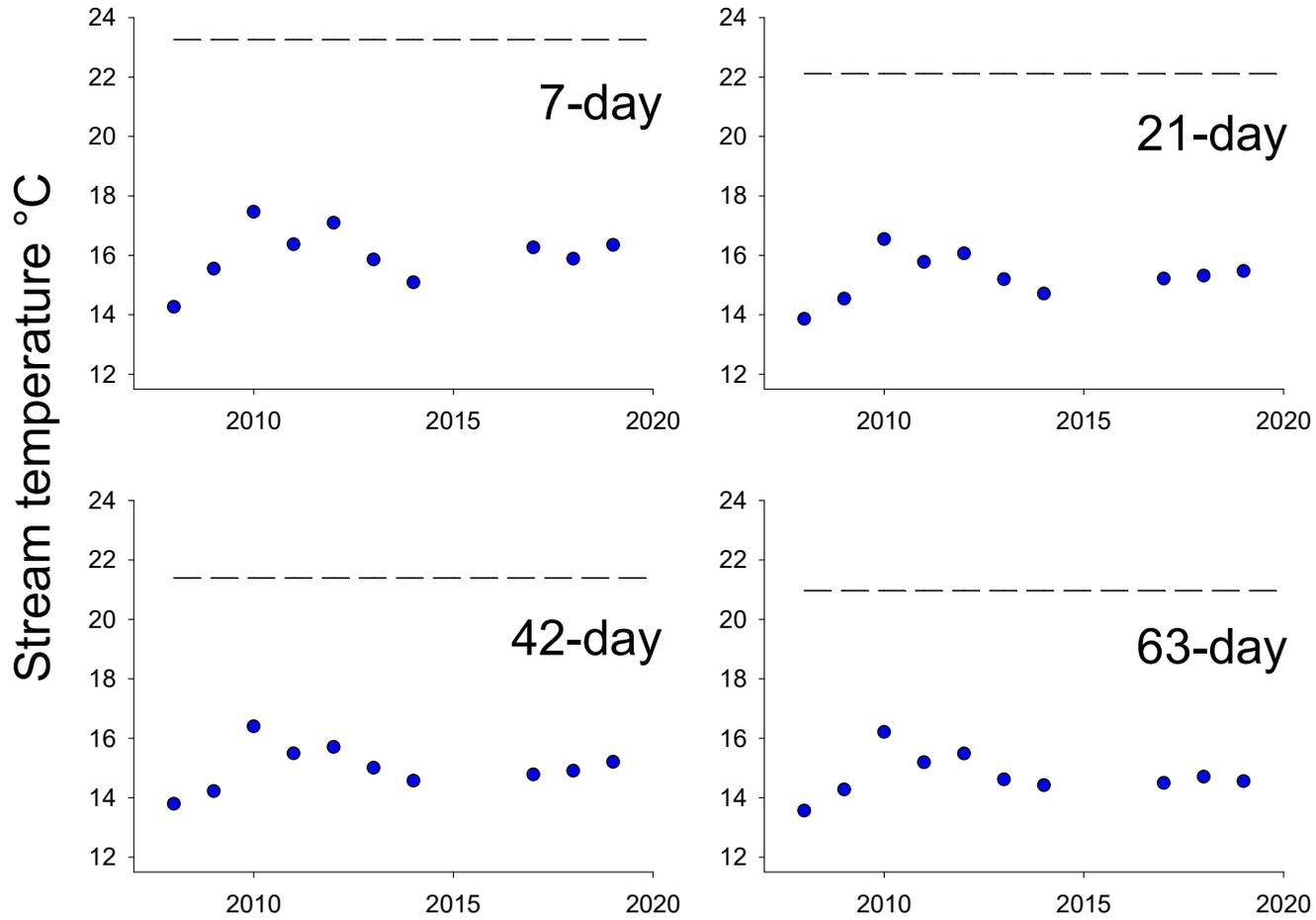
Warmer ▶

# Elk Creek Vernon County



# Elk Creek, Vernon County, Wisconsin

## Maximum *n*-day mean temperature

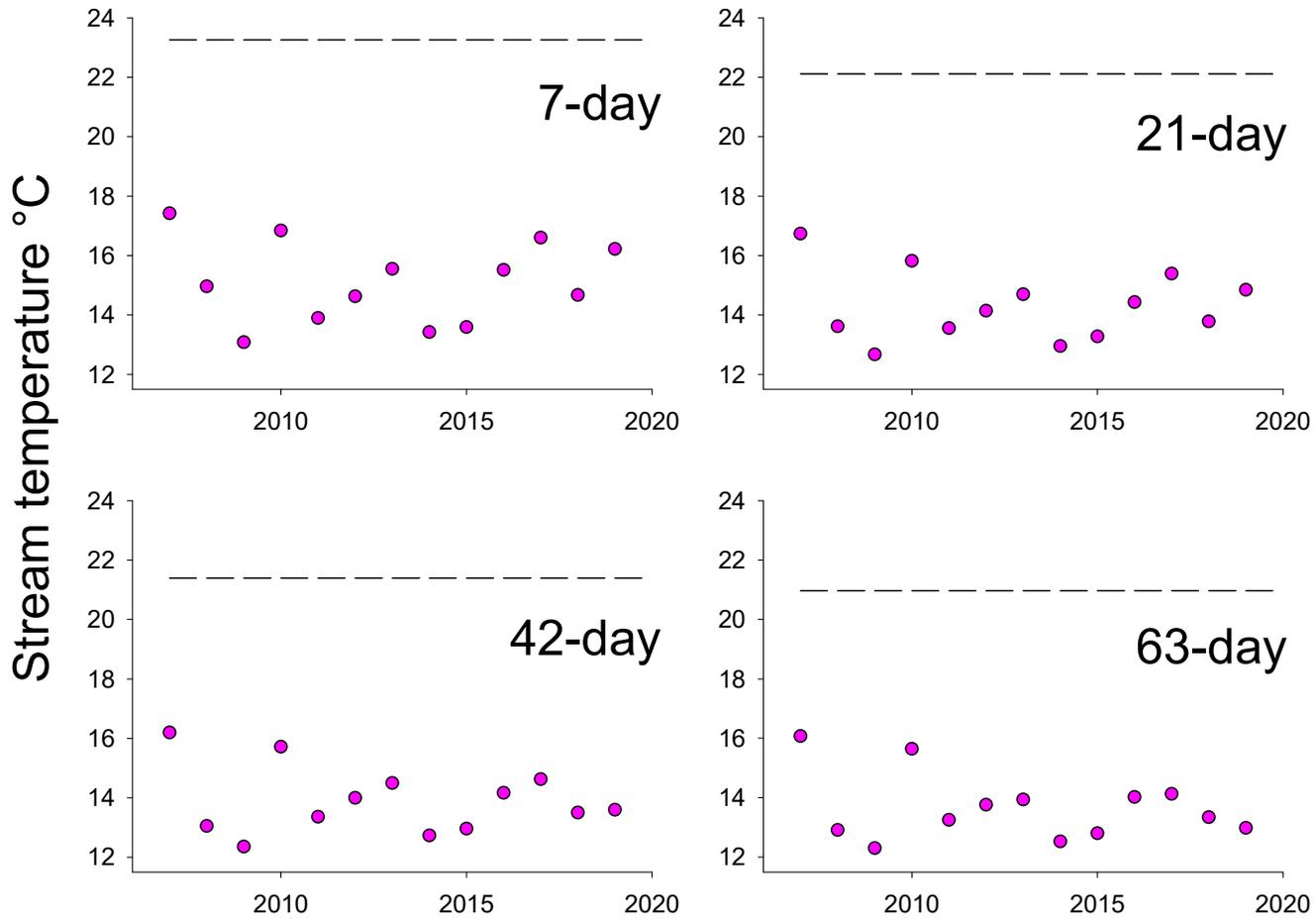


# Ash Creek Richland County



# Ash Creek, Richland County, Wisconsin

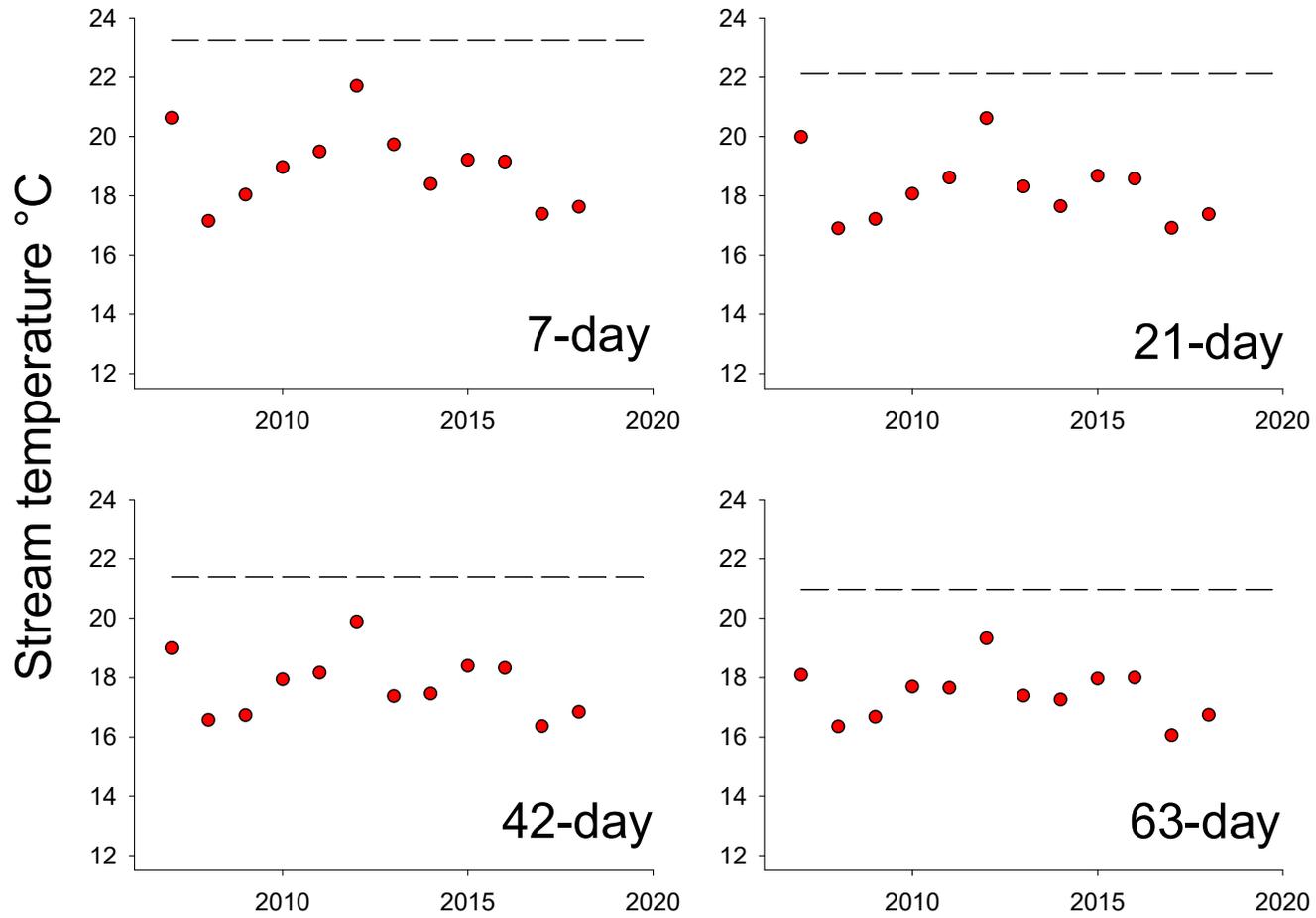
## Maximum *n*-day mean temperature





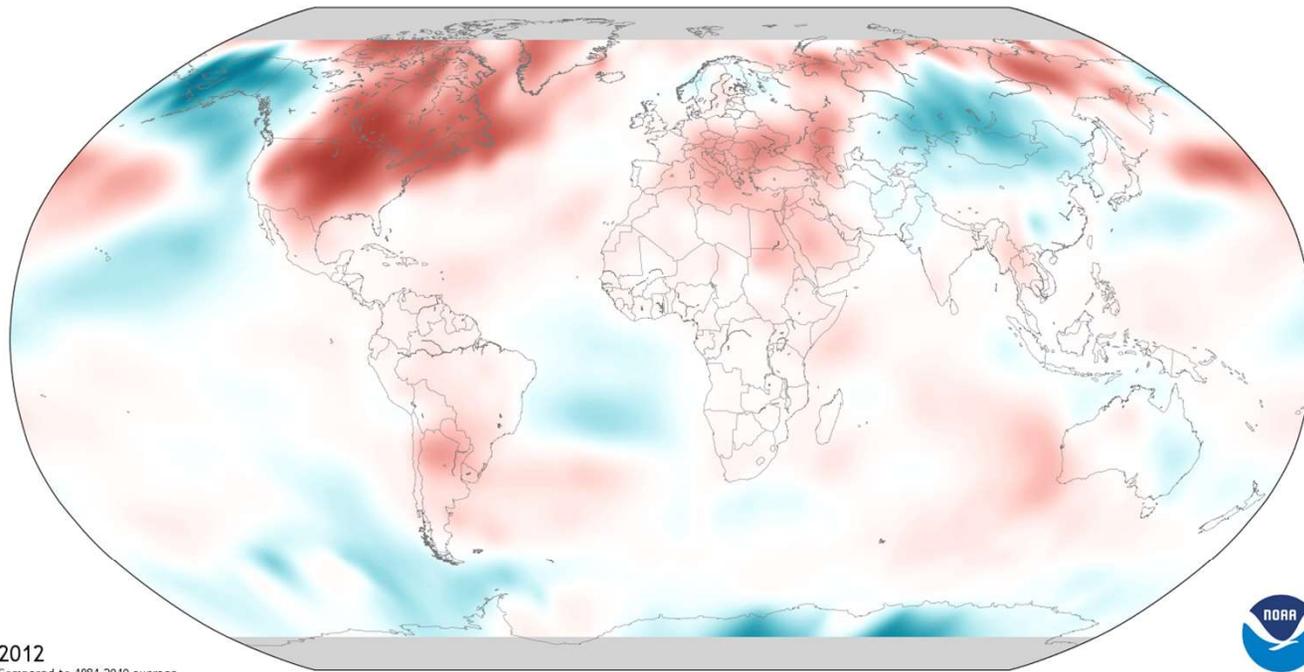
# Timber Coulee Creek, Vernon County, Wisconsin

## Maximum *n*-day mean temperature



# Difference from average temperature (compared to 1981-2010 average)

**2012**



2012  
Compared to 1981-2010 average



◀ Cooler

Warmer ▶

Building resilience to adapt to climate change...

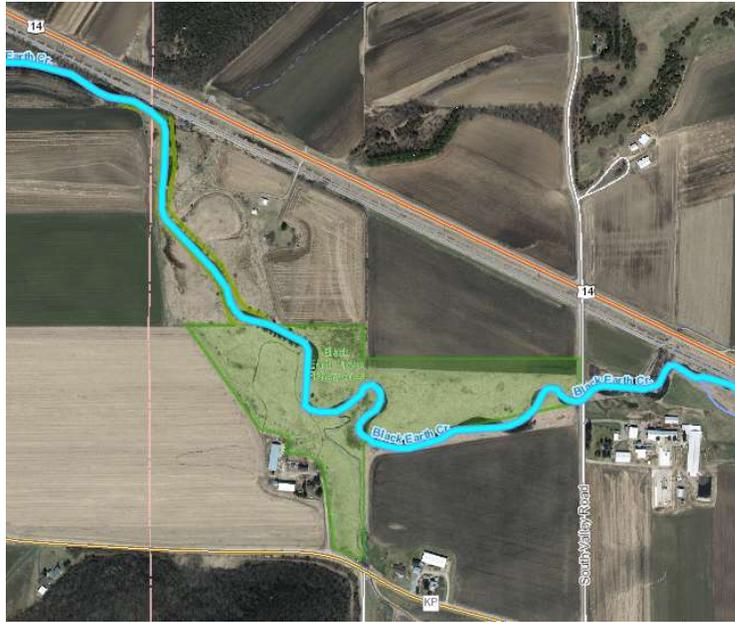




# Hunting River

Langlade County

Dave Seibel  
Taylor Curran  
WDNR FM



## Black Earth Creek

Hwy KP Fishery Area  
Dane County

200 trees scheduled  
to be planted



## Sugar River

Neperud Project  
Dane County

75 trees planted



Dan Oele  
WDNR FM

Before



After

# West Branch White River

Waushara County

Shawn Sullivan  
WDNR FM





Before

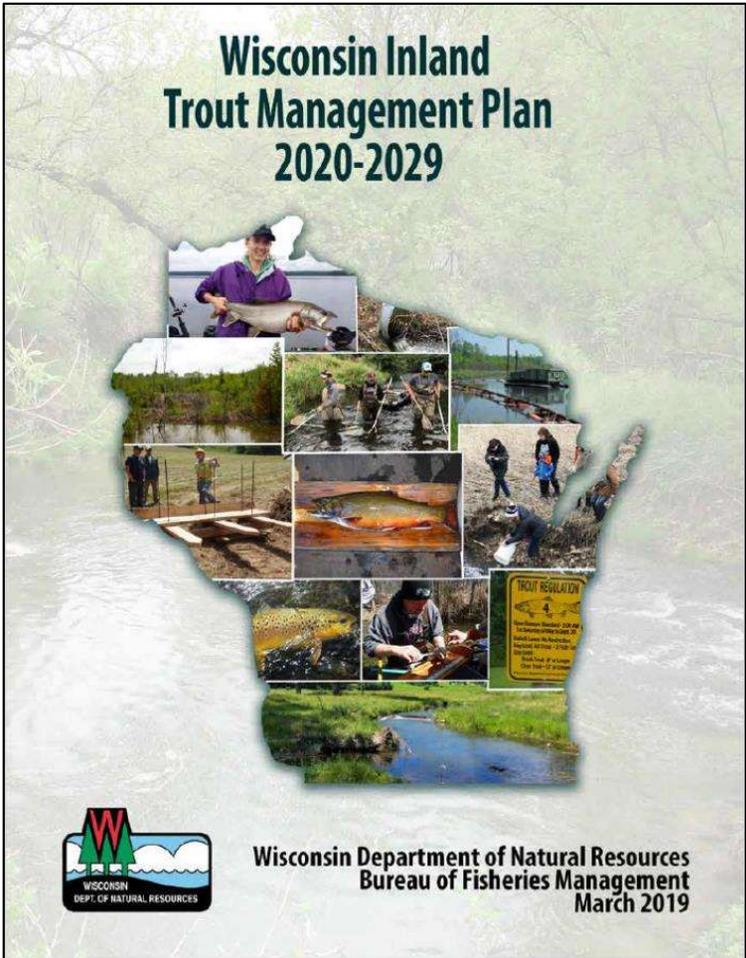


After



Little Balsam Creek  
Douglas County

Paul Piszczek  
WDNR FM



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- Climate Change ..... 33
- Invasive Species..... 36
- Angler Participation..... 38

**4**

**Goal 2. Protect, develop, enhance, and restore trout populations and trout angling opportunities for the diverse preferences and needs of our participants.**

**Action 2.1.B.2. Identify and develop Brook Trout reserves for protection and management.**





## Acknowledgements

WDNR Fisheries Research

WDNR Fisheries Management

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