IOWA DEPARTMENT OF NATURAL RESOURCES

LEADING IOWANS IN CARING FOR OUR NATURAL RESOURCES

Iowa's Temperature Criteria: History & Implementation

Topics to Cover

- Iowa's coldwater and warmwater temperature criteria
  - Historical
  - Current
- Implementation
  - Wasteload allocations/NPDES permit limits
  - Integrated report assessments/TMDLs
- Ongoing projects:
  - Iowa's coldwater reclassification project
    - Using coldwater protocol

Timeline

- March 20, 1967
  - Temperature criteria first established.
- June 8, 1971
  - WW criteria split/specified for border rivers, interior streams, and lakes and reservoirs.
  - Degree/hour restriction established for CW.
- February 13, 1974
  - Degree/hour restriction established for WW.
- February 23, 1977
  - Criteria implementation text added.
  - °F switched to °C.
- August 9, 1989
  - Big Sioux River added to interior streams criteria.
  - Last time the standard was updated.
- March 22, 2006
  - Coldwater protocol adopted.
- February 21, 2018
  - Iowa Wasteload Allocation Procedure adopted (revised in 2020)

1967 Criteria

(1) Warm water areas.
Temperature: Not to exceed 93°F during the months of May through November, and not to exceed 73°F during the months of December through April.
(2) Cold water areas. All criteria stated for warm water areas apply to cold water areas except as follows:
Temperature: No greater than 70°F.

1971 Criteria

Location	Max Temperature	Max Change from Background/Natural Temperature	Max Rate of Change Due to Added Heat
Mississippi River (Minnesota to Wisconsin)	89°F	5°F	N/A
Mississippi River (Wisconsin to Missouri)	90°F	5°F	N/A
Missouri River	90°F	5°F	N/A
Interior streams	90°F	5°F	N/A
Lakes and reservoirs	90°F	3°F	N/A
Cold water	68°F	5°F	2°F/hour

1974 Criteria

Location	Max Temperature	Max Increase Due to Added Heat	Max Rate of Change Due to Added Heat
Interior streams	90°F	5°F	2°F/hour
Cold water	68°F	3°F	2°F/hour
Lakes and reservoirs	90°F	3°F	2°F/hour
Missouri River	90°F	5°F	2°F/hour

1974 Criteria: Mississippi River

Location	Max Temperature	Max Increase Due to Added Heat	Max Rate of Change Due to Added Heat
Mississippi River	See table	5°F	2°F/hour

Month	Zone II	Zone III
January	40°F	45°F
February	40°F	45°F
March	54°F	57°F
April	65°F	68°F
May	75°F	78°F
June	84°F	85°F
July	84°F	86°F
August	84°F	86°F
September	82°F	85°F
October	73°F	75°F
November	58°F	65°F
December	48°F	52°F

- Zone II - Iowa-Minnesota State line to Northern Illinois border (Mile Point 1534.6)
- Zone III - Northern Illinois border (Mile Point 1534.6 to Iowa-Missouri state line

- Temperature at representative locations shall not exceed max limits by more than 1% of the hours in the 12-month period ending with any month.
- Temperatures at locations shall not exceed limits in table by more than 3°F.

1977 Criteria

- Same criteria, just switched from °F to °C.
- Two new paragraphs explaining the criteria and implementation.

The allowable 3°C temperature increase criterion for warm water interior streams, 16.3(3)”f”(1), is based in part on the need to protect fish from cold shock due to rapid cessation of heat source and resultant return of the receiving stream temperature to natural background temperature. On low flow streams, in winter, during certain conditions of relatively cold background stream temperature and relatively warm ambient air and groundwater temperature, certain wastewater treatment plants with relatively constant flow and constant temperature discharges will cause temperature increases in the receiving stream greater than allowed in 16.3(3)”f”(1).

During the period November 1 to March 31, for the purpose of applying the 3°C temperature increase criterion, the minimum protected receiving stream flow rate below such discharges may be increased to not more than three times the rate of flow of the discharge, where there is reasonable assurance that the discharge is of such constant temperature and flow rate and continuous duration as to not constitute a threat of heat cessation and not cause the receiving stream temperature to vary more than 3°C per day.

1977 Criteria - Summary

- Same criteria, just switched from °F to °C.
- Two new paragraphs explaining the criteria and implementation.
  - 3°C criterion is to protect fish from cold shock.
  - Minimum receiving flow rate November-March may be increased to not more than 3x the rate of flow of the discharge, where there is reasonable assurance the discharge won't cause the receiving stream temp to vary by more than 3°C per day.

1989 Criteria - Current Through 2024

61.2(5) “Implementation strategy”

- Same two paragraphs explaining criteria and implementation.

61.3(3) Specific water quality criteria

Location	Max Temperature	Max Increase Due to Added Heat	Max Rate of Change Due to Added Heat
Interior streams/Big Sioux River	32°C	3°C	1°C/hour
Cold water	20°C	2°C	1°C/hour
Lakes and reservoirs	32°C	2°C	1°C/hour
Missouri River	32°C	3°C	1°C/hour

1989 Mississippi Criteria - Also Current

Location	Max Temperature	Max Increase Due to Added Heat	Max Rate of Change Due to Added Heat
Mississippi River	See table	3°C	1°C/hour

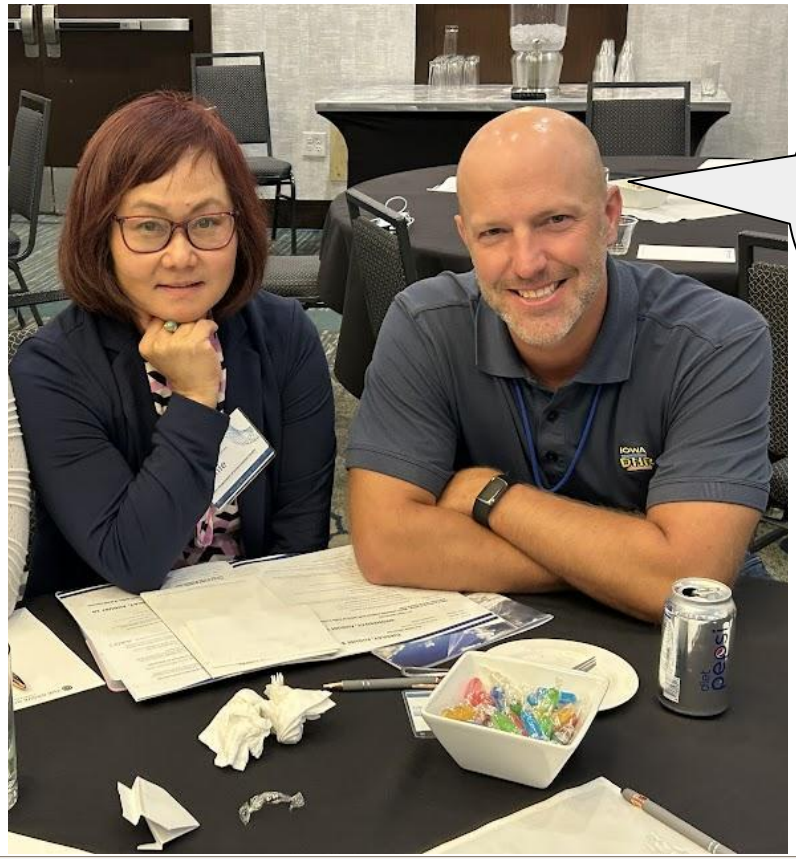
Month	Zone II	Zone III
January	4°C	7°C
February	4°C	7°C
March	12°C	14°C
April	18°C	20°C
May	24°C	26°C
June	29°C	29°C
July	29°C	30°C
August	29°C	30°C
September	28°C	29°C
October	23°C	24°C
November	14°C	18°C
December	9°C	11°C

- Zone II - Iowa-Minnesota State line to Northern Illinois border (Mile Point 1534.6)
- Zone III - Northern Illinois border (Mile Point 1534.6 to Iowa-Missouri state line

- Temperature at representative locations shall not exceed max limits by more than 1% of the hours in the 12-month period ending with any month.

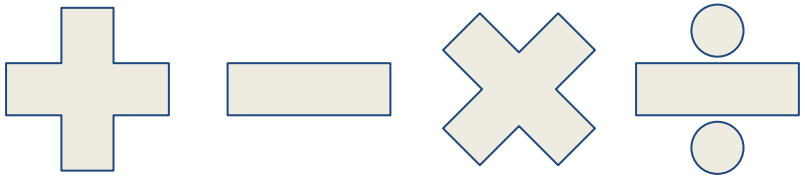
Criteria Development

- No historical info on how Iowa developed its temperature criteria.
- Some criteria match EPA's historical recommendations.



Wasteload Allocations (WLAs)

- Implemented through Iowa Wasteload Allocation Procedure (adopted 2018, revised 2020).
- Convert temperature criteria to NPDES permit limits.
- WLAs for temperature are given in both °C and °F.
- WLAs for discharges into the Mississippi River also account for the allowed 1% maximum exceedance.
- Default mixing zone based on the ratio of the stream flow to the discharge flow.
- Temperature decay in a discharge pipe or general use waterbody can be considered.
- WLAs include language about avoiding fish shock during winter months.



NPDES Permits

- NPDES permits use values from WLAs to give monthly 30 day average and daily maximum temperature limits in °F.
- Other temperature restrictions can also be included in the permit.

Effluent Limitations:

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

003 DISCHARGE CONSISTS OF BOILER BLOWDOWN, BEARING AND OIL COOLING WATER, ASH HOPPER SEAL WATER, AND WATER TREATMENT REGENERATION WASTES FROM THE DEMINERALIZER FROM THE POWER PLANT.

Outfall: 003 Effective Dates: 05/01/2021 to 04/30/2026			
Parameter	**Season**	**Limit Type**	**Limits**
TEMPERATURE			
	JAN	30 Day Average	73.4 FAHRENHEIT
	JAN	Daily Maximum	111.2 FAHRENHEIT
	FEB	30 Day Average	84.7 FAHRENHEIT
	FEB	Daily Maximum	111.5 FAHRENHEIT
	MAR	30 Day Average	93.0 FAHRENHEIT
	MAR	Daily Maximum	109.2 FAHRENHEIT

Non-Standard Effluent Limits

Outfall #	Description
003	TEMPERATURE Cessation of thermal inputs to the receiving water by a thermal discharge shall occur gradually so as to avoid fish mortality due to cold shock during the winter months (November through March). The basis for this requirement is to allow fish associated with the discharge-heated mixing zone to acclimate to the decreasing temperature. Likewise, when the discharge resumes the temperature would need to be increased gradually to avoid negative impacts to aquatic life in the receiving stream.

IR Temperature Assessments

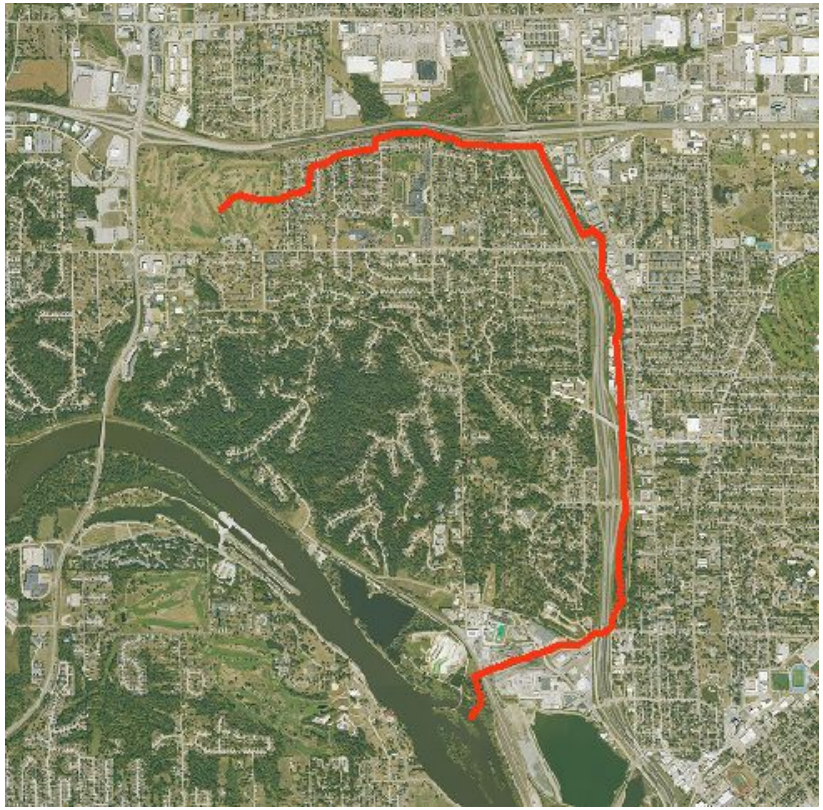
- The Iowa DNR assesses IR segments that have sufficient temperature data.
  - Lakes and reservoirs, the Big Sioux River, and interior BWW streams are assessed based on a maximum of 32°C.
  - BCW streams are assessed based on a maximum of 20°C.

Use	# 2024 IR Assessments	# Fully Supported	# Not Supported
BCW1	9	5	4
BLW	208	208	0
BWW1	182	182	0
BWW2	53	53	0

Use	# 2024 IR Category 5a	# 2024 IR Category 3b
BCW1	7	4
BLW	0	0
BWW1	0	0
BWW2	0	2

TMDLs

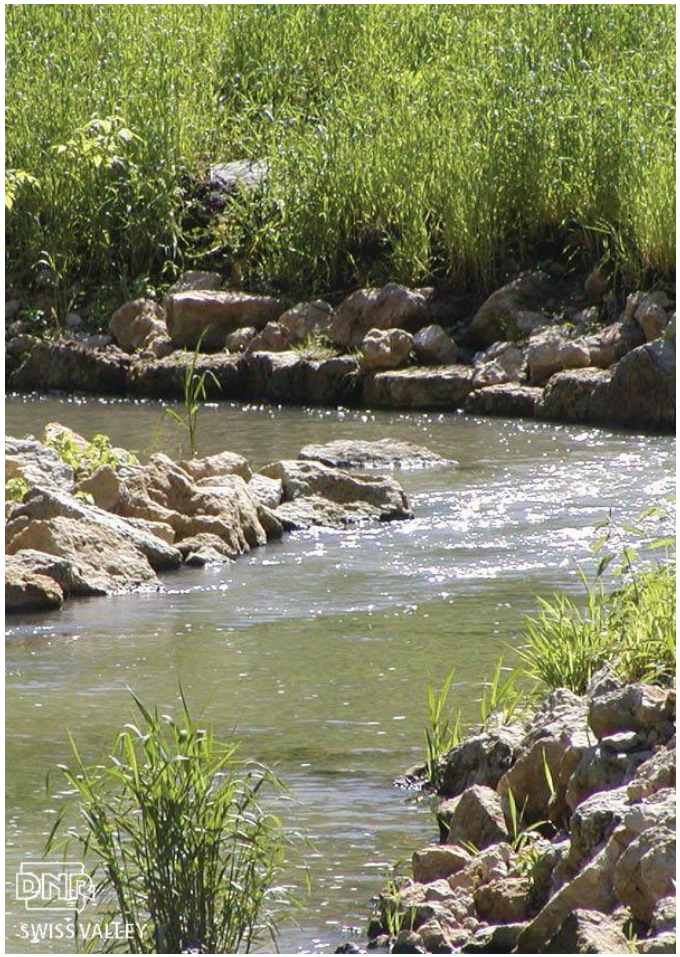
- Thermal impacts of a brief summer 2001 rain event in McLoud Run killed 184 trout.
- The Iowa DNR completed its only temperature TMDL in 2007 for McLoud Run.
- The TMDL encouraged local citizens, businesses, and municipalities to use BMPs to reduce and slow down runoff.
- Since 2001, McLoud Run has had fish kills due to chlorine caused by water main breaks, but has not had any more thermal fish kills.



Iowa's Coldwater Protocol

Criteria to designate coldwater segments:

- Maximum stream water temperature mid-May through mid-September can't exceed 75°F under normal stream conditions, for three (not necessarily consecutive) years, as documented by continuous monitoring.
  - Measured instantaneously between 2 and 6pm on the 2nd consecutive day of >85°F air temperature.
- Continuous flow during years with normal precip



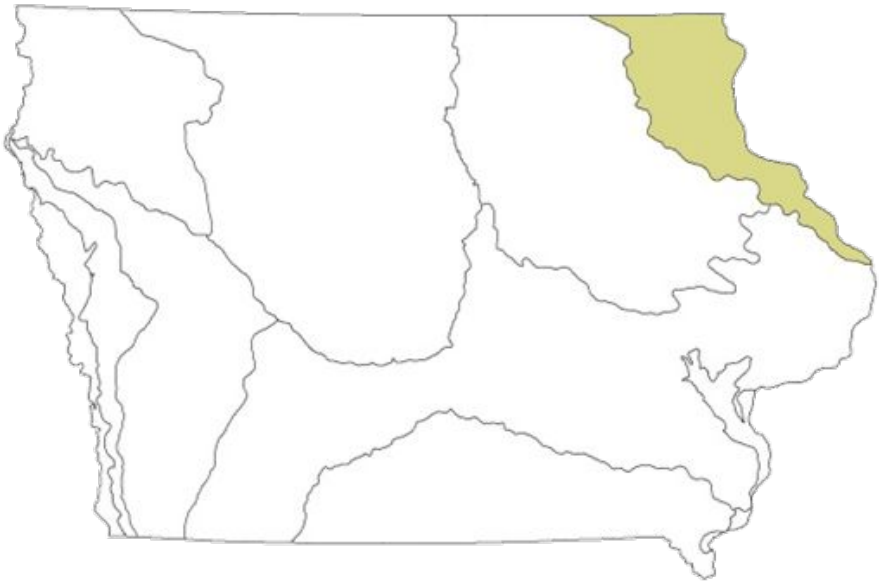
Iowa's Coldwater Protocol

Criteria to designate coldwater segments:

- Reproducing trout/sculpin
- Watercress
- Coldwater macroinvertebrates

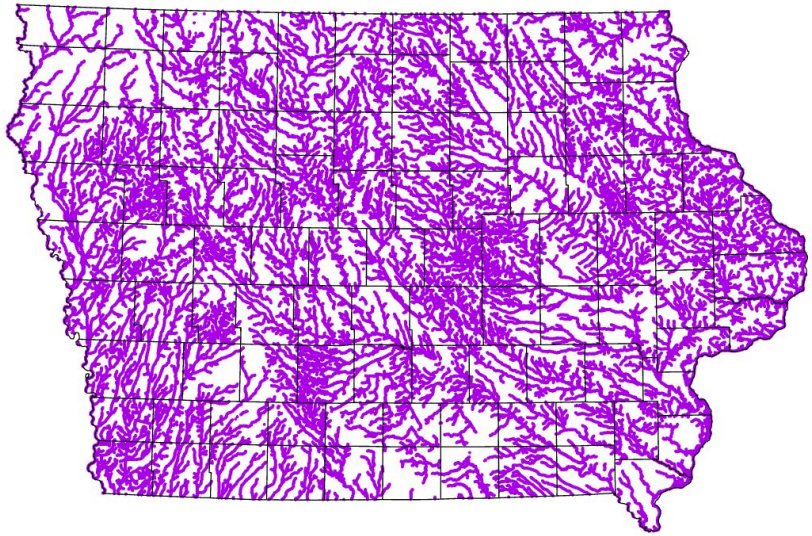
Northeast Iowa

- Driftless Area
- Karst topography
  - Springs
  - Sinkholes
  - Losing streams
  - Hatcheries



Iowa's Coldwater Reclassification Project

- Perennial streams presumed to be:
  - A1 (primary contact recreation)
  - BWW1 (Warm Water - Type 1)
- Perennial coldwater streams legally start as warmwater streams.
- Rulemaking is required to switch the designated use from a presumptive BWW1 use to an actual BCW1 use.



Iowa's Coldwater Reclassification Project

- Coordination with fisheries on project to re-designate CW streams.
- Aerial imagery and field sampling for Canoe Creek watershed.
- 23 km currently designated as cold water.
- 34 additional km identified.

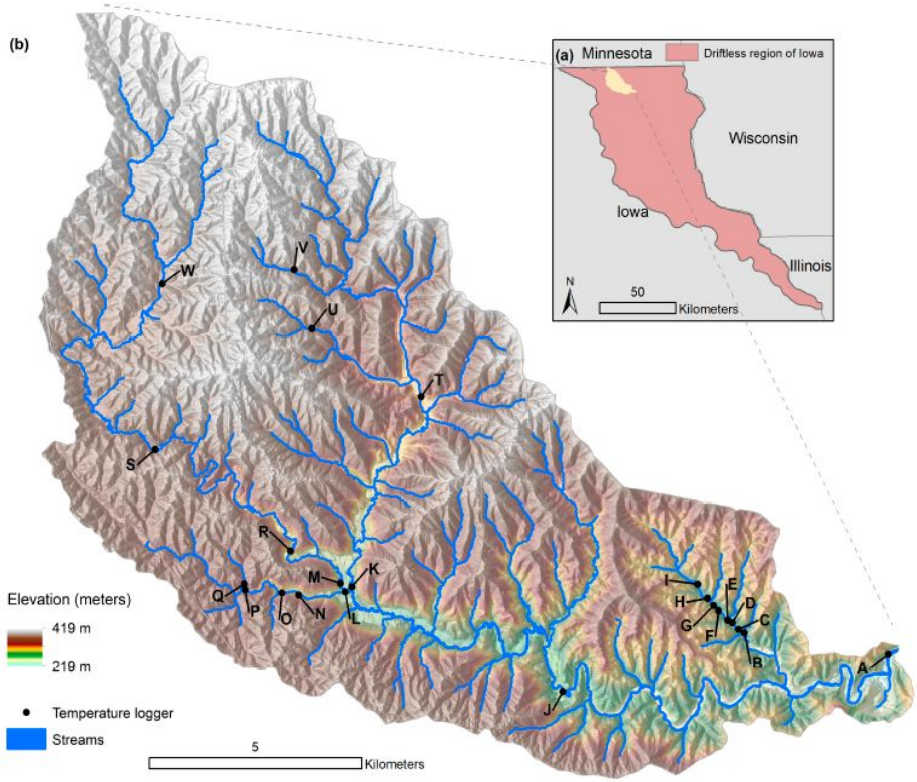


Figure 2. (a) Location of the Canoe Creek watershed within the Driftless Region of Iowa; (b) streams in the study watershed and locations where continuous water temperature data (black dot) was available. The watershed is shown using hillshade coverage. Site IDs (A–W) for each water temperature monitoring location are also shown.

Summary

- Iowa has had temperature criteria for both WW and CW streams since 1967. The criteria were last changed in 1974.
- Iowa regularly includes temperature limits in its WLAs and NPDES permits for heated point source dischargers.
- Iowa includes temperature assessments in its IR and has competed one temperature TMDL.
- Iowa is working to properly classify coldwater streams.

IOWA | Iowa Department of Natural Resources

Thank you!

Questions?