Iowa's Nutrient Reduction Strategy – WQS role in it's development

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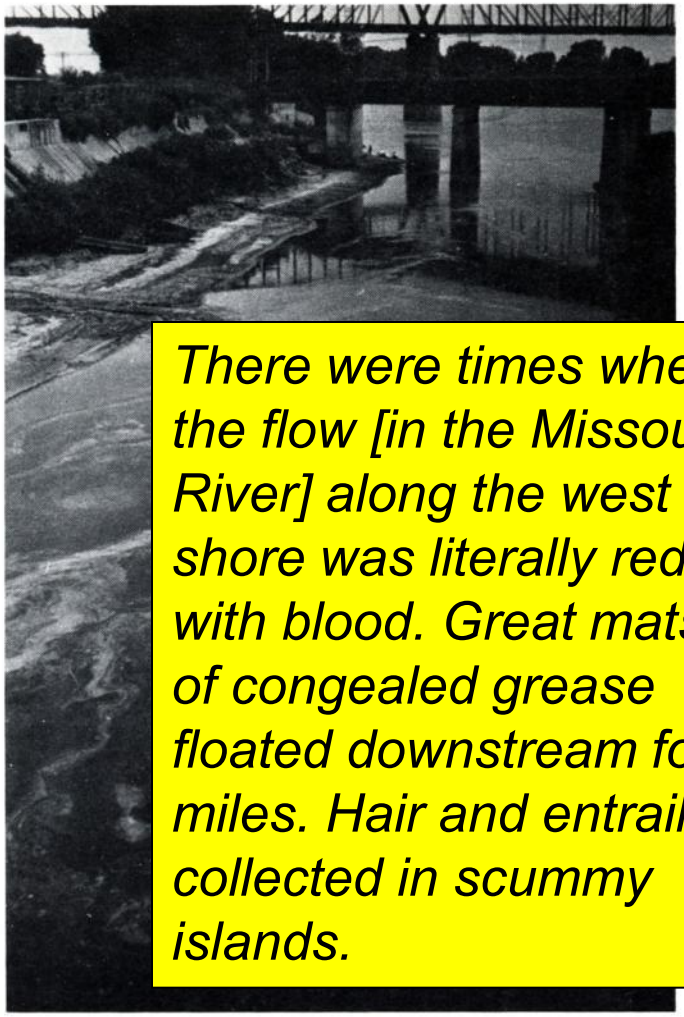
Iowa Department of Natural Resources

July 23, 2025

When water quality was worse:



Packing house waste being discharged to the Floyd River in Sioux City, August 1952.

There were times when the flow [in the Missouri River] along the west shore was literally red with blood. Great mats of congealed grease floated downstream for miles. Hair and entrails collected in scummy islands.

Des Moines Register, November 19, 1969

Sewage Pre-Treatment Plant In Omaha Ends Bloody River

By a Staff Writer

OMAHA, NEB. — One of the worst pollution situations in the entire nation has been all but eliminated here with completion of a sewage pre-treatment plant for the huge Omaha livestock industry.

This city's stockyards and packing industry have been among the largest in the world since the mid-1950s. Since that time and before, all the waste — millions of gallons a day — has been dumped untreated into the Missouri River.

There were times when the flow along the west shore was literally red with blood. Great mats of congealed grease floated downstream for miles. Hair and entrails collected in scummy islands.

"The Worst"

"People who know have told me this was absolutely the worst pollution they have seen anywhere in the U.S.," says Carl Chloupek, area representative for the Federal Water Pollution Control Commission in Lincoln, Neb.

Now the bloody flow into the river has stopped, thanks to the unique pre-treatment plant which began its shakedown last week. The $5.5 million plant is expected to go into full operation later this month.

Federal efforts to end the flow of packinghouse wastes into the river began in 1956 — 13 years ago — Chloupek said. The river still is far from clean, he said, but Omaha passed a "real milestone" last week.

The City of Omaha still gives only primary treatment to its wastes, but has agreed in principle to construct secondary facilities, Chloupek said. No timetable has been established, he added.

Primary treatment removes sewage solids, about 35 per cent of the pollutants. Secondary treatment removes about 90 per cent.

Omaha's primary treatment plant went into operation only four years ago. Before that, it too dumped all its wastes untreated into the river.

As it was, Chloupek said, the city plant has been operating at only half of its capacity because, without pre-treatment, it was unable to handle the packinghouse wastes. So half of the plant has been idle for four years waiting for the packers to pre-treat their wastes.

This half was placed in operation for the first time last week, Chloupek said, when it began handling the effluent from the pre-treatment plant.

for retirement of $5.5 million in bonds sold for the construction of the plant and its operation.

The plant was designed and built by the Carver-Greenfield Corp. Kirkham, Michael & Associates were the consultants.

Omaha's primary treatment plant went into operation only four years ago [~1965]. Before that, it too dumped all its wastes untreated into the [Missouri] river.

Why this strategy?

- **2006 – Rebuttable Presumption - BIG $$$**
- Excessive nutrients can cause water quality problems
  - In state , downstream
- Numeric nutrient criteria development presents challenging problems
  - Difficult to pin down cause & effect relationship
  - Difficult to comply with permit limits and costly to try
  - Possibly every water body impaired, variances
- A different approach needed (thank you Stoner memo!)

Select Fiscal Year to View: 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024

E. Coli Compliance Projects

276

cumulative number of projects

Wastewater Flow Disinfected

109,017,000,000

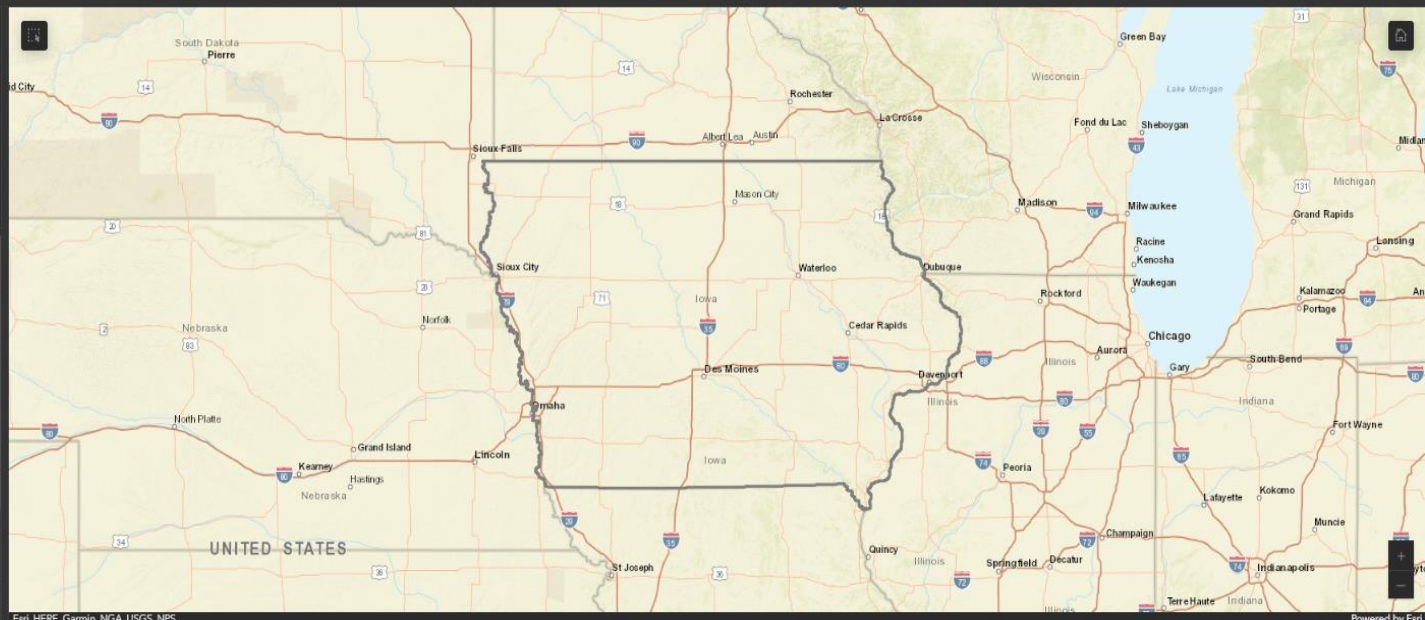
cumulative gallons/year (adjusted for recreational season)

11

E. Coli Compliance Projects

added in selected fiscal year

- City of Algona
  Design Average Wet Weather (AWW) Flow : 2.600000 million gallons per day
- City of Cincinnati
  Design Average Wet Weather (AWW) Flow : 0.061000 million gallons per day
- Country Estates Mobile Home Park
  Design Average Wet Weather (AWW) Flow : 0.018000 million gallons per day
- East Iowa Bible Camp
  Design Average Wet Weather (AWW) Flow : 0.012000 million gallons per day
- Greg Alida,Lee,Jim Sandy Gingerich
  Design Average Wet Weather (AWW) Flow : 0.010000 million gallons per day
- Holstein, City of
  Design Average Wet Weather (AWW) Flow : 0.355000 million gallons per day
- Iowa American Water Company
  Design Average Wet Weather (AWW) Flow : 0.003000 million gallons per day



The Iowa DNR Field Services and Compliance Bureau includes six field offices (1-6) located throughout Iowa.

Select Fiscal Year to View: 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024

Ammonia Compliance Projects
189
cumulative number of projects

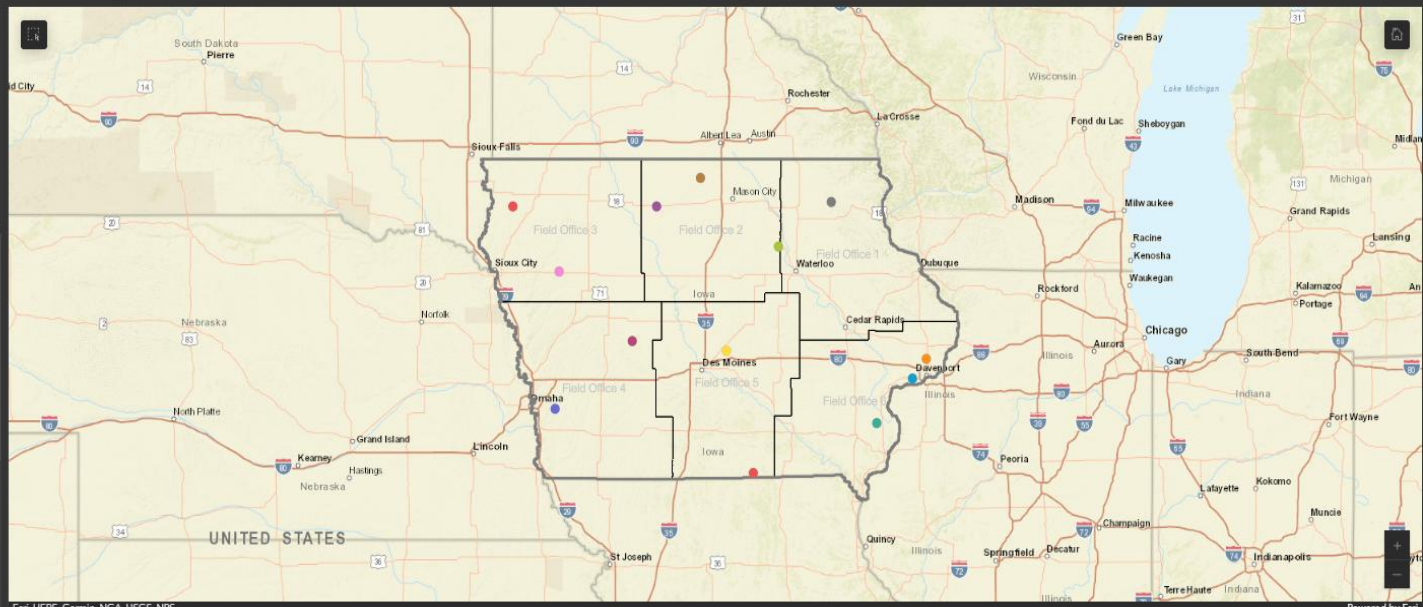
Wastewater Flow Treated
54,438,000,000
cumulative gallons/year

Ammonia Mass Eliminated from Iowa Waterways
1,728,000
cumulative pounds/year

13

Ammonia Compliance Projects
added in selected fiscal year

- Bayard, City of
  Design Average Wet Weather (AWW) Flow : 0.070000 million gallons per day
- Center Fresh Egg Farm
  Design Average Wet Weather (AWW) Flow : 0.003000 million gallons per day
- City of Algona
  Design Average Wet Weather (AWW) Flow : 2.600000 million gallons per day
- City of Cincinnati
  Design Average Wet Weather (AWW) Flow : 0.061000 million gallons per day
- City of Shell Rock
  Design Average Wet Weather (AWW) Flow : 0.282000 million gallons per day
- Country Estates Mobile Home Park
  Design Average Wet Weather (AWW) Flow : 0.018000 million gallons per day
- Holstein, City of
  Design Average Wet Weather (AWW) Flow : 0.355000 million gallons per day



The Iowa DNR Field Services and Compliance Bureau includes six field offices (1-6) located throughout Iowa.

Begin with the end in mind…

Dateline Iowa

From Register staff and news services

Nutrient Reduction Strategy released

State officials have released a new plan for reducing water pollution from city and industrial wastewater treatment plants and from farms, but environmental groups say it lacks clear goals and time lines.

The Iowa Nutrient Reduction Strategy, first unveiled in November, became the state's official policy for improving water quality on Wednesday. Supported by Gov. Terry Branstad, it is a product of the Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources and Iowa State University.

The agencies say it is a cost-effective, science-based approach.

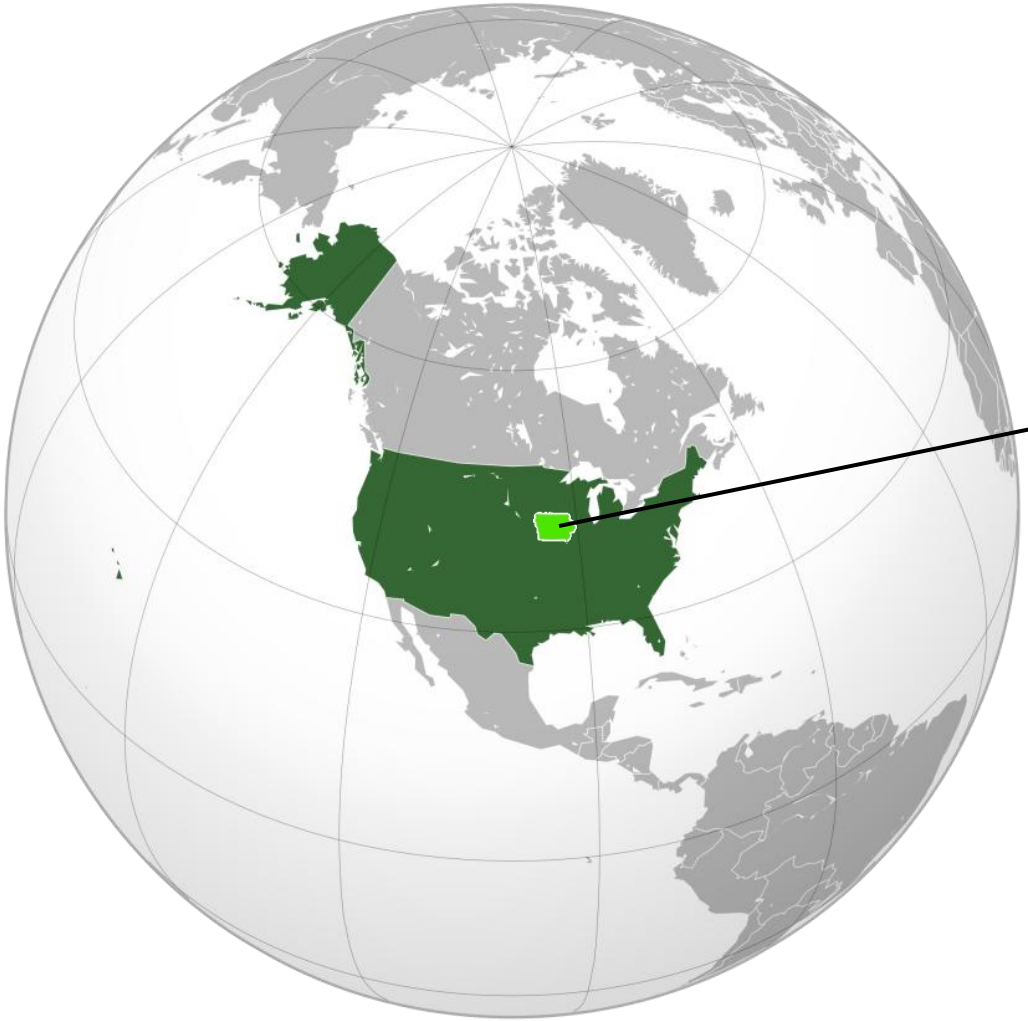
NUTRIENT REDUCTION STRATEGY HIGHLIGHTS

- Reduce nitrogen (N) and phosphorus (P) loads to Iowa waters and the Gulf of Mexico by 45% (*Gulf Hypoxia Task Force*)
- Led by Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, and Iowa State University
- Science-based approach, integrating non-point (*agriculture*) and point (*industrial and municipal wastewater treatment plants*) sources working together for common goal

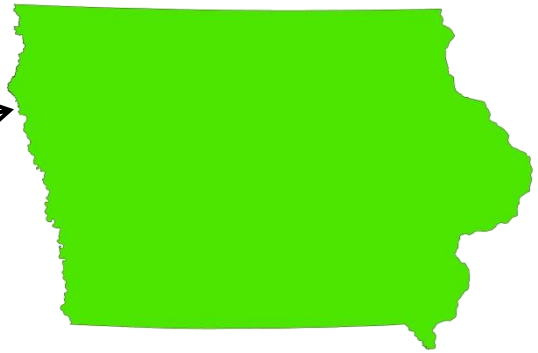
IOWA DEPARTMENT OF AGRICULTURE & LAND STEWARDSHIP

DNR

IOWA STATE UNIVERSITY



United States
4.5% of World Population



Iowa
0.04% of World Population

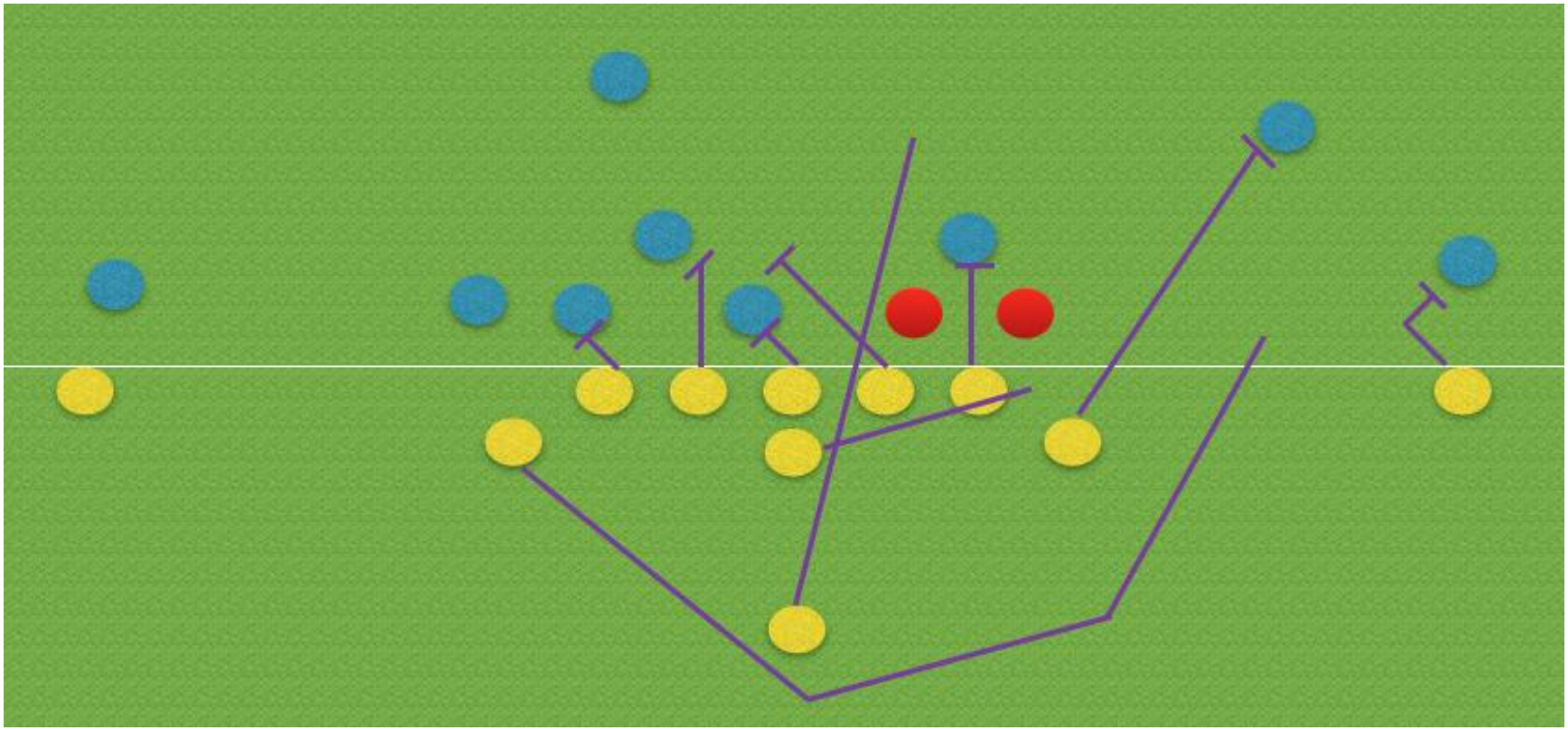
Total Grain Production (Metric Tons)
Iowa – 55 Million
Canada – 45 Million

Total Soybean Production (Metric Tons)
China – 15 Million
Iowa – 14 Million

PS/NPS Collaboration

- Nonpoint sources
  - 41% reduction of statewide N load
  - 29% reduction of statewide P load
- Point sources
  - 4% reduction of statewide N load
  - 16% reduction of statewide P load
- **Combined 45% N and P reductions**

Different Playbooks Available



Nutrient Reduction Strategy Update

Focus on:

- **~100** major municipal wastewater treatment plants
- **~50** industries with biological treatment for process waste
- **Total of ~150 ----- (actual 161)**

Goal:

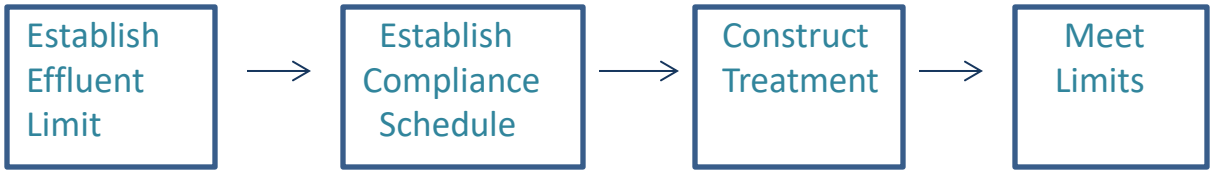
- To achieve BNR equivalent nutrient removal at each plant
  - **TN removal ~66%**
  - **TP removal ~75%**

Secondary
25 mg/l TN
4 mg/L TP

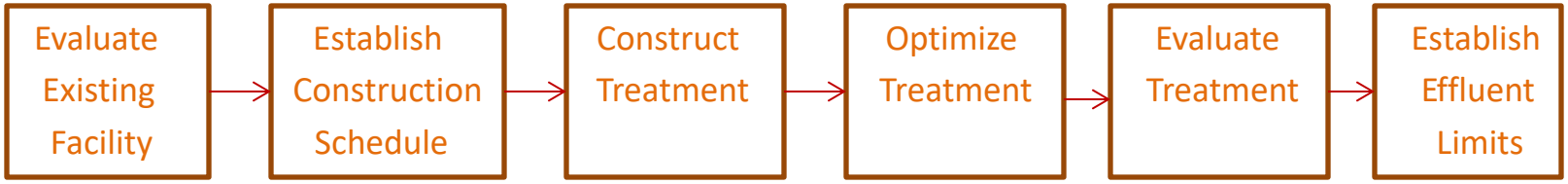
BNR
10 mg/l TN
1 mg/L TP

LOT
3 mg/l TN
0.05 mg/L TP

Normal Permitting Process



Nutrient Permitting Process



Iowa Nutrient Reduction Strategy Recap

- **Focused on Nitrogen and Phosphorus to the Mississippi River**
  - Finalized in May 2013
  - Total TN & TP Reduction Goal: 45% for Non-Point Source (NPS) and Point Source (PS)
- **Integrated Strategy**
  - Non-Point Source: Science Assessment for NPS agricultural producers with voluntary implementation of conservation practices
  - Point Source: Technology/Performance Assessment for major wastewater treatment facilities
- **Estimated Cost**
  - NPS: Initial Investment Costs range from $1.2 to $4 billion
  - PS: Capital and operation costs over 20 years of approximately $1.5 billion
- **Water Quality Trading Included in Final Strategy and Annual Updates**

Iowa Nutrient Reduction Exchange

Iowa Permittee Name: City of Ames			
NRE Project	Yr	Total Nitrogen Reduction	Total Phosphorus Reduction
2021 SWOF Cover Crops - Ames	2021	34383.6	2386.9
2022 SWOF Cover Crops	2022	20583.1	1144.8
2023 Bioreactor Batch and Build	2023	2652.98	
		57619.68	**3531.7**

Iowa Permittee Name: City of Cedar Rapids			
NRE Project	Yr	Total Nitrogen Reduction	Total Phosphorus Reduction
City of Cedar Rapids - 2019-2023 - WPC Farmland Retirement	2019	2498.5	256.5
City of Cedar Rapids - 2020 Submission - Part 2	2020	520	11.2
City of Cedar Rapids - 2020 Nutrient Reduction Practices on City-Owned Farmland	2020	10187	225.4
City of Cedar Rapids - 2021 Nutrient Reduction Practices on City-Owned Farmland	2021	17636	929.3
Soil & Water Outcomes Fund - Cedar Rapids - 2021	2021	140753.5	8365.8
City of Cedar Rapids - 2022 Nutrient Reduction Practices on City-Owned Farmland	2022	25700.83	1401.66
Soil & Water Outcomes Fund - City of Cedar Rapids - 2022	2022	130501.3	7507
		327797.13	**18696.86**

Iowa Permittee Name: City of Des Moines			
NRE Project	Yr	Total Nitrogen Reduction	Total Phosphorus Reduction
City of Des Moines - Rothfus Bio-reactor	2017	29.4	
		29.4	

Gulf Restoration Network v. EPA

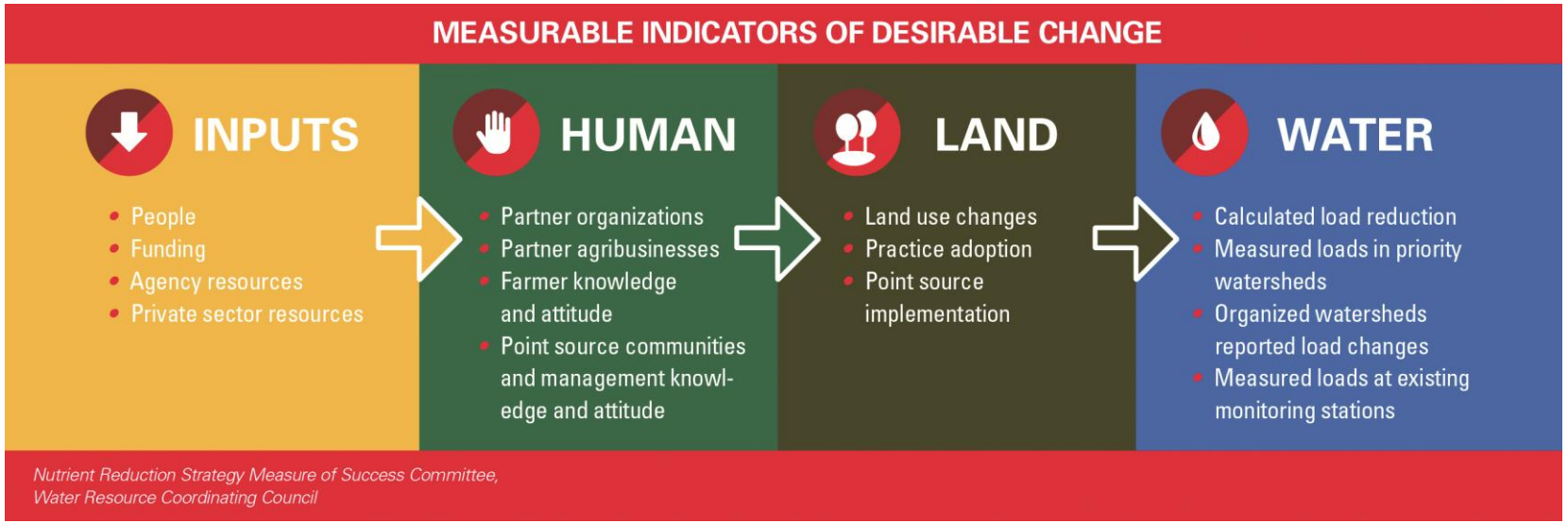
- Decision in December 2016

- **Upheld EPA denial petition for rulemaking to establish numeric nutrient criteria for states within the Mississippi basin**

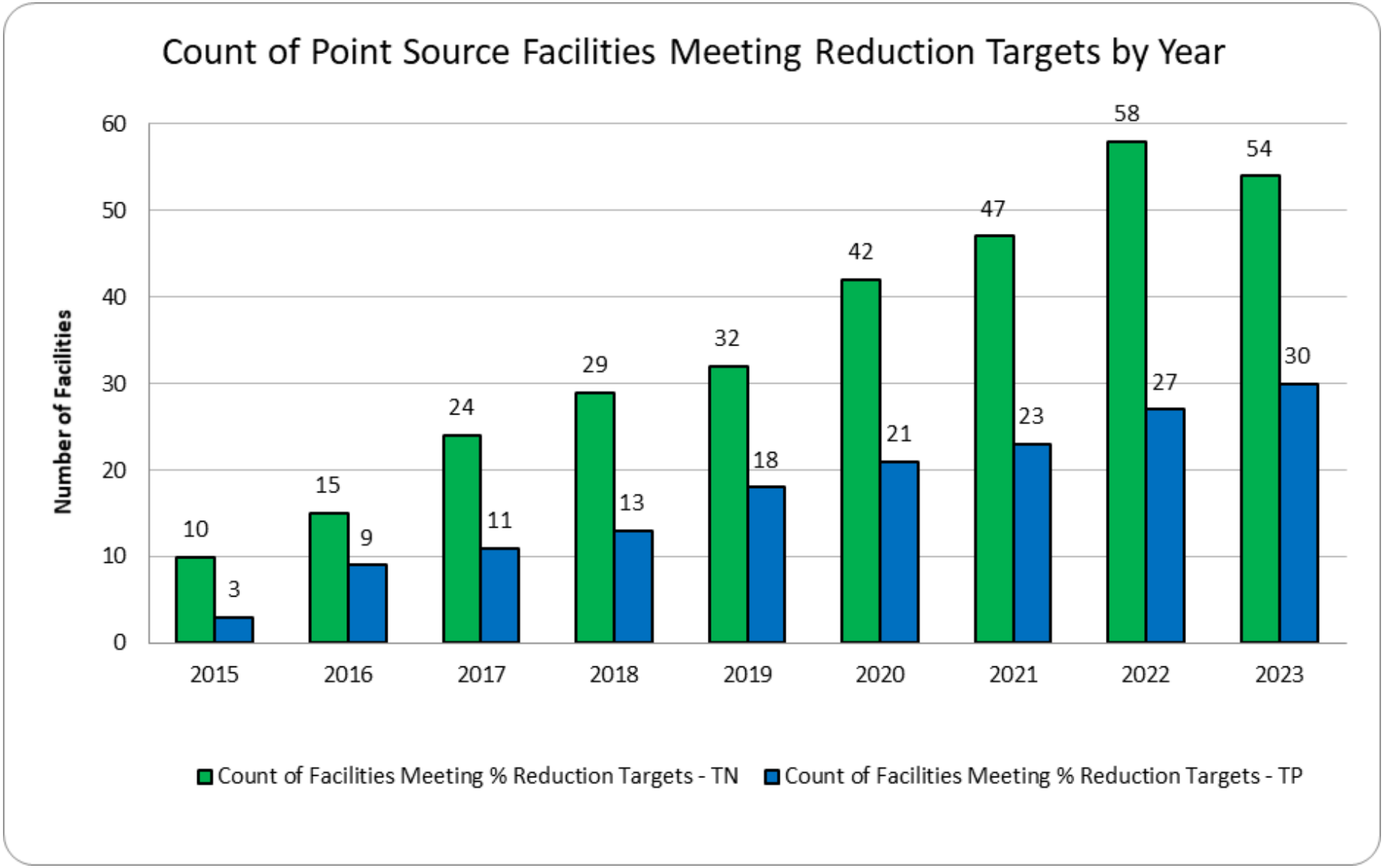
- Court found that "the most effective and sustainable way to address widespread and pervasive nutrient pollution in the Mississippi-Atchafalaya River Basin and elsewhere would be to build on its earlier efforts and to continue to work cooperatively with states and tribes to strengthen nutrient management programs" is a valid legal basis to decline to make a necessity determination

- Court also noted that the use of nutrient reduction frameworks **may only buy EPA so much time** if they can't prove they're working

How do you know when the Nutrient Reduction Strategy is successful?



https://nrstracking.cals.iastate.edu/


Count of Point Source Facilities Meeting Reduction Targets by Year
Number of Facilities
60
50
40
30
20
10
0
10
3
15
9
24
11
29
13
32
18
42
21
47
23
58
27
54
30
2015
2016
2017
2018
2019
2020
2021
2022
2023
Count of Facilities Meeting % Reduction Targets - TN
Count of Facilities Meeting % Reduction Targets - TP

Design Flow Considerations

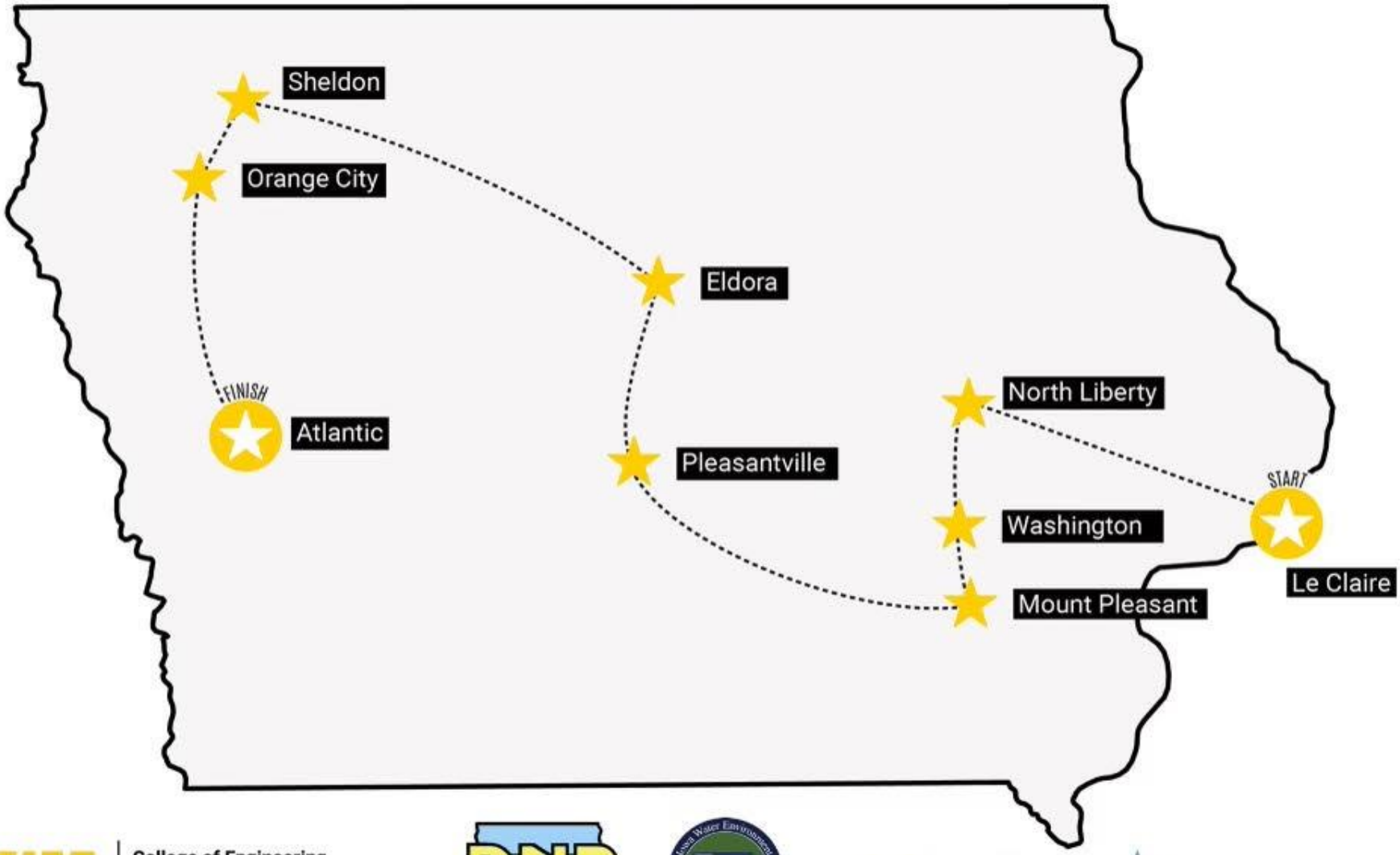
Total Municipal Design Flow Under the Strategy:

655.5 MGD

FACILITY NAME	TREATMENT TYPE	Design Flow (MGD)	% of Overall Municipal Flow
DES MOINES	ACTIVATED SLUDGE	134	20.4%
CEDAR RAPIDS	ACTIVATED SLUDGE	56	8.54%
WATERLOO	ACTIVATED SLUDGE	34.8	5.31%
DAVENPORT	ACTIVATED SLUDGE	26	3.97%
IOWA CITY	ACTIVATED SLUDGE	24.2	3.69%
SIOUX CITY	ACTIVATED SLUDGE	17.6	2.68%
FORT DODGE	ACTIVATED SLUDGE	15	2.29%
MASON CITY	ACTIVATED SLUDGE	14.9	2.27%
COUNCIL BLUFFS	TRICKLING FILTER	14	2.14%
DUBUQUE	ACTIVATED SLUDGE	13.47	2.05%

THE 2022 GREAT WASTEWATER TREATMENT TOUR ACROSS IOWA

August 15th - 19th



IOWA College of Engineering
Wastewater and Waste to Energy Research Program

DNR

IAWEA

IOWA economic development

GRANT TECH
GrantTechSolutions.com

Top 10 - 2023 Nitrogen Removal

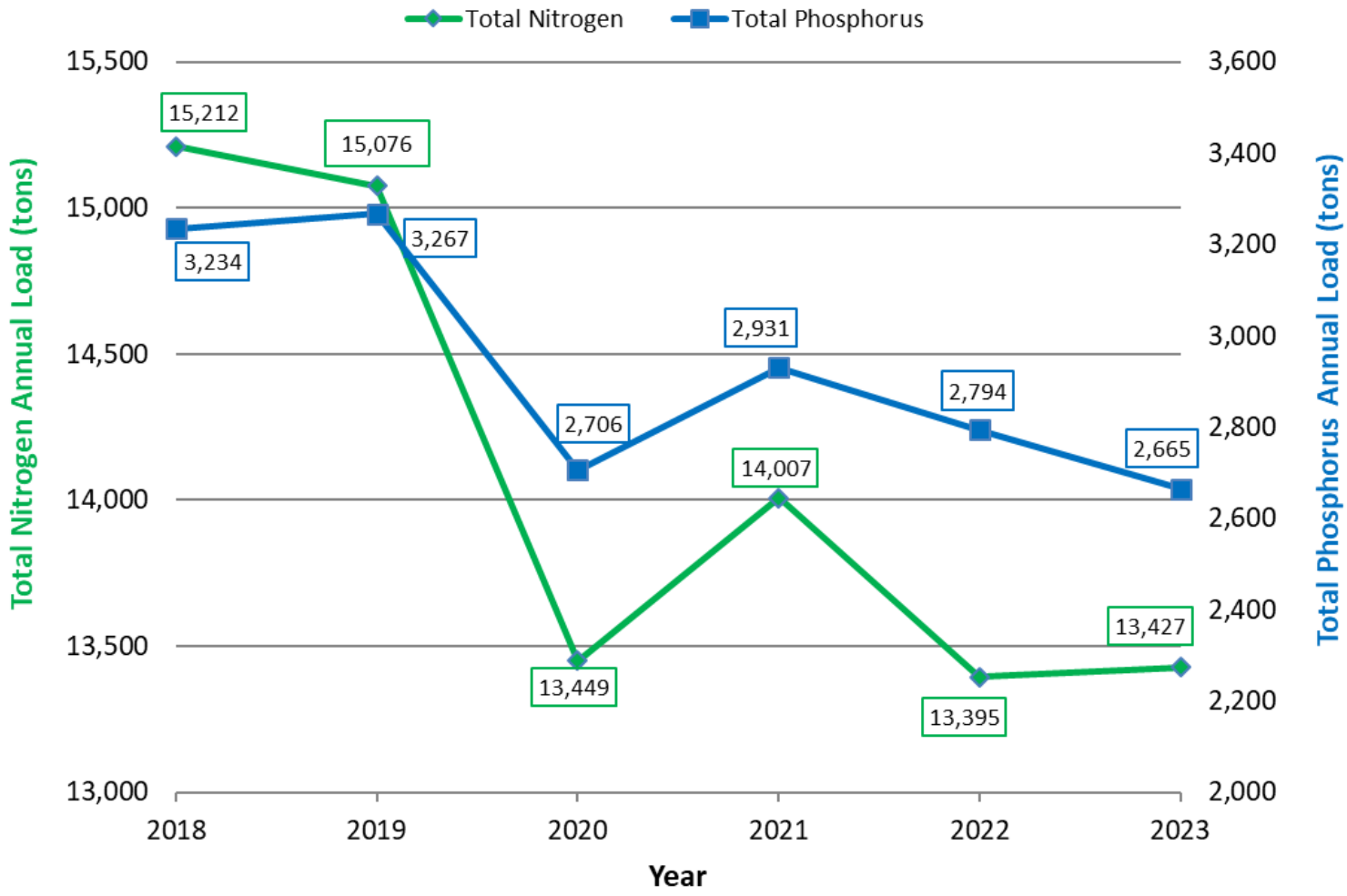
1. ATLANTIC	-	**97.4%**
2. NORTH LIBERTY	-	**90.9%**
3. WAPELLO	**UP 2**	**90.8%**
4. CORALVILLE	**UP 6**	**90.8%**
5. OELWEIN	**UP 1**	**90.5%**
6. ANAMOSA	**NEW**	**89.5%**
7. GRUNDY CENTER	**NEW**	**86.7%**
8. CLARINDA	**DOWN 5**	**86.7%**
9. WAUKON	**NEW**	**85.6%**
10. DYERSVILLE	**DOWN 2**	**85.2%**

Top 10 – 2023 Phosphorus Removal

1. ATLANTIC	**UP 2**	**95.3%**
2. EAGLE GROVE	**UP 4**	**94.0%**
3. CLINTON	**DOWN 1**	**92.7%**
4. SIOUX CENTER	**NEW**	**88.9%**
5. DYERSVILLE	**-**	**87.3%**
6. CARROLL	**DOWN 2**	**87.2%**
7. GRIMES	**UP1**	**86.2%**
8. GRUNDY CENTER	**DOWN 7**	**85.7%**
9. WAUKON	**NEW**	**82.7%**
10. SIOUX CITY	**NEW**	**82.5%**

Iowa Point Source Annual Nutrient Loads, 2018-2023

Major POTWs, Minor Domestic, and Industrial w/BTP (estimates included)

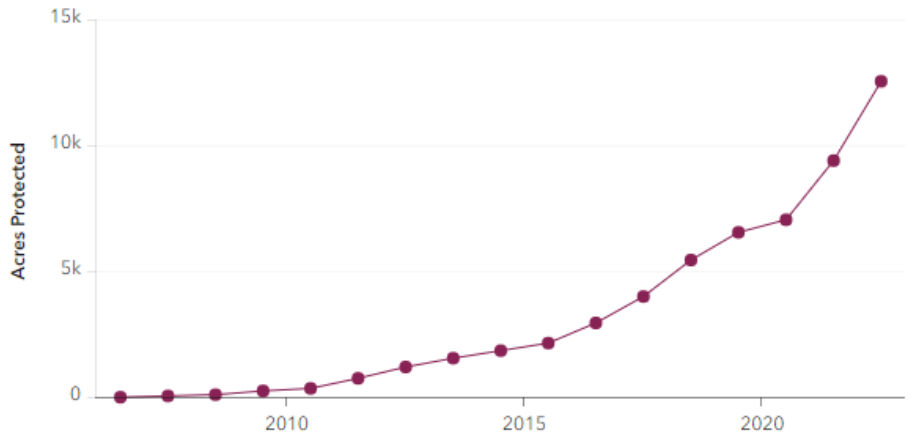


Iowa Nutrient Reduction Strategy - Edge-of-Field Practices and Structural Erosion Control (Updated May 2024

This dashboard presents nonpoint source – or agricultural – efforts to reduce nutrient loss via edge-of-field conservation practices and structural erosion control. To view other related dashboa

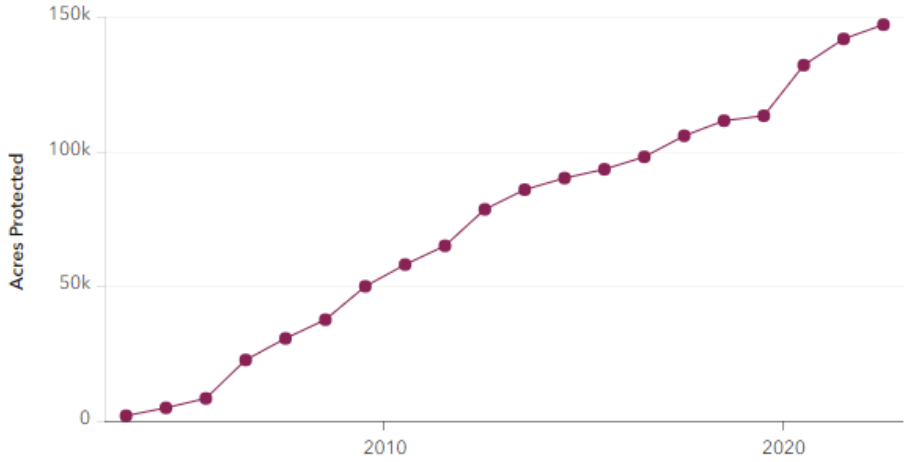
This dashboard is best viewed on a web browser, and may present difficulties in mobile format. Accessibility information can be accessed here.

Cumulative Acres Protected by Bioreactors, Saturated Buffers, and Multi-Purpose Oxbows Installed in Iowa Since 2006



Edge-of-Field Prac. - Cumu. | Edge-of-Field Prac. - Annual | Description

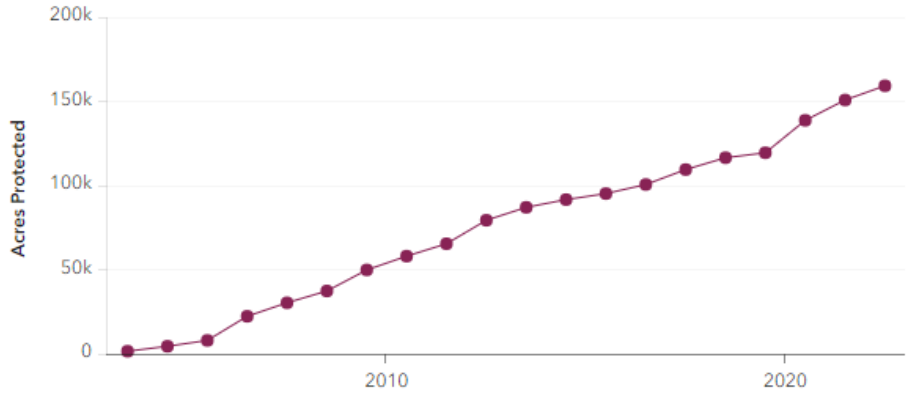
Cumulative Acres Protected by Water Quality Wetlands Installed in Iowa



Wetlands - Cumulative | Wetlands - Annual | Description

Cumulative Acres that Protect Tile Drained Land in Iowa Since 2004

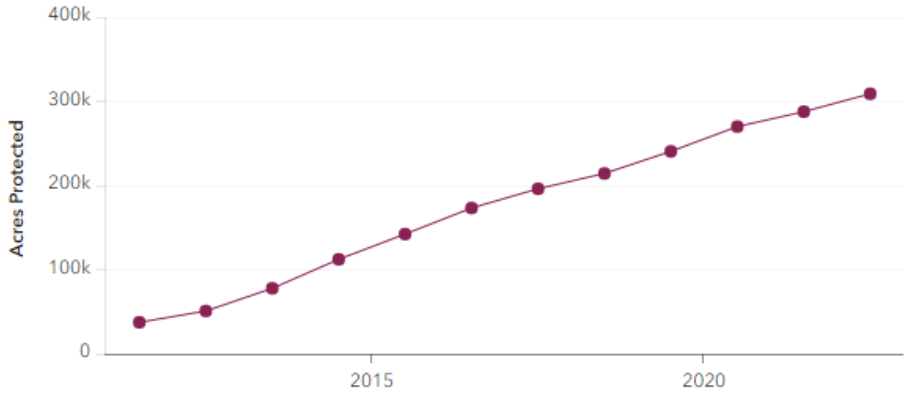
Practices Included: Bioreactors, Saturated Buffers, Multi-Purpose Oxbows, and Water Quality Wetlands



Drainage Area - Cumulative | Drainage Area - Annual

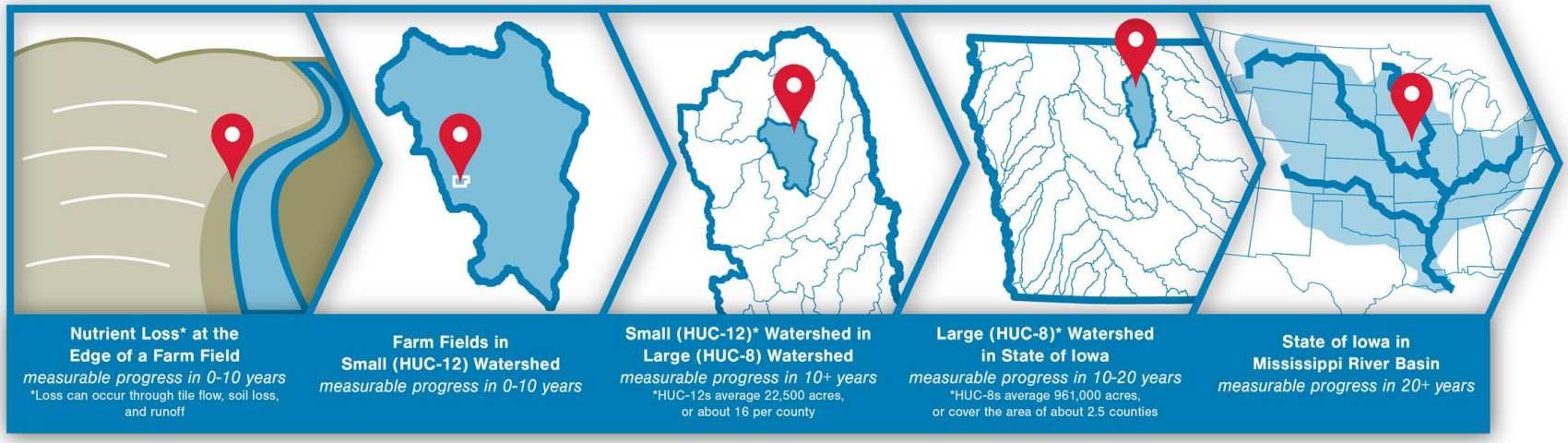
Cumulative Acres Protected by Structural Erosion Control Practices Installed in Iowa Since 2011

Terraces, Ponds, Grade Stabilization, and Water & Sediment Control Basins

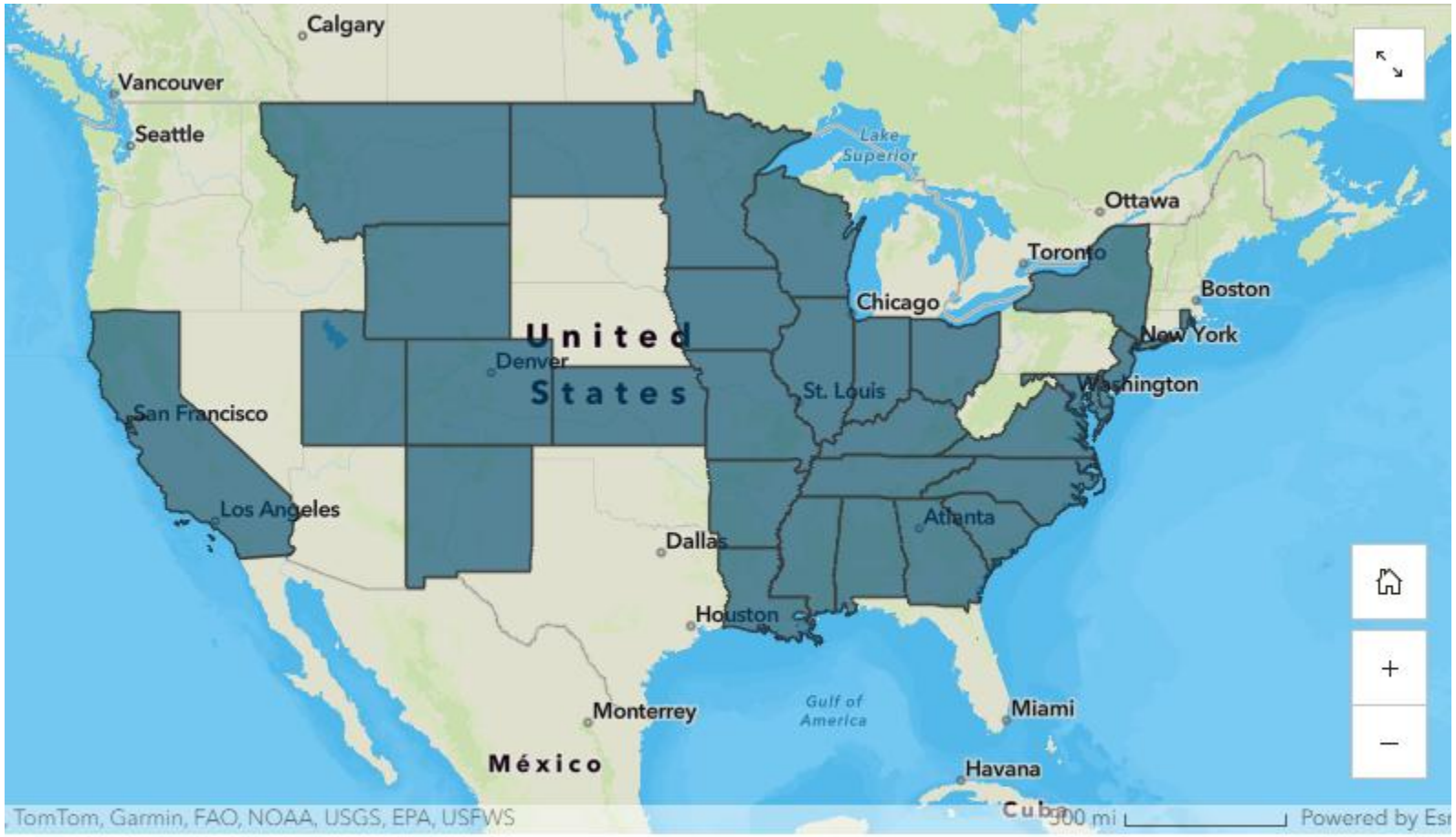


Erosion Control - Cumulative | Erosion Control - Annual | Description

Nutrient Water Quality Monitoring Framework



EPA Story Map – April 2025



States with a Nutrient Reduction Strategy

THANK YOU

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