



Exploring positive synergies between water quality and wildlife in Iowa wetlands

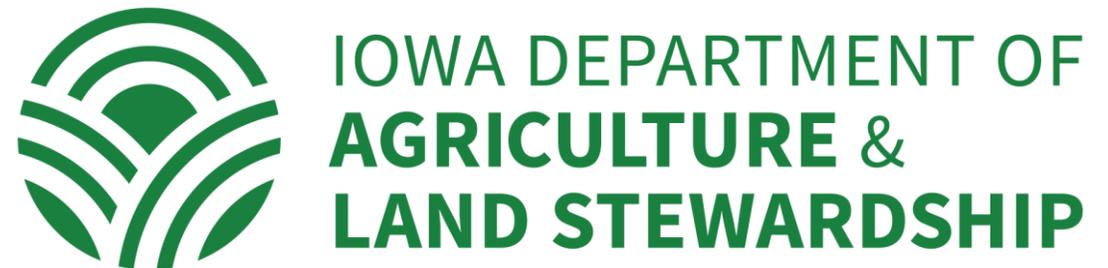
Mic Rohde*, Jayden Jech, Adam Janke

Acknowledgements

- Landowners

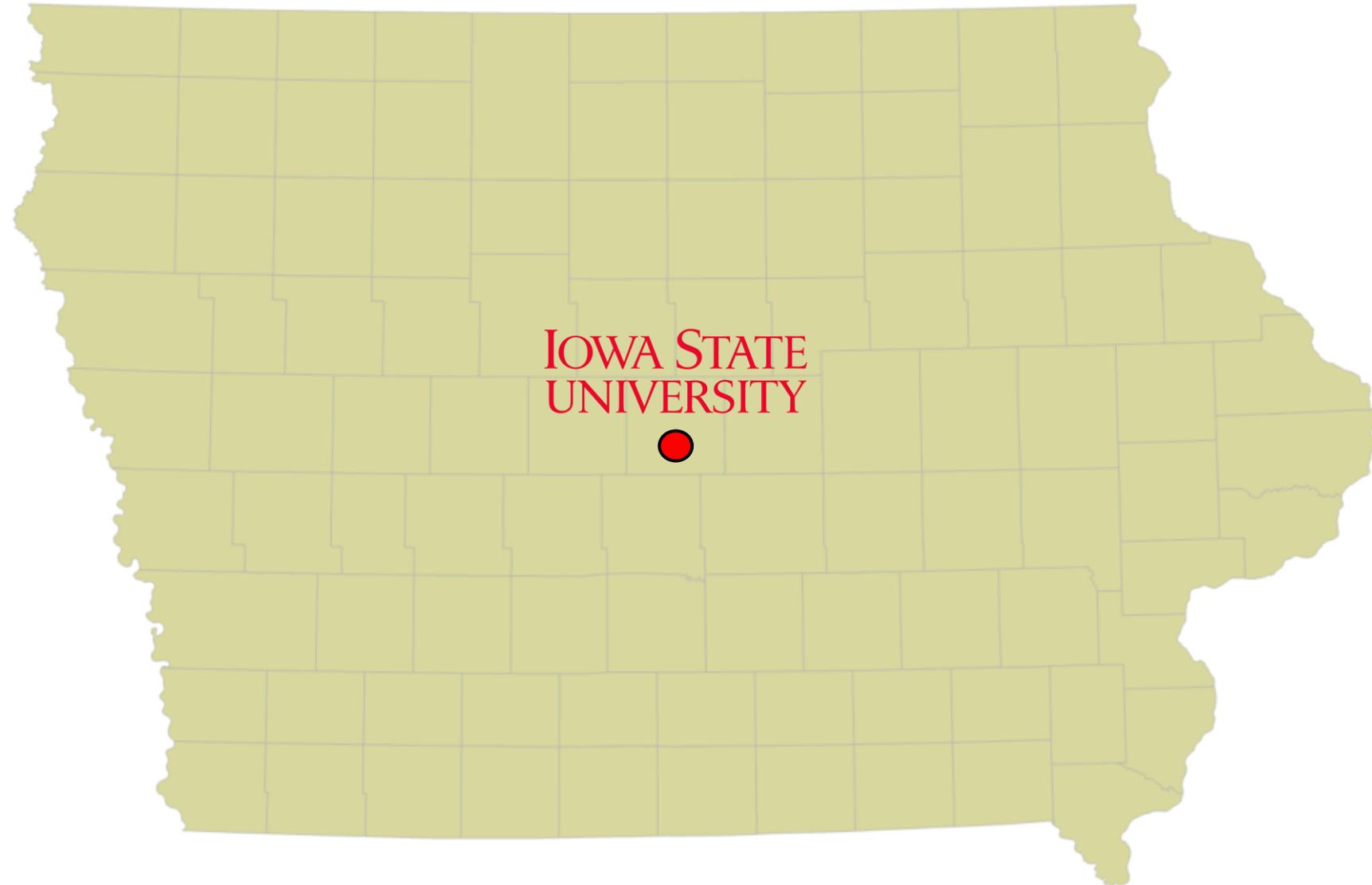


**IOWA STATE
UNIVERSITY**



Who am I?

- PhD Candidate
- Wildlife ecology



Who am I?



Objectives

- Water quality issues
- Wetlands as BMP's
- Wetland Design
- Partners - Funding
- Research - Findings



A 'dead zone' about the size of New Jersey lurks in the Gulf of Mexico

A dead zone occurs at the bottom of a body of water when there isn't enough oxygen in the water to support marine life.



For decades, an oxygen-depleted "dead zone" that is harmful to sea life has appeared in the Gulf of Mexico in a region off Louisiana and Texas. This year, it's larger than average, federal scientists announced in a report out Thursday.

The 2024 zone is about 6,705 square miles, which is an area roughly the size of New Jersey.

That makes this year's dead zone among the top third of largest dead zones in records that go back 38 years, the National Oceanic and Atmospheric Administration (NOAA) said. The average size of the dead zone is 4,298 square



HEALTH

A 'dead zone'
Jersey

A dead zone (low oxygen) in the

Central Iowa Water Works issues first-time lawn-watering ban as nitrate crisis intensifies



Donnelle Eller

Des Moines Register

June 12, 2025 | Updated June 13, 2025, 3:51 p.m. CT

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That makes t
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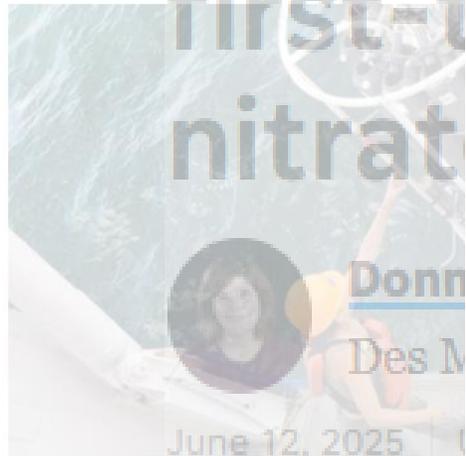
Administrati

For the first time on record, the Des Moines region's water authority has banned its 600,000 commercial and residential customers from watering their lawns, effective immediately, as high levels of nitrate pollutants in the Raccoon and Des Moines rivers threaten to outstrip its treatment capabilities.

HEALTH

A 'dead zone' a
Jersey lurks in

A dead zone occurs at the bottom
oxygen in the water to support



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These 20 Iowa beaches are unsafe for swimming, Iowa DNR, local water monitoring shows



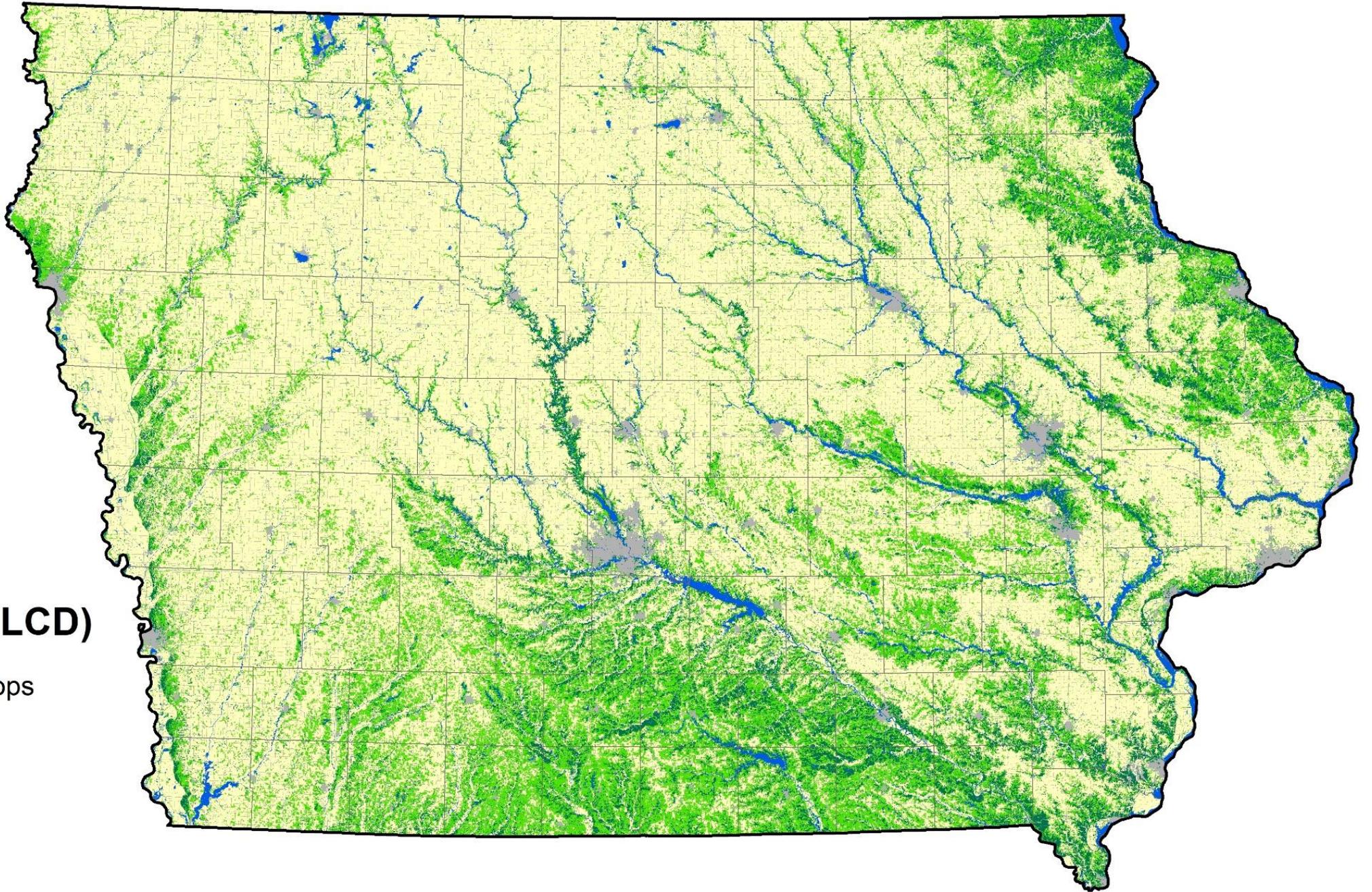
Victoria Reyna-Rodriguez

Des Moines Register

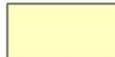
Updated Aug. 15, 2025, 11:18 a.m. CT

As summer nears its end, beaches are still being added to the not recommended for swimming list, according to the latest [Iowa Department of Natural Resources](#) beach monitoring report released Friday, Aug. 15.

Eighteen beaches monitored by the state and two Des Moines-area beaches tested high for E. coli or toxic algae.

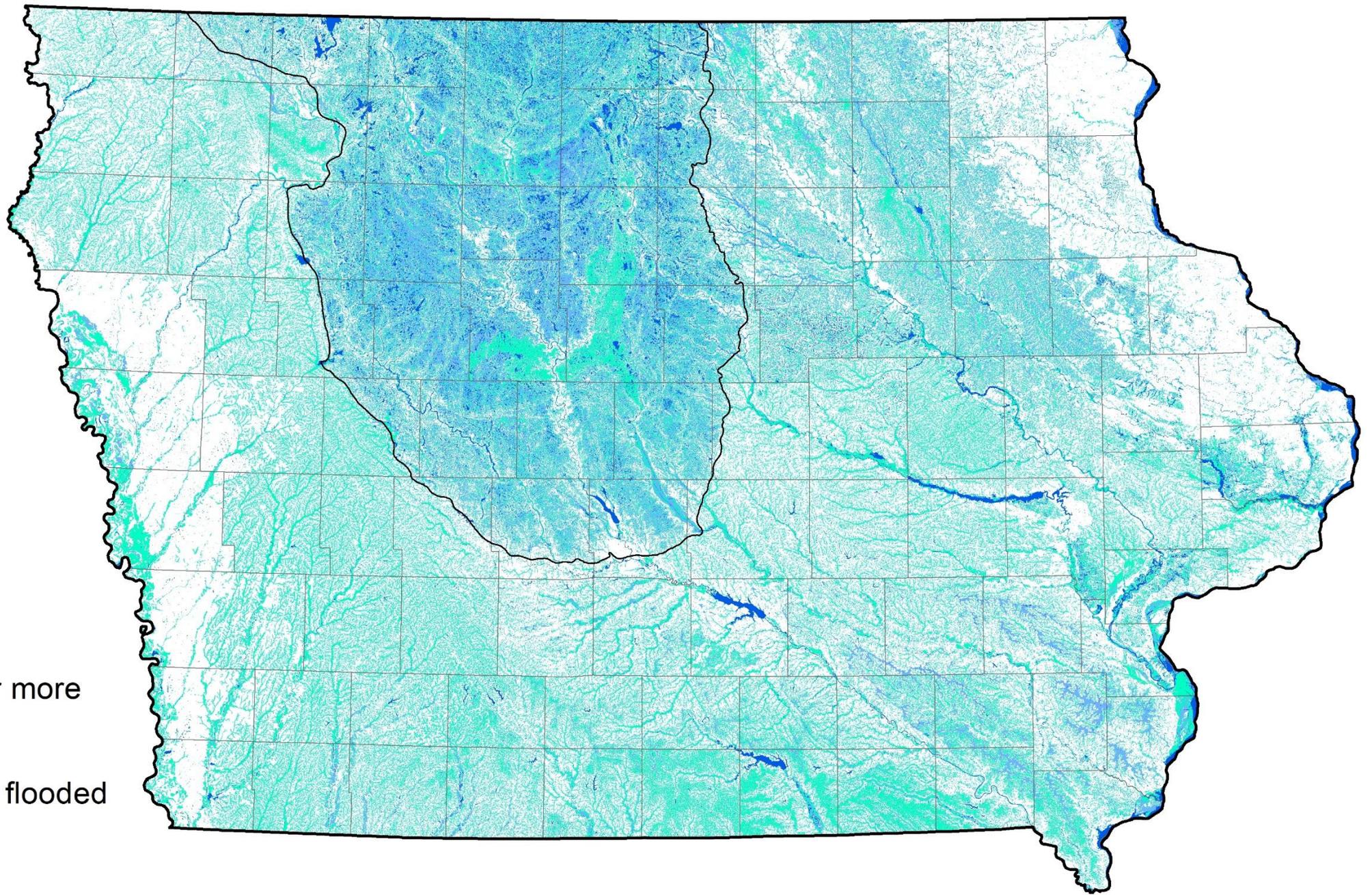


Land cover (NLCD)

-  Cultivated Crops
-  Forest
-  Developed
-  Water
-  Grass

Hydric soils

-  Seasonal or more
-  Saturated
-  Temporarily flooded



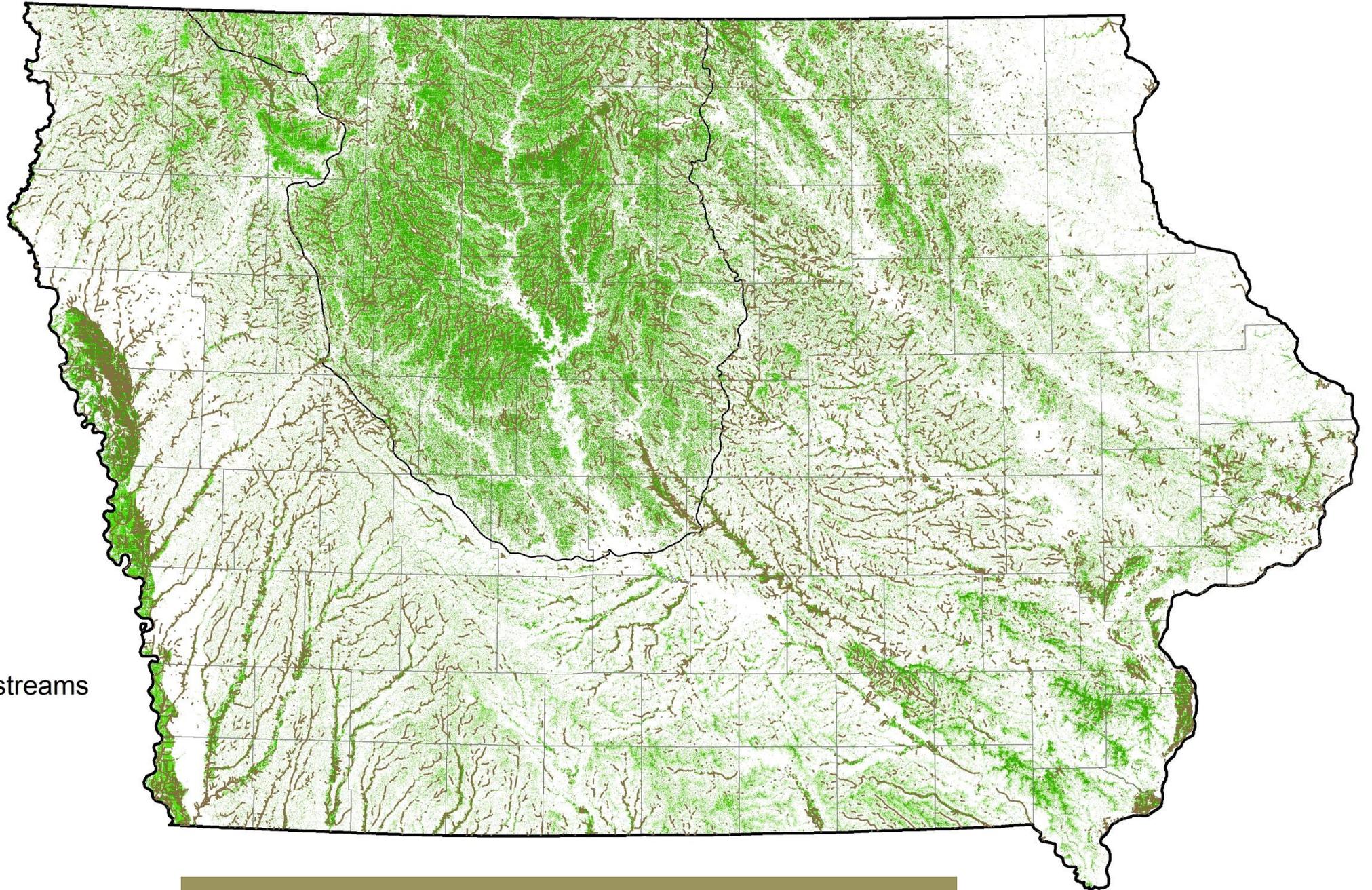
Source: Miller et al. 2009 Wetlands 29:1146-1152; glsi.agron.iastate.edu



Drainage

— Channelized streams

Source: Iowa DNR



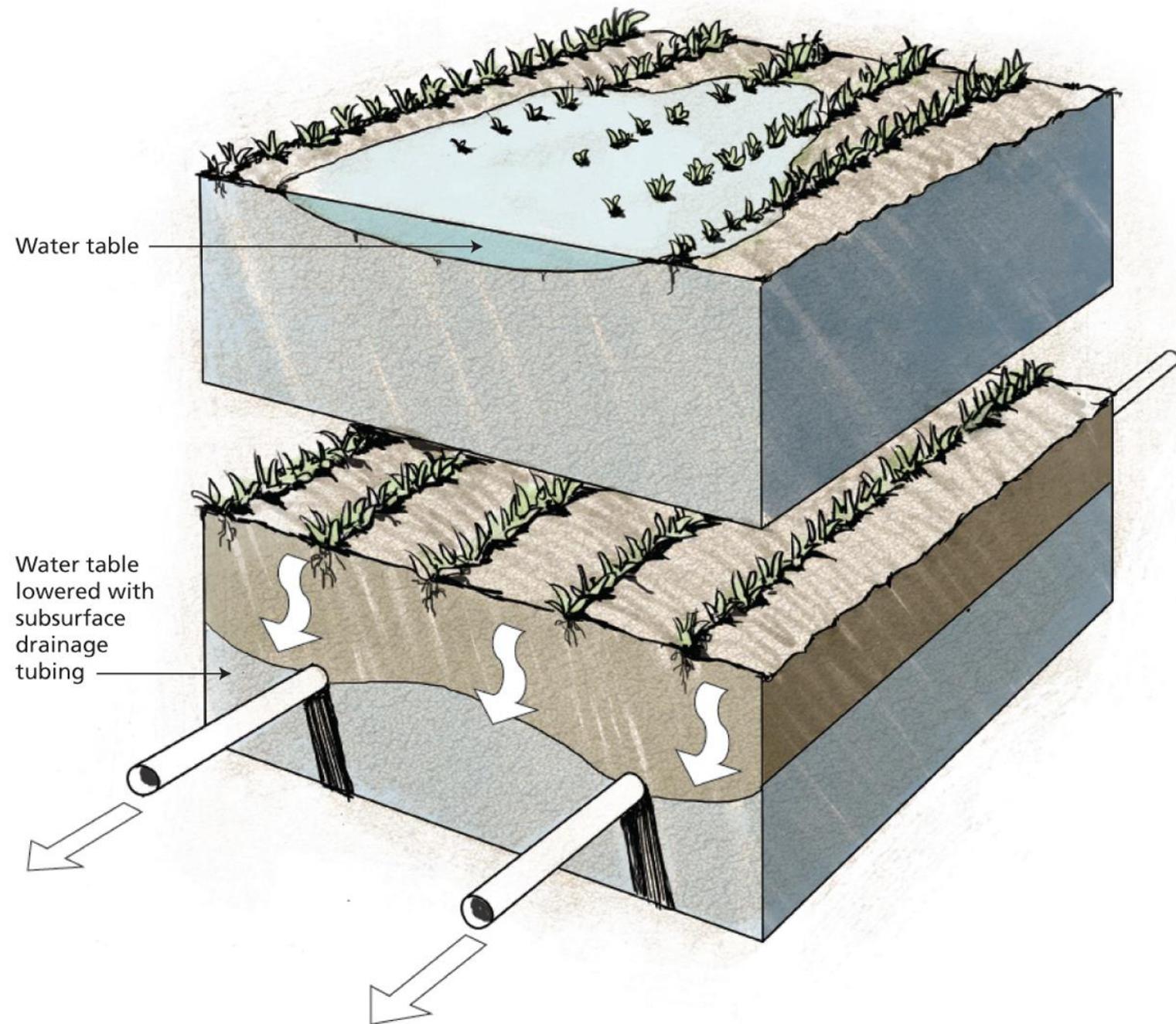
Drainage

- Channelized streams
- None
- Low
- Moderate
- High

Source: Horvath et al. 2017. Ecological Indicators 83:463-473.

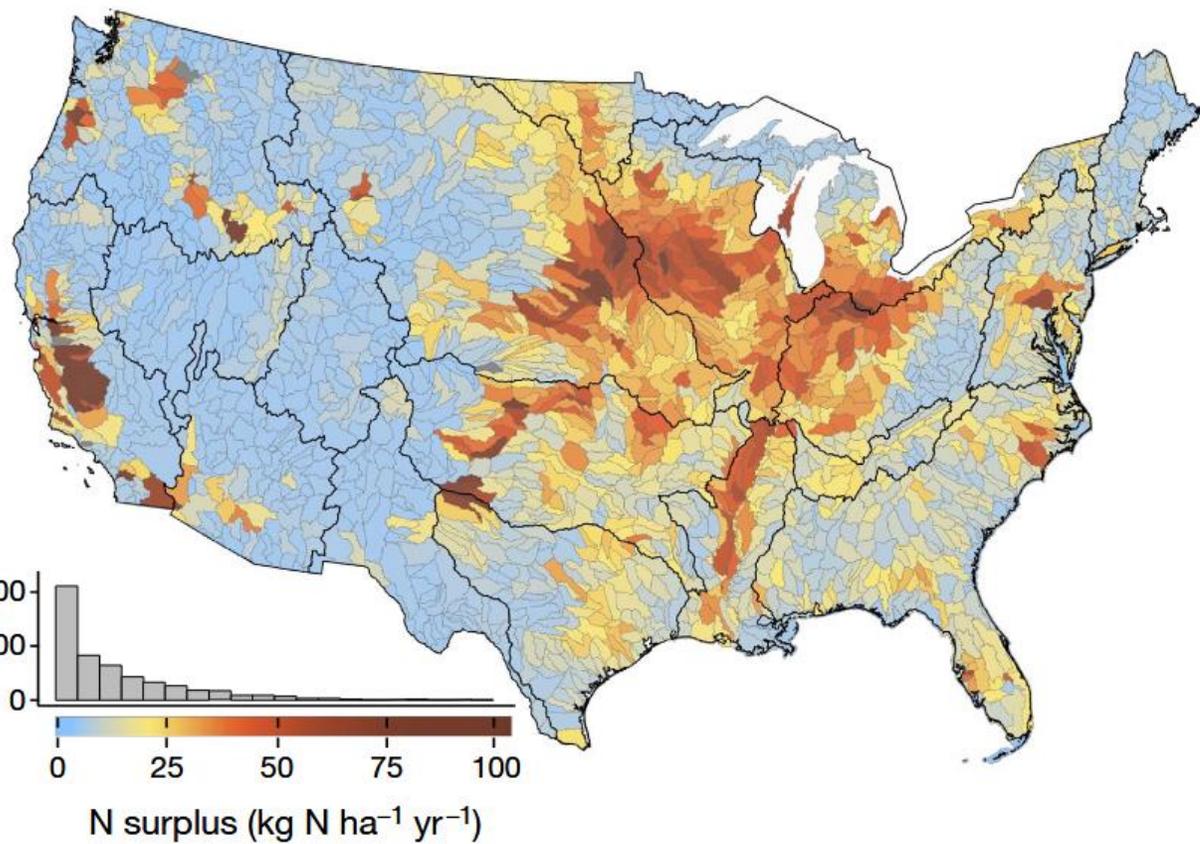
Agricultural Drainage

- Water table near surface
- Sub-surface drainage
 - Water table lowered
 - Increase yields
 - Mainline nitrate downstream

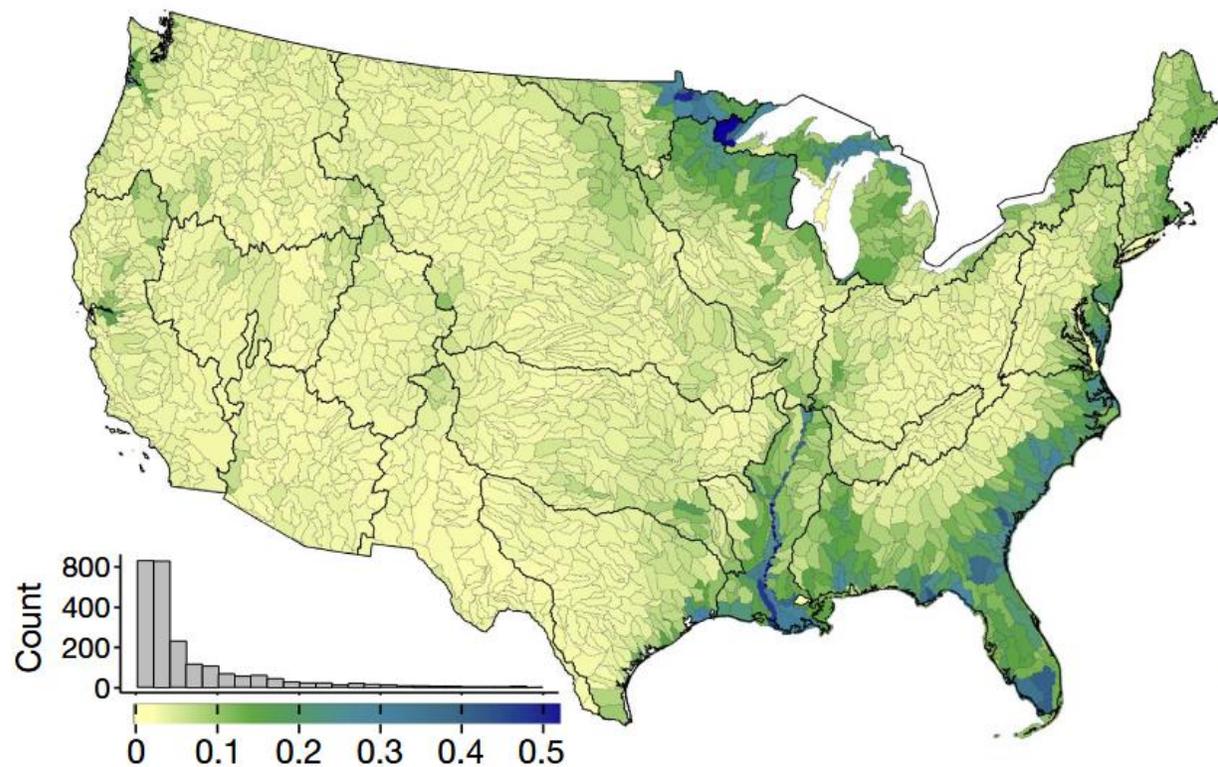


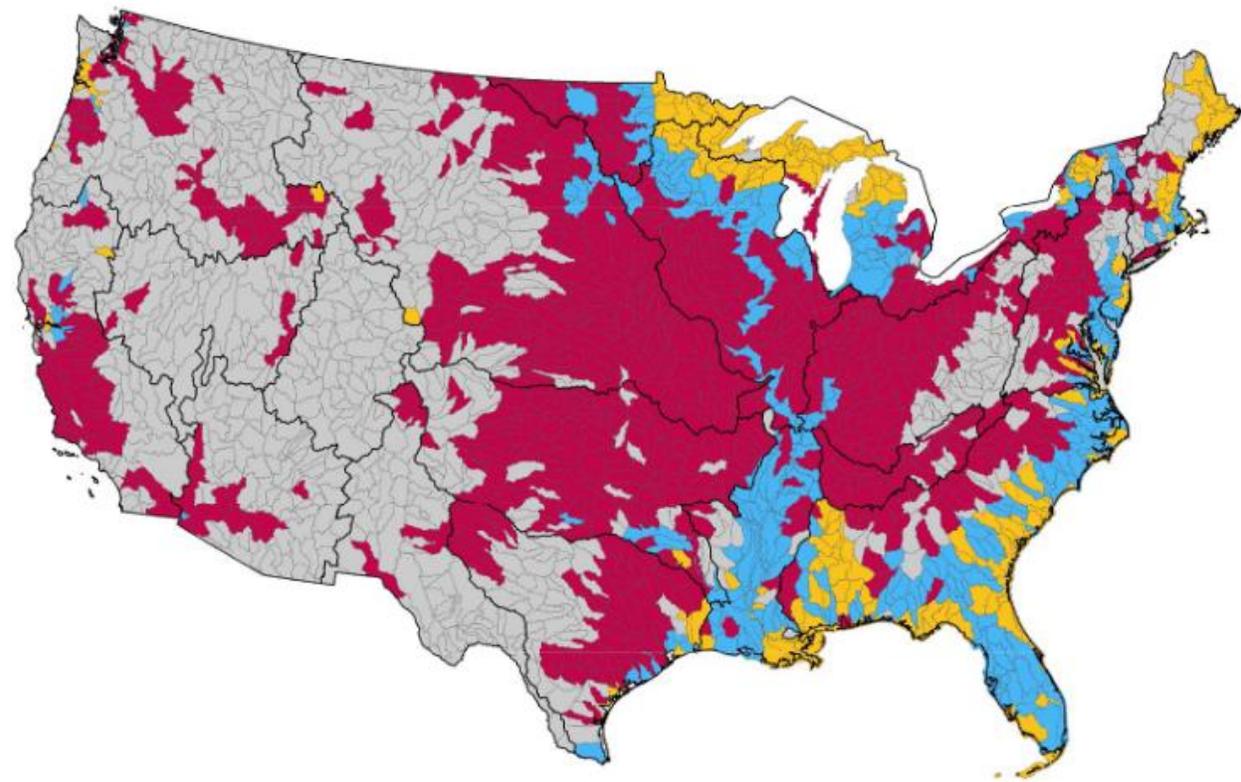
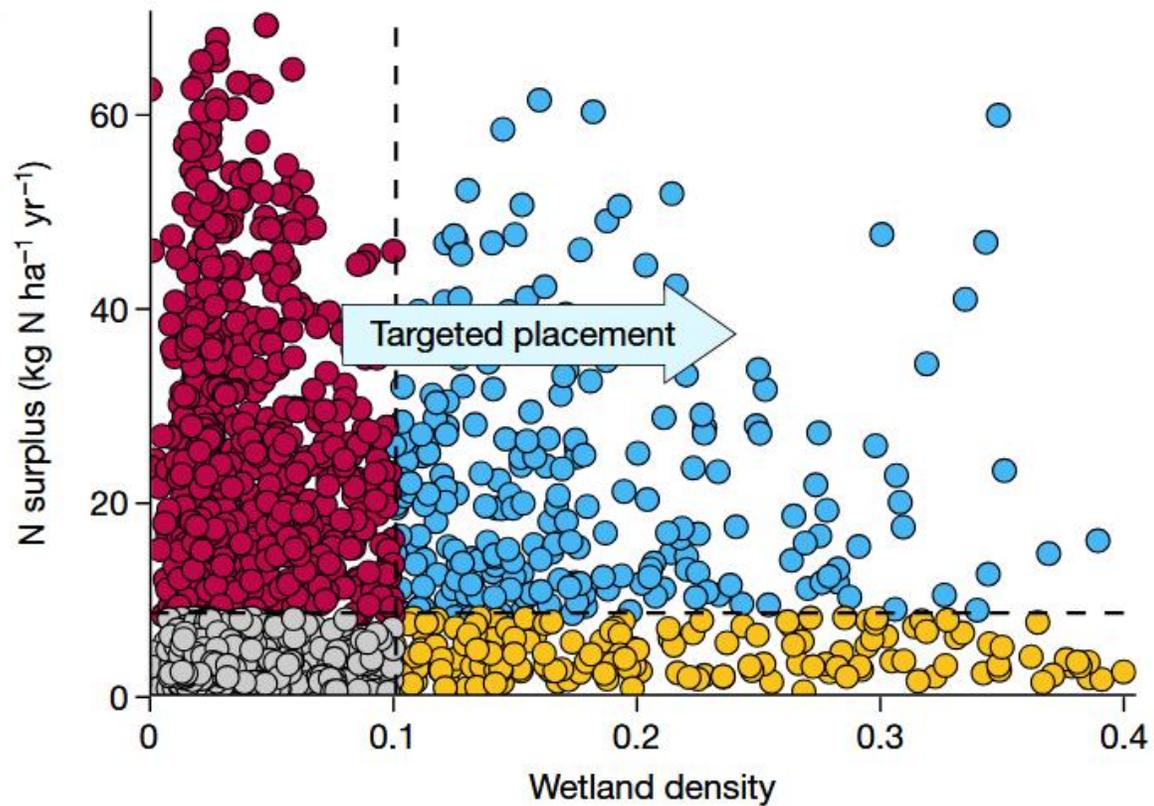
Maximizing US nitrate removal through wetland protection and restoration

Nitrate surplus



Wetland Density





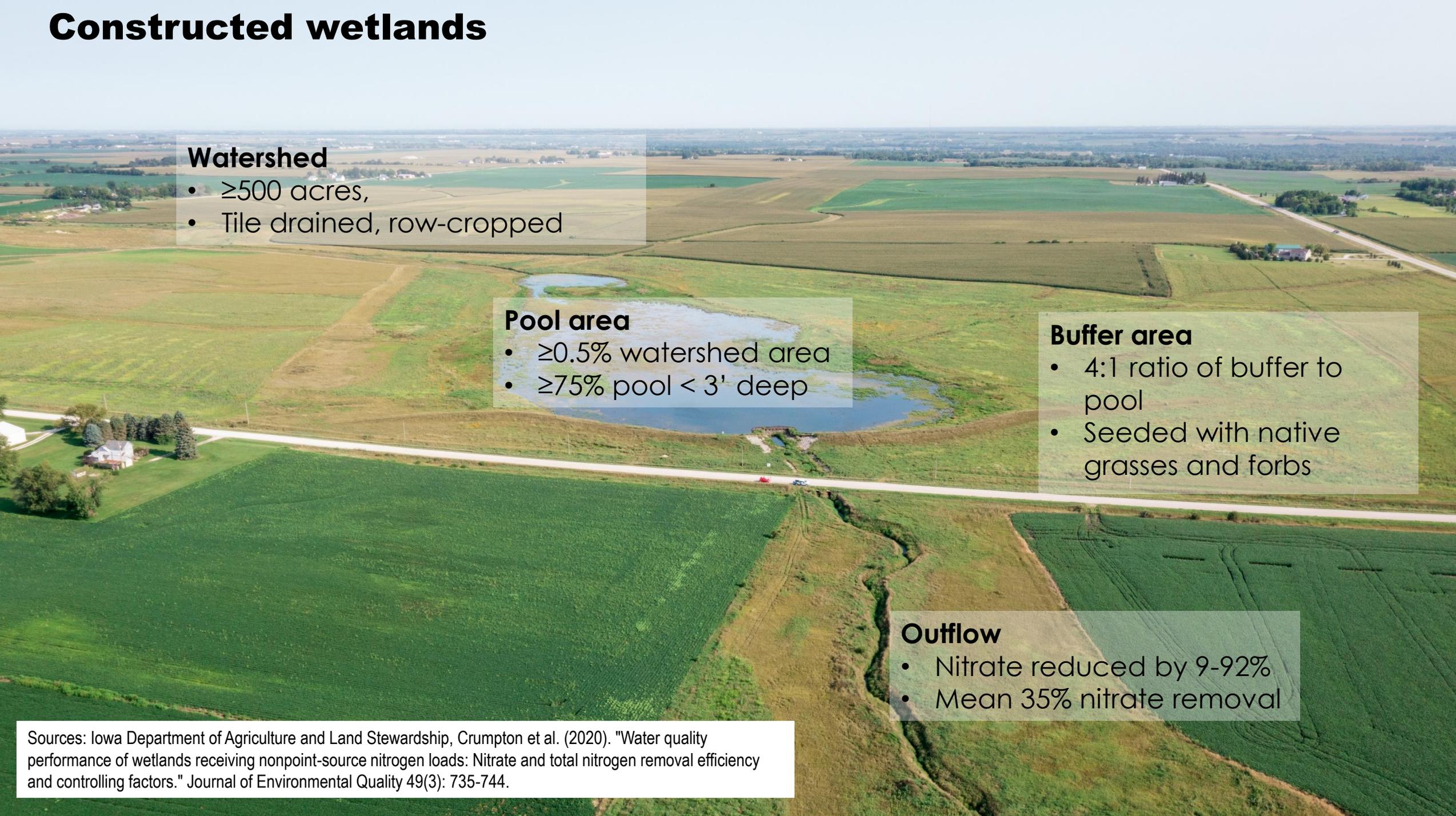
■ Wetland-limited

■ High-input, wetland-abundant

■ Low-input, low-wetland

■ Low-input, wetland-abundant

Constructed wetlands

An aerial photograph showing a constructed wetland in a rural landscape. The wetland consists of a central pool of water surrounded by a buffer area of native grasses and forbs. The surrounding area is dominated by large, rectangular fields of corn, some of which are green and others are yellow, indicating different stages of growth or harvest. A dirt road runs horizontally across the middle of the image, with a few vehicles visible. In the background, there are scattered houses and more fields under a clear sky.

Watershed

- ≥ 500 acres,
- Tile drained, row-cropped

Pool area

- $\geq 0.5\%$ watershed area
- $\geq 75\%$ pool $< 3'$ deep

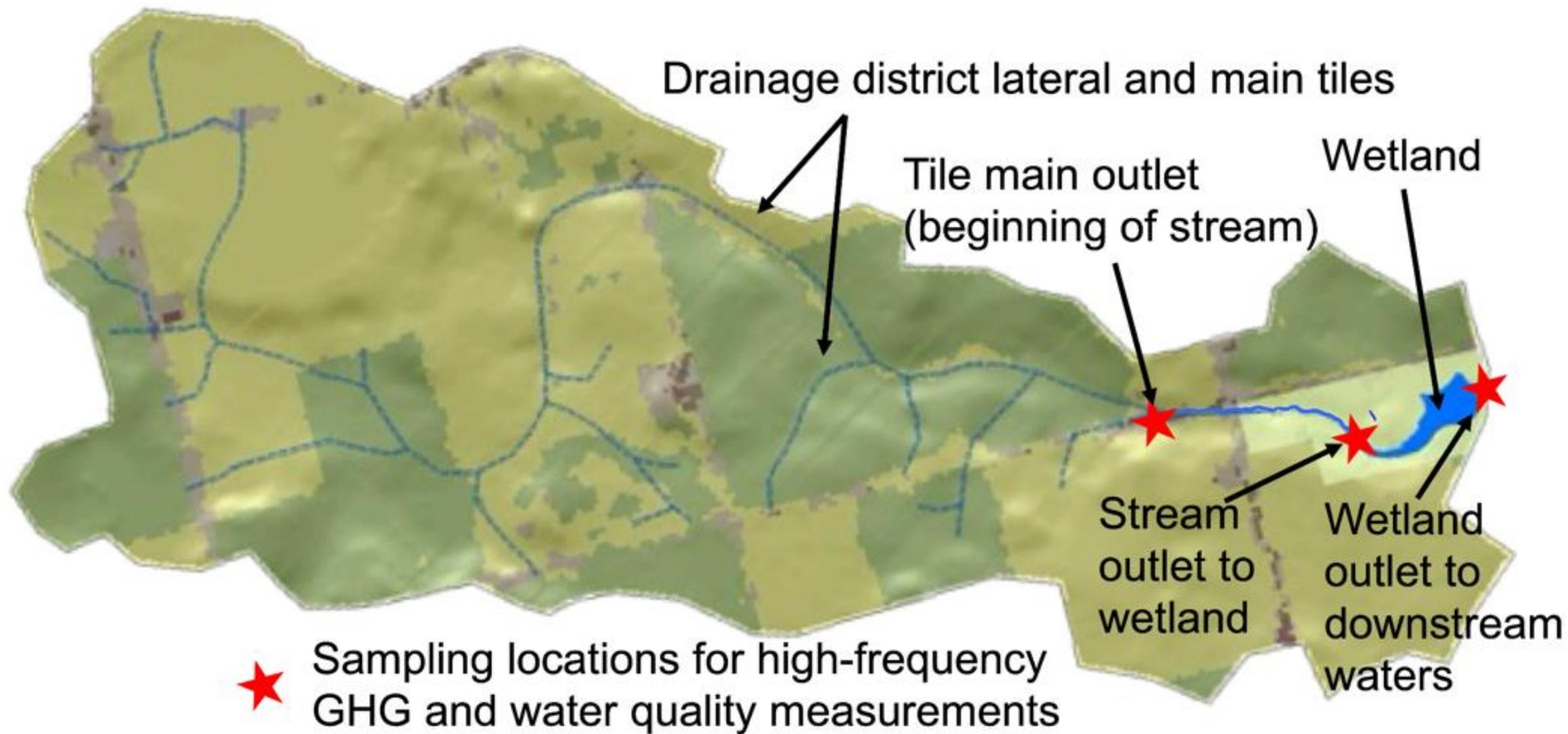
Buffer area

- 4:1 ratio of buffer to pool
- Seeded with native grasses and forbs

Outflow

- Nitrate reduced by 9-92%
- Mean 35% nitrate removal

Sources: Iowa Department of Agriculture and Land Stewardship, Crumpton et al. (2020). "Water quality performance of wetlands receiving nonpoint-source nitrogen loads: Nitrate and total nitrogen removal efficiency and controlling factors." *Journal of Environmental Quality* 49(3): 735-744.

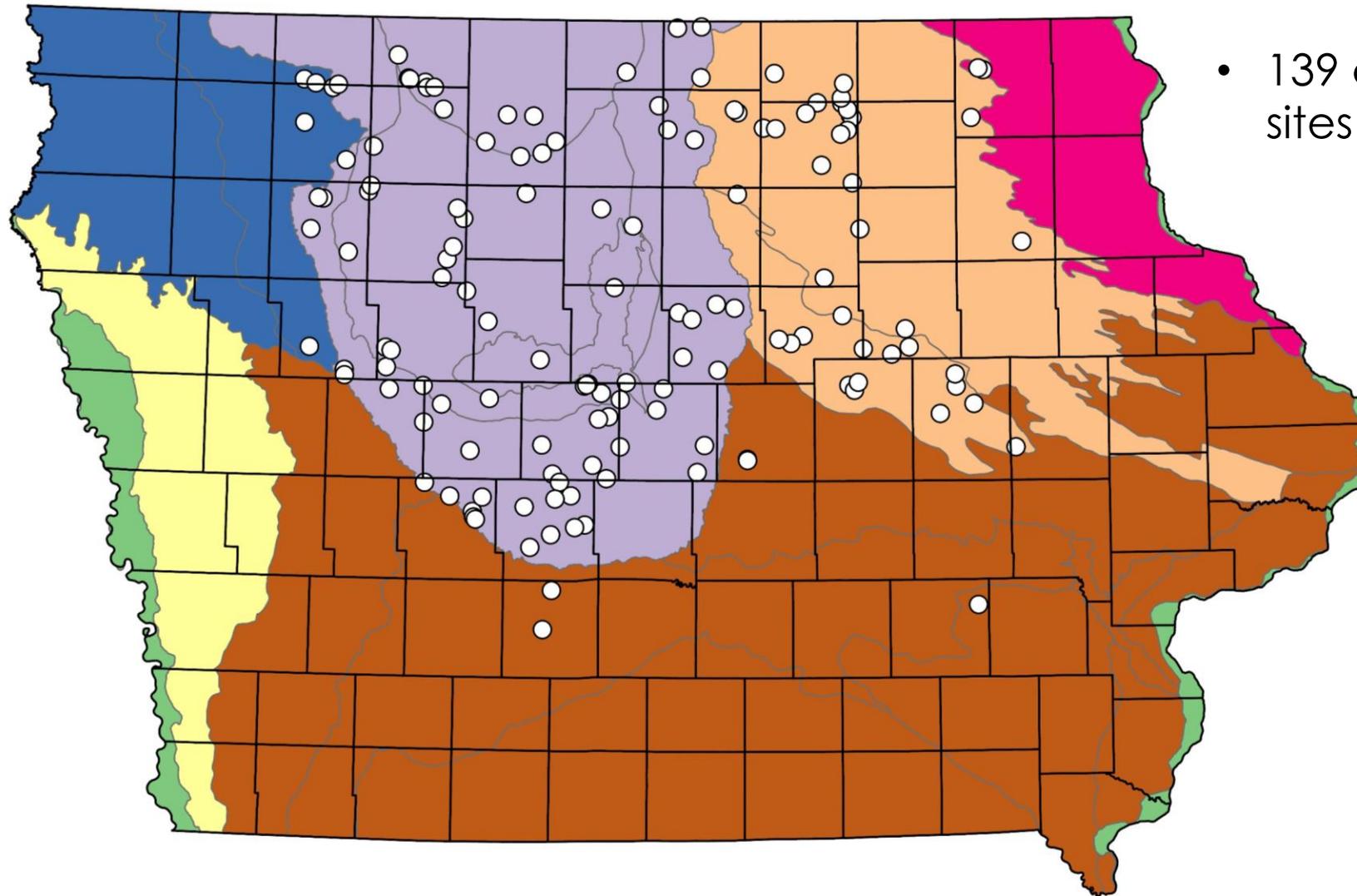


How do these get built - Partners and funding



- 100% cost-share for wetland and buffer
- 1-time incentive to enter 30 or perpetual easement

- 15-year rental payments at 150% avg. soil rental rate
- Partners like DU support in various ways



• 139 completed sites

Iowa Landforms

- | | |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|  Alluvial Plain |  Loess Hills |
|  Des Moines Lobe |  Northwest Plains |
|  Iowan Erosion Surface |  Paleozoic Plateau |
| |  Southern Iowa Drift Plain |

 Completed nutrient treatment wetlands

Nutrient Treatment Wetlands



Water Quality Monitoring

- 10 intensively monitored wetlands
 - Inflow and outflow - autosamplers and weekly grab samples.



Photo Credit: Lynn Betts

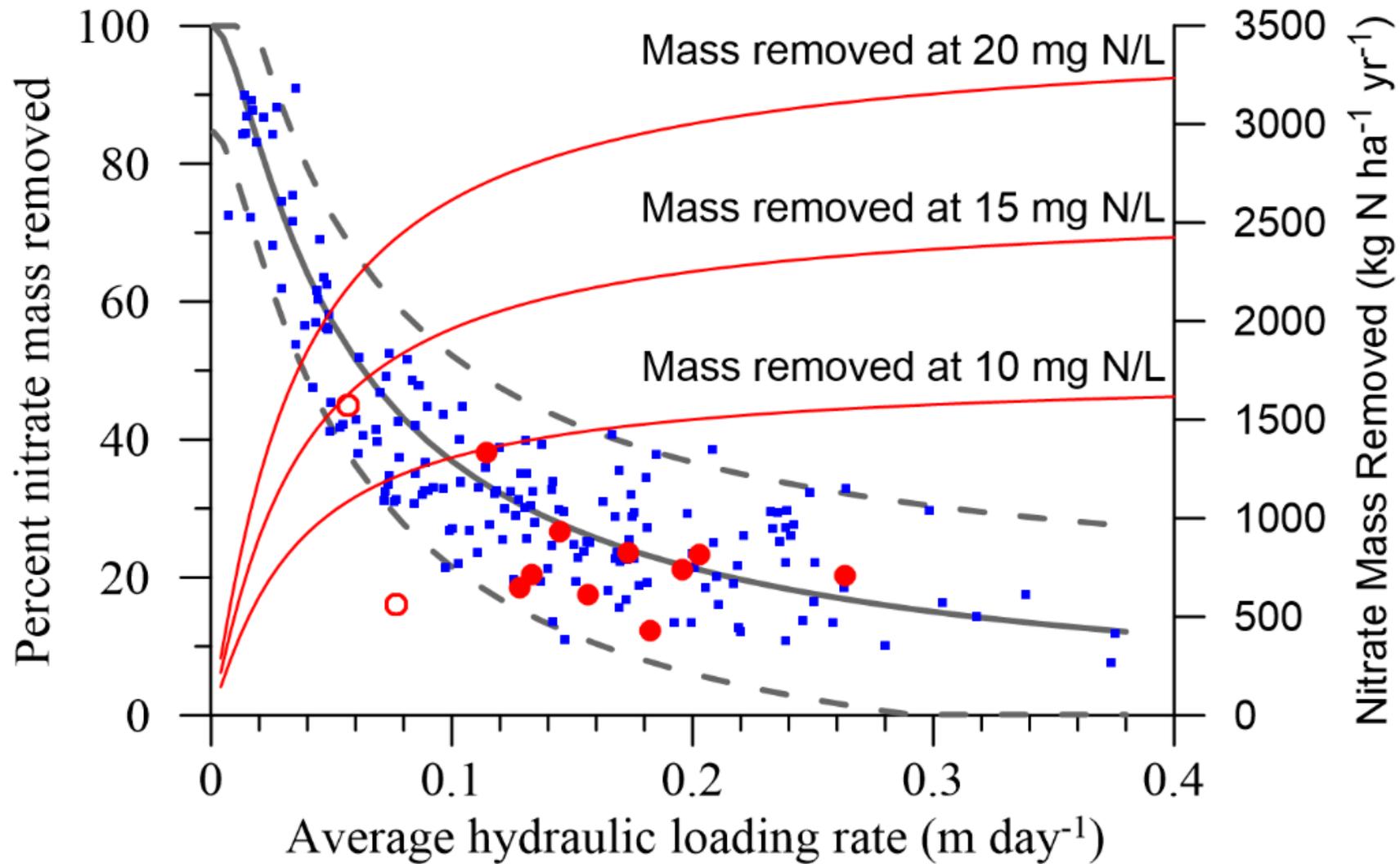
Water Quality Monitoring

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Photo Credit: Lynn Betts

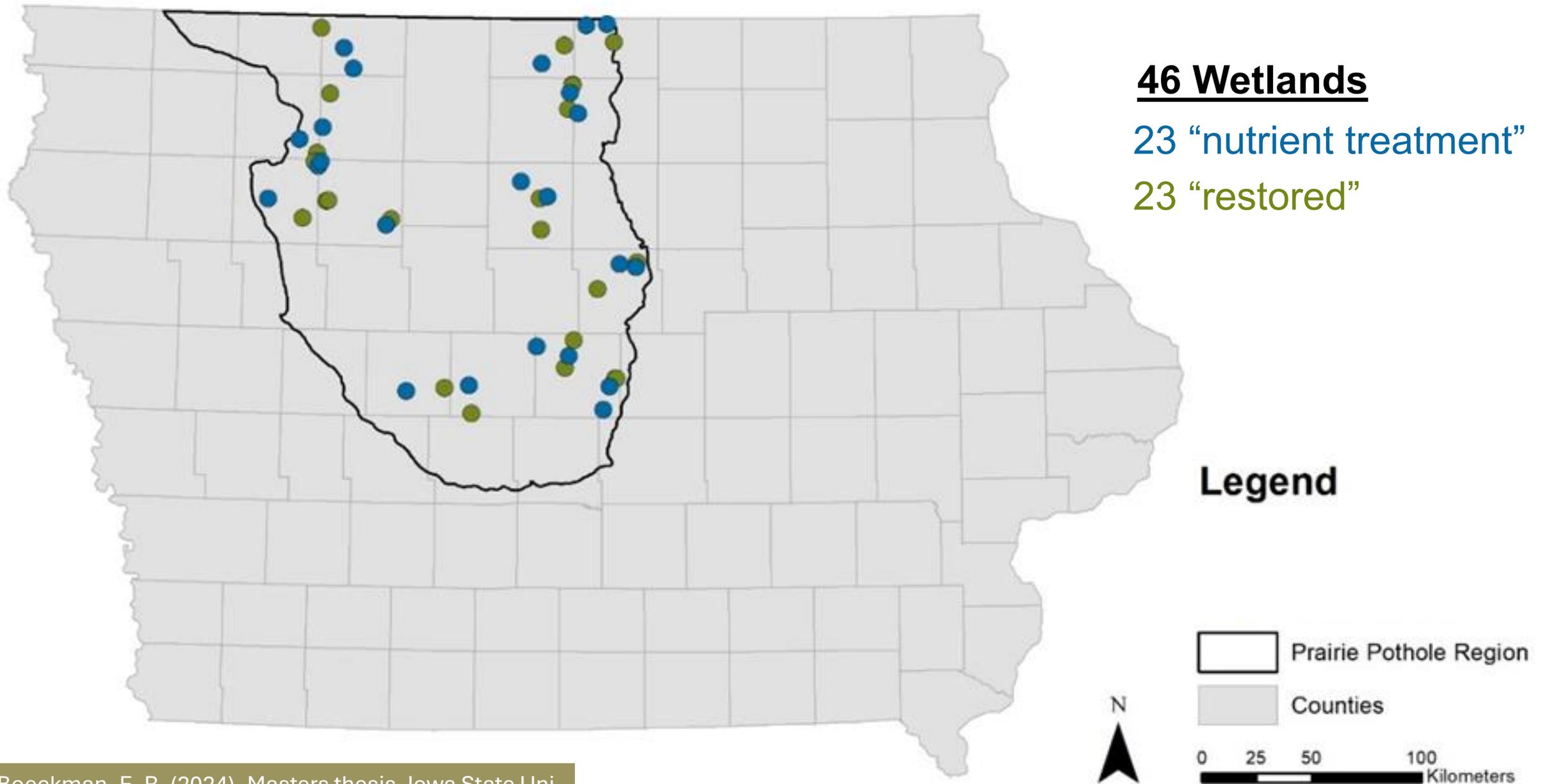
2024 Water Quality Monitoring Results



Secondary benefits for wildlife



Waterbird use of nutrient treatment wetlands and restored wetlands



There were 31 species of wetland birds on *restored wetlands* and 37 species of wetland birds on *nutrient treatment wetlands*

Trumpeter swan

Canada goose

Mallard

Blue-winged teal

Green-winged teal

Northern shoveler

Gadwall

Wood duck

Hooded merganser

Ruddy duck

Pied-billed grebe

Common loon

Sandhill crane

Black-necked stilt

American coot

Common moorhen

Sora

Virginia rail

Black tern

Least bittern

American bittern

Great blue heron

Great egret

Black-crowned night heron

Green heron

Long-billed dowitcher

Sanderling

Semipalmated sandpiper

Solitary sandpiper

Spotted sandpiper

Willet

Wilson's snipe

Yellow-headed blackbird

Red-winged blackbird

Great-tailed grackle

Common yellow-throat

Swamp sparrow

Sedge wren

Marsh wren

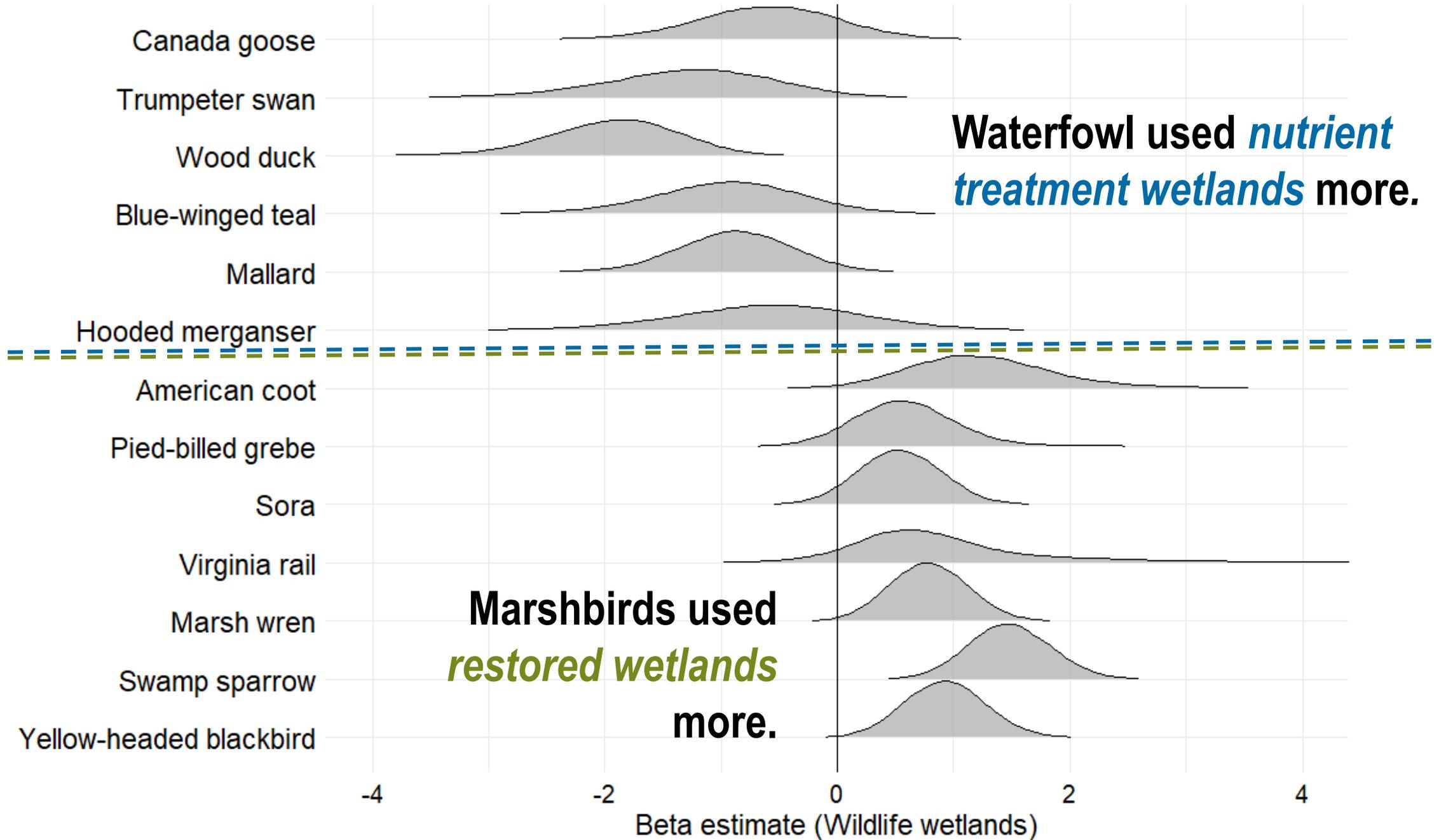
Belted kingfisher

Willow flycatcher

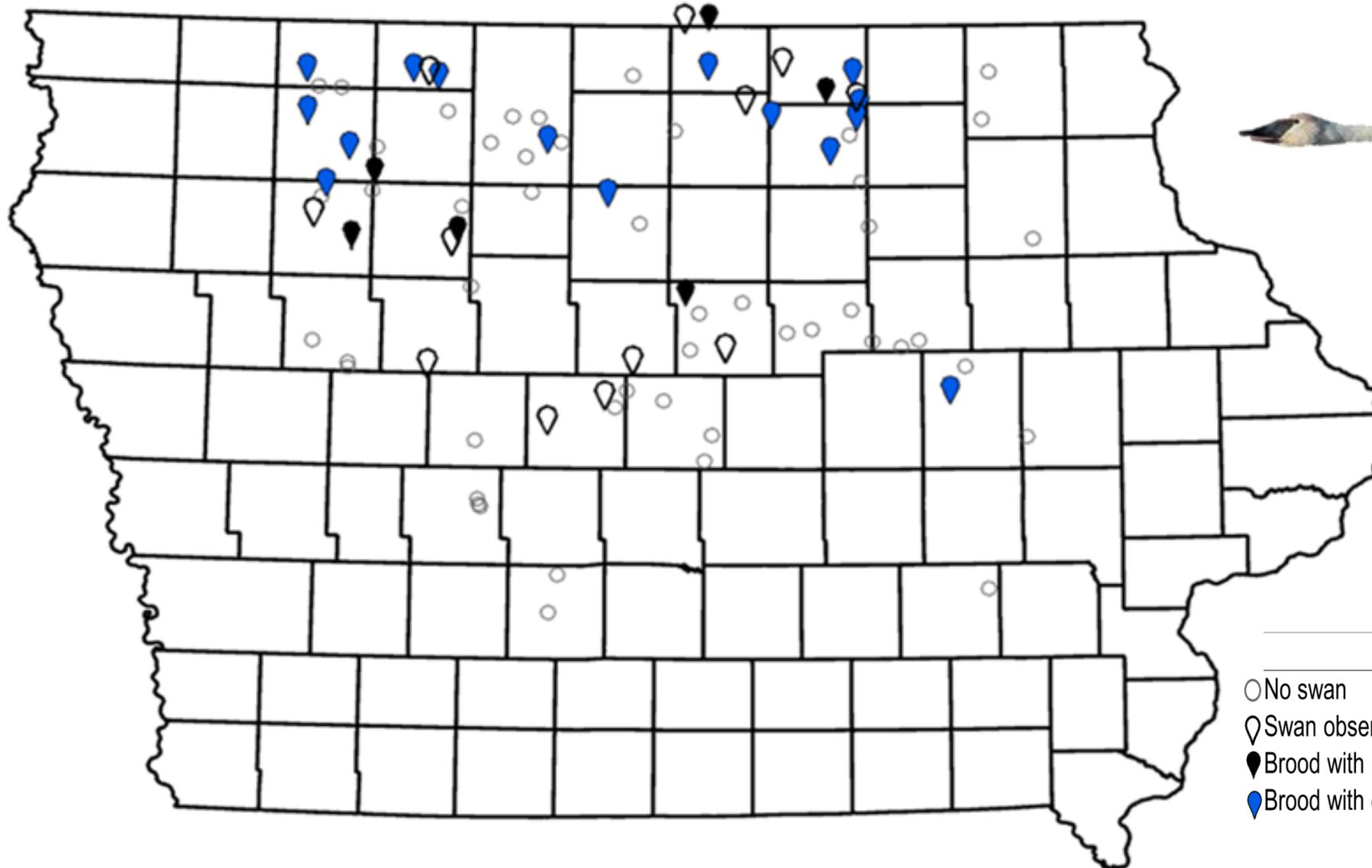
Black text – *Seen on both types*

Green text – *Seen only on restored wetlands*

Blue text – *Seen only on nutrient treatment wetlands.*



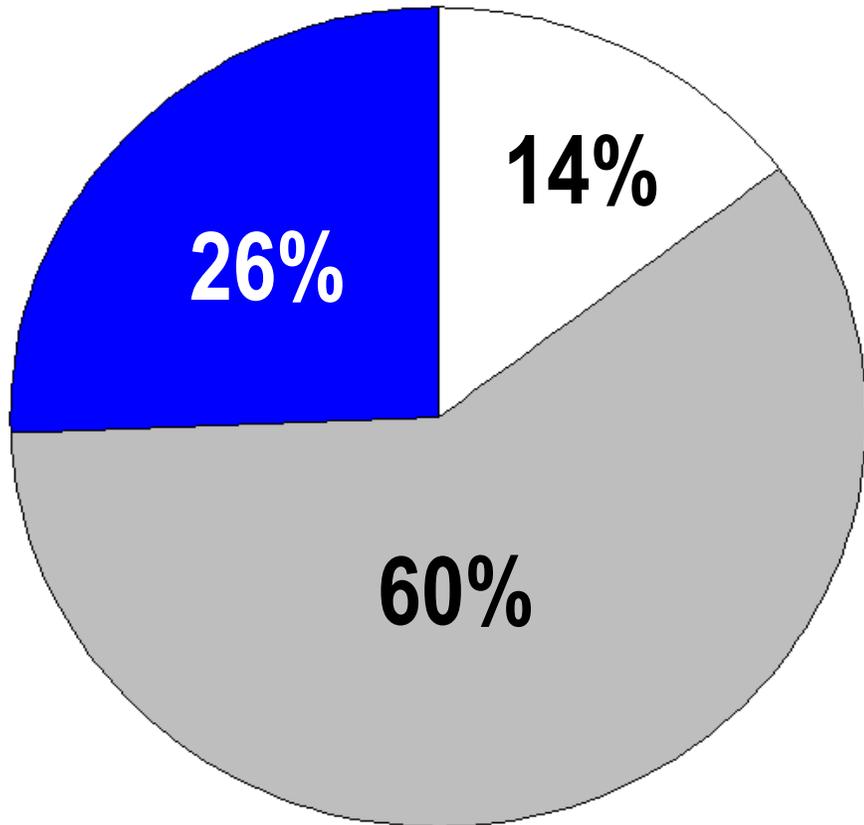
Trumpeter Swans and NTW



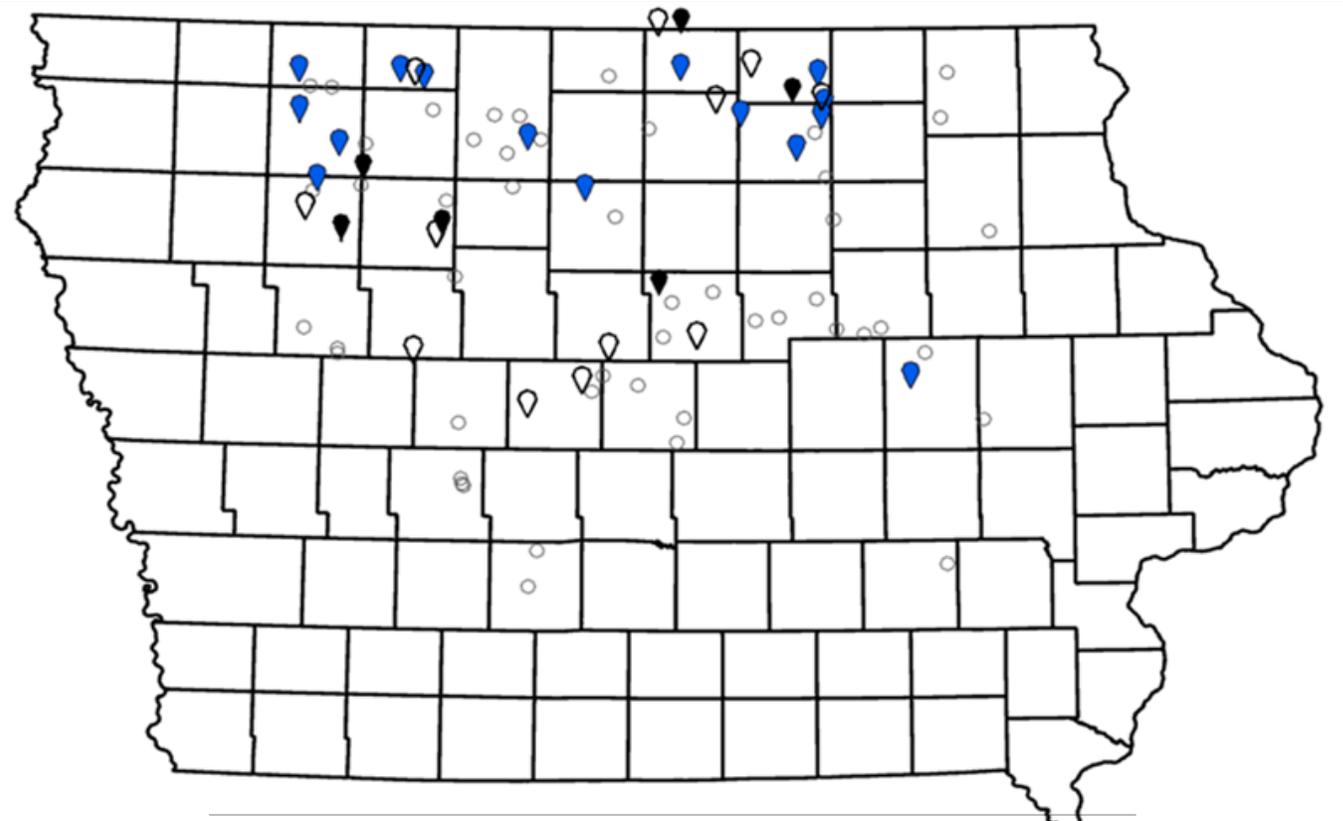
n = 82

Category	Number of Wetlands
○ No swan	49
▽ Swan observation, no brood	12
● Brood with no confirmed nest	6
● Brood with confirmed nest	15

26% of NTW had Swan broods



- Brood observation (26%)
- No swan (60%)
- Swan, no brood (14%)



Category	Number of Wetlands
No swan	49
Swan observation, no brood	12
Brood	6
Brood with confirmed nest	15

21 broods

High cygnet apparent survival

113

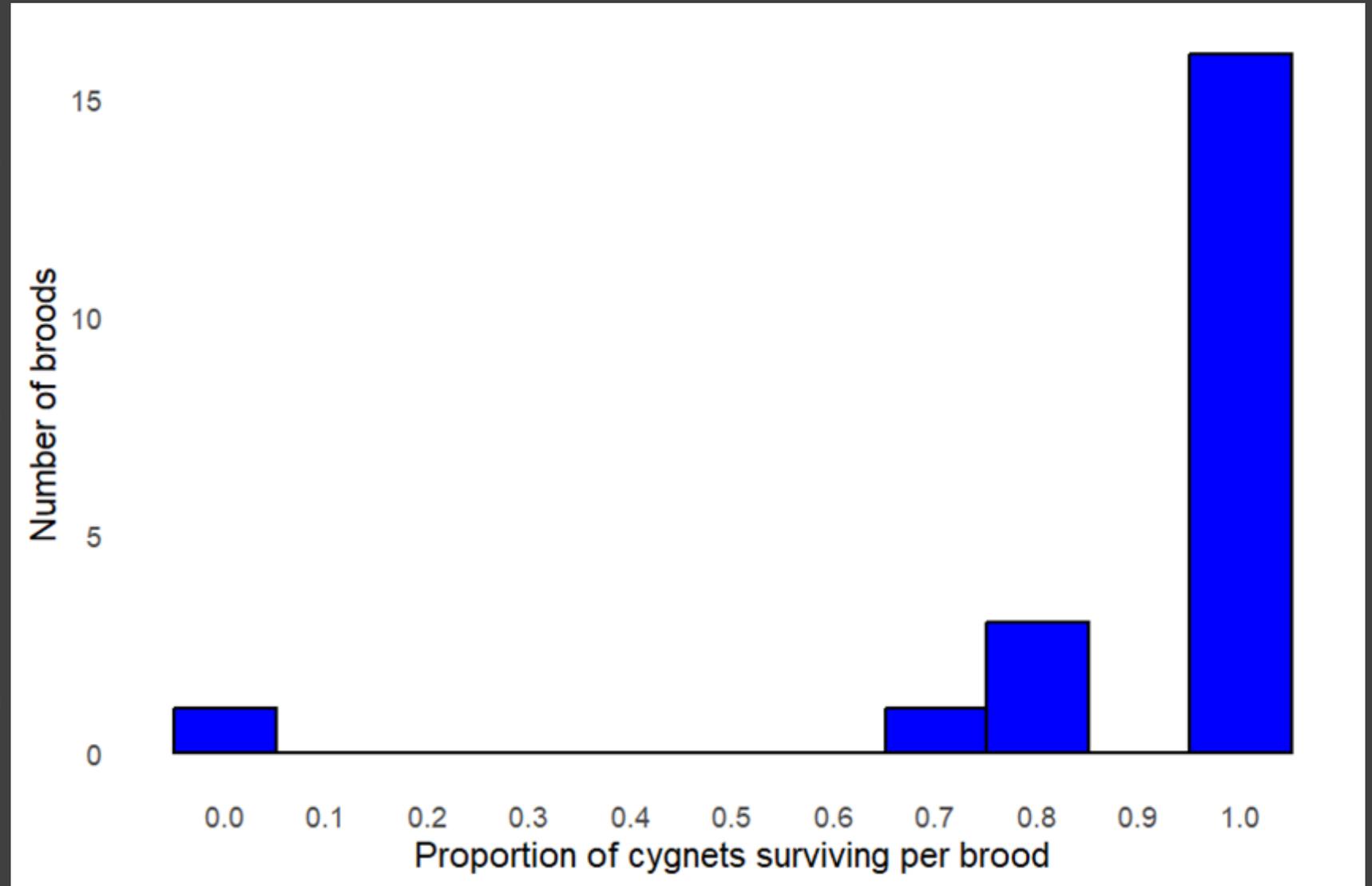
Cygnets Hatched

106

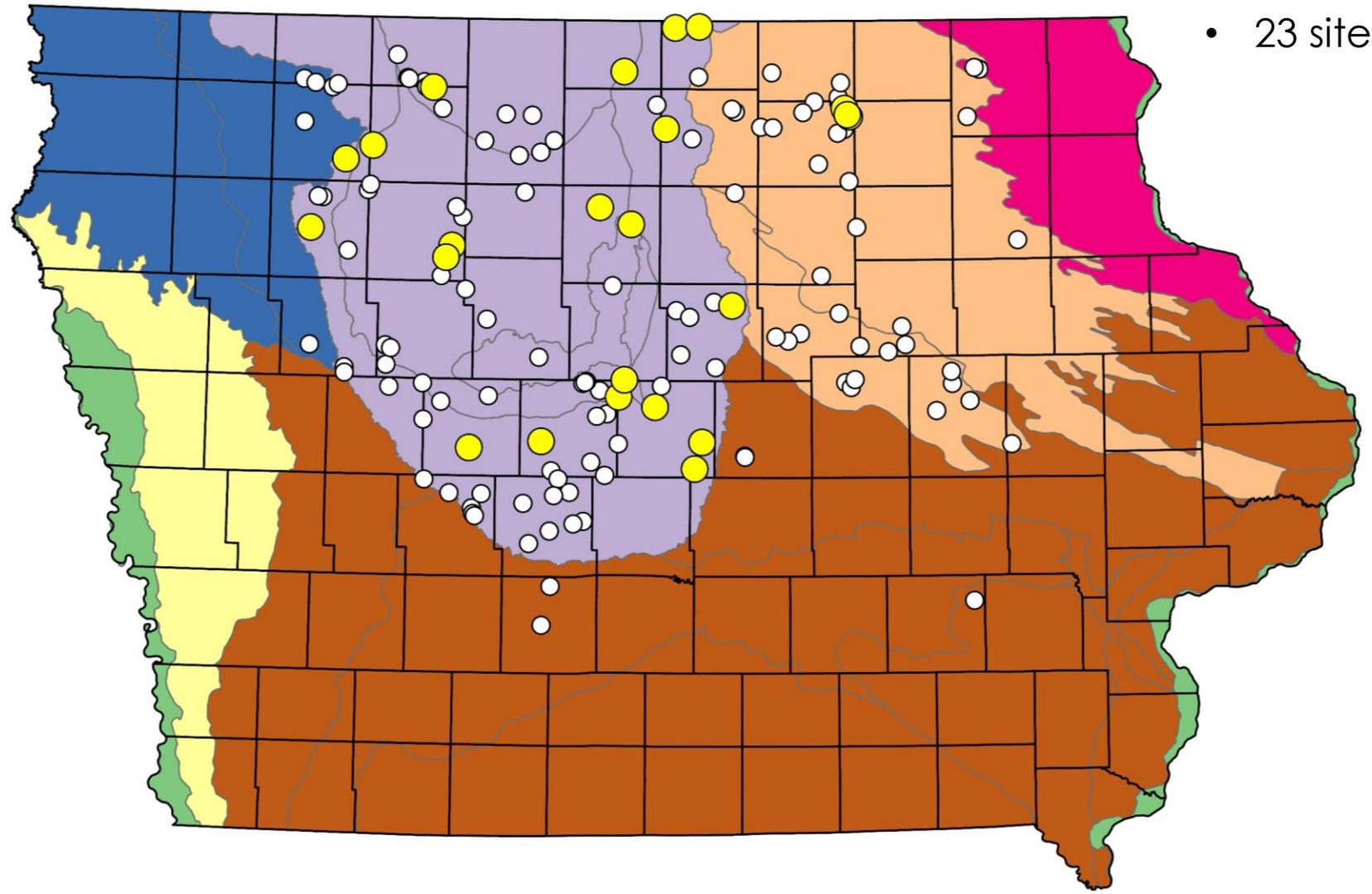
Fledged

92%

Cygnet Apparent
Survival



Amphibian and reptile use



• 23 sites

Iowa Landforms

- Alluvial Plain
- Northwest Plains
- Des Moines Lobe
- Iowan Erosion Surface
- Loess Hills
- Paleozoic Plateau
- Southern Iowa Drift Plain

- Completed Water Quality Wetlands
- NTW study sites

Almost a third of Iowa's herps live in these wetlands

- 20 species detected
- 67 in Iowa
 - ~30%
- Non-wetland, specialized, or rare species



Smooth Greensnake

- Iowa SGCN
- Midwest RSGCN



1 site

North. Prairie Skink

- Iowa SGCN
- Midwest RSGCN

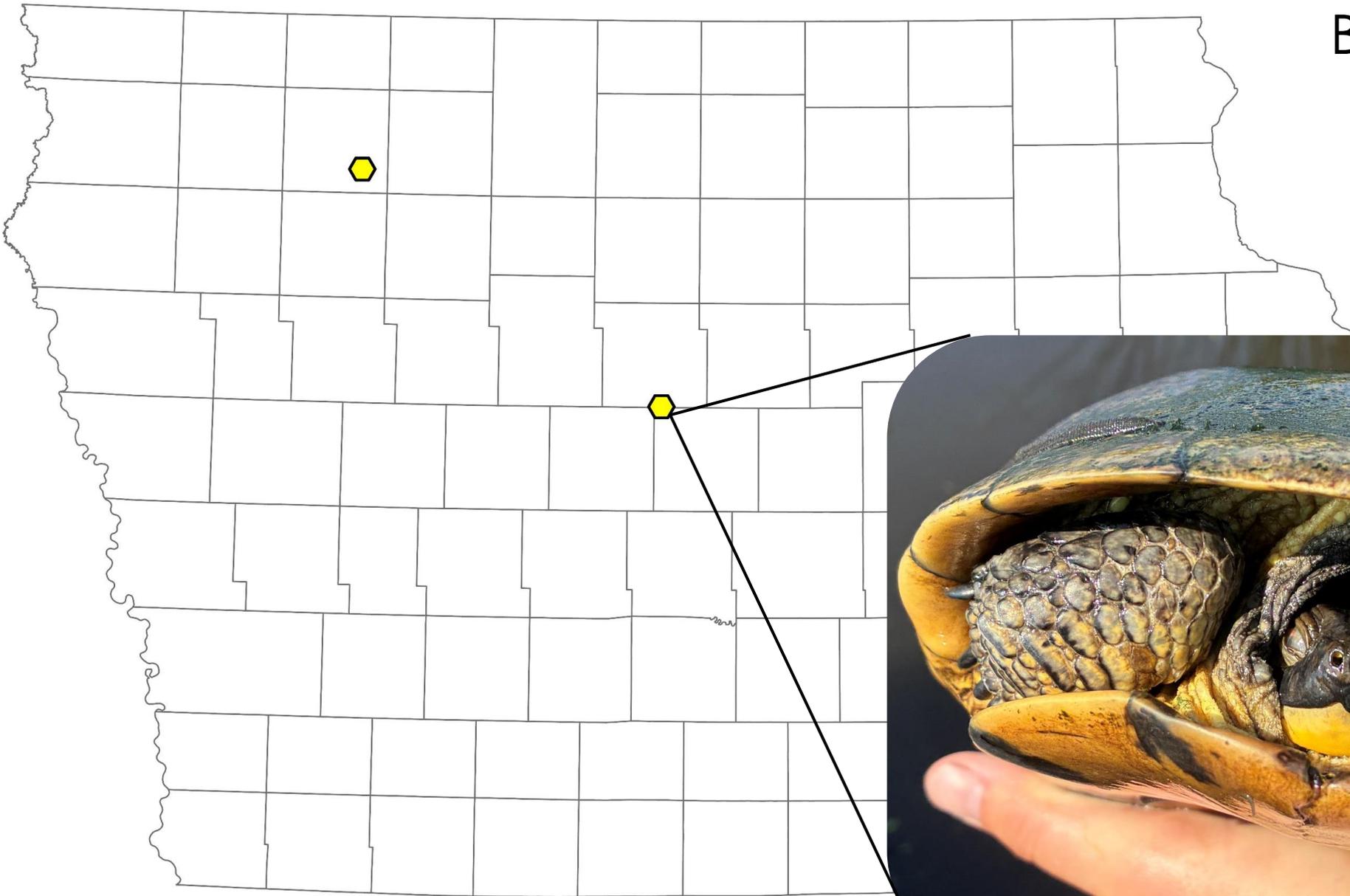


PC: Gabby Barnas

3 sites

Blanding's Turtle

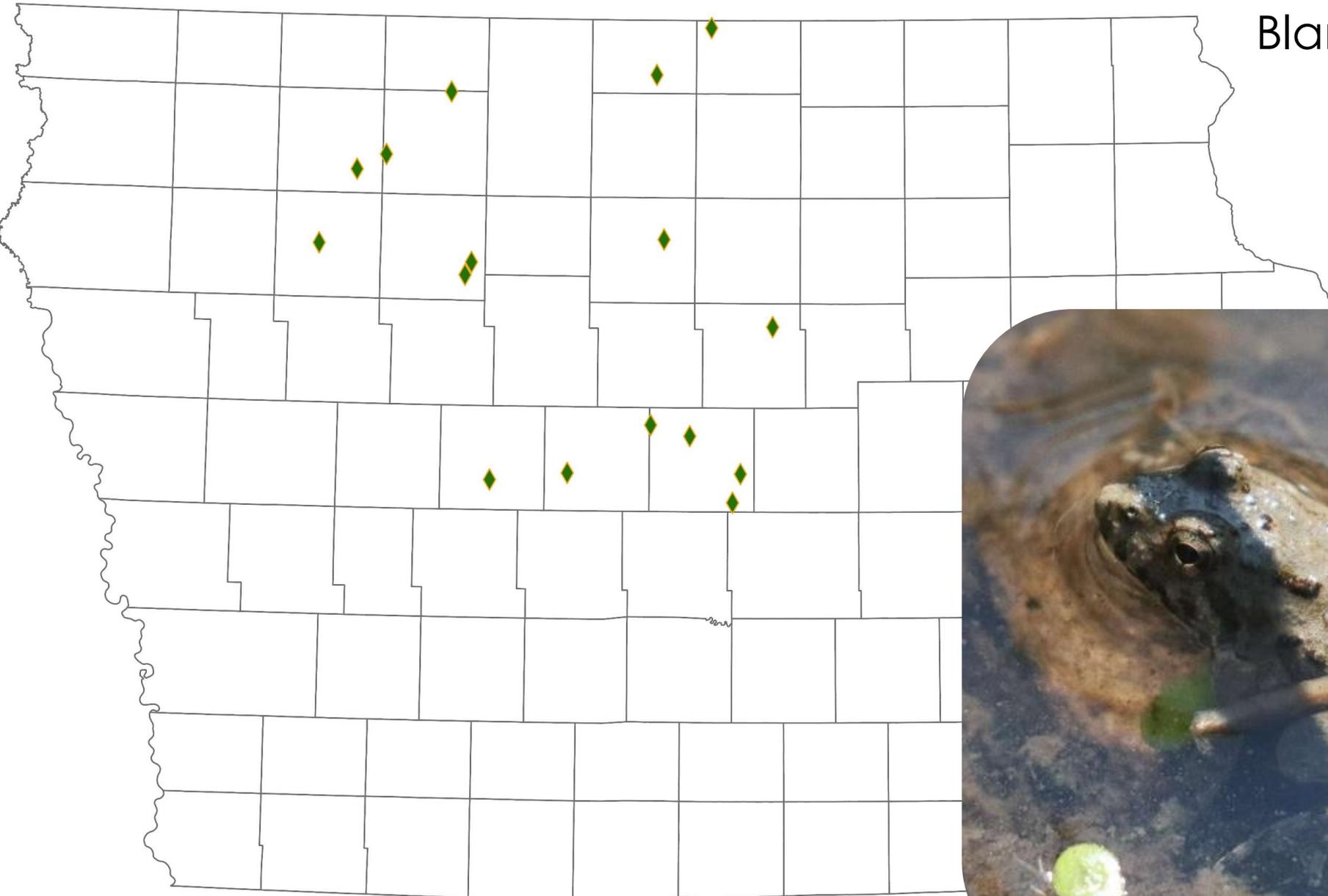
- Iowa SGCN
- Midwest RSGCN



2 sites

Blanchard's Cricket Frog

- Iowa SGCN
- Midwest RSGCN



16 sites

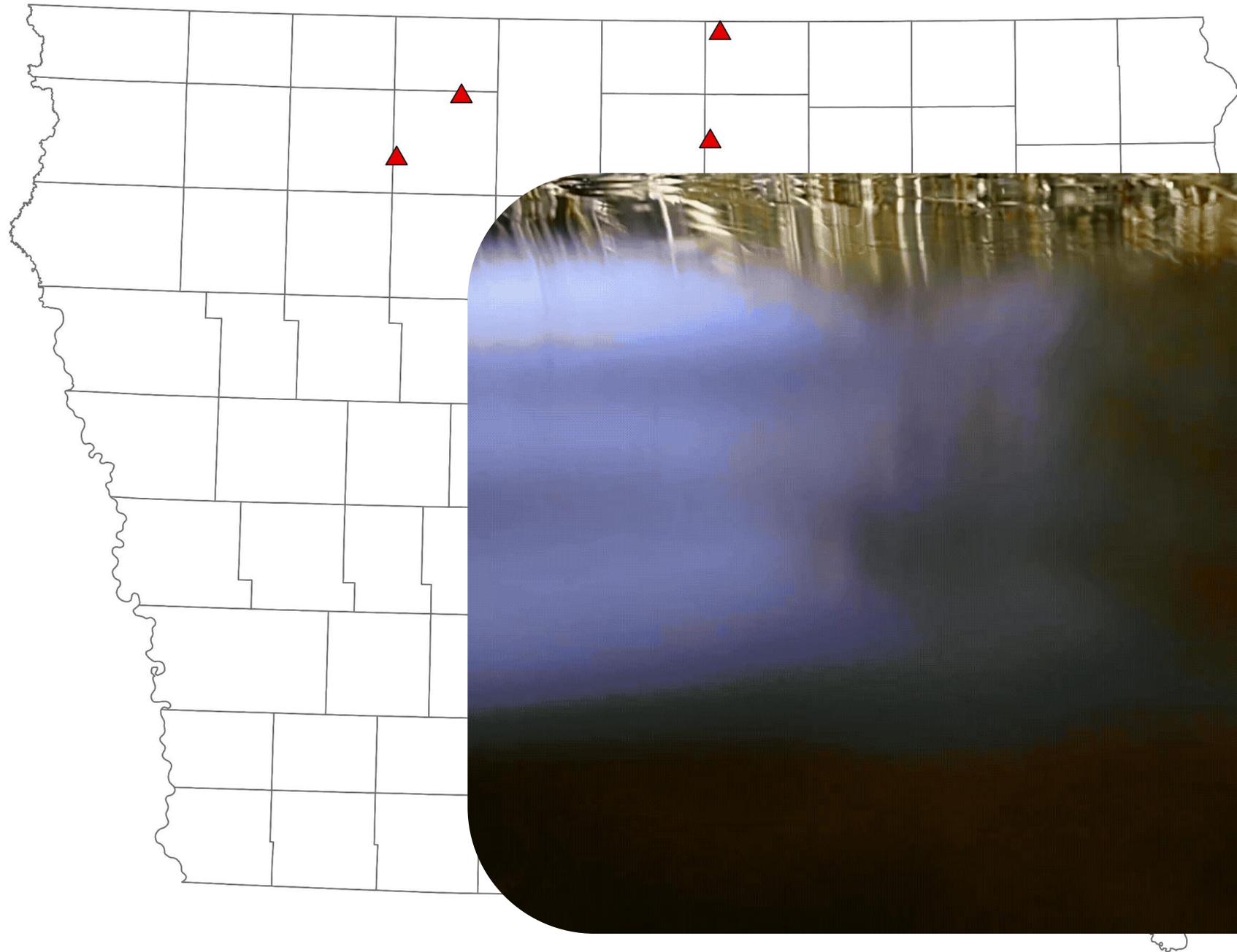
Tiger Salamander

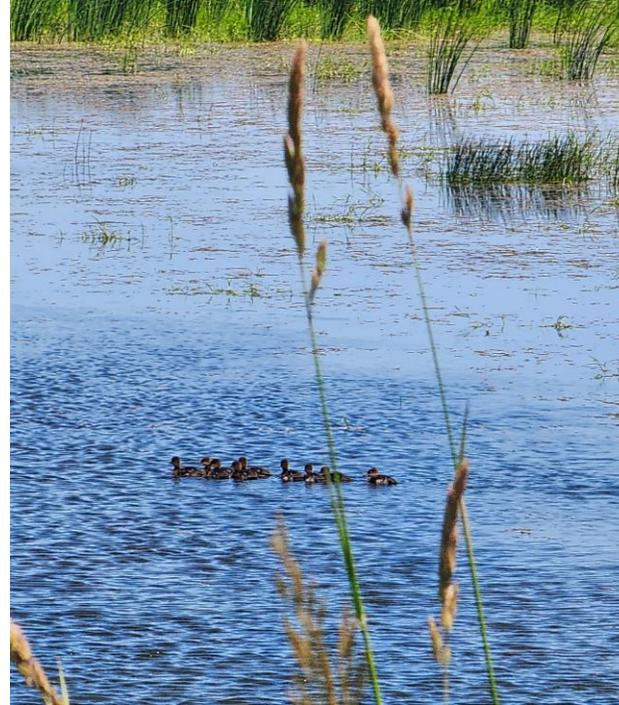
- Iowa SGCN



4 sites

Tiger Salamander





Conclusions

- Nutrient treatment wetlands provide opportunity for ag, water, and wildlife to co-exist.
 - \$\$ incentives – loss of production
 - Conservation in difficult but abundant environment
 - Potential benefits to wildlife
 - Water quality
 - No traditional “wildlife” funding



Questions?

Questions?

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