VEGETATION RESPONSES TO CONTROLLED WATER LEVEL MANAGEMENT IN IOWA

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STUDY OBJECTIVES

Two primary objectives:

1. **Measure vegetation responses (species diversity, cover, etc.) and development to decreasing water levels**
2. **Link vegetation responses with wildlife benefits**

STUDY AREA

Western extent of Red Rock Reservoir in central Iowa

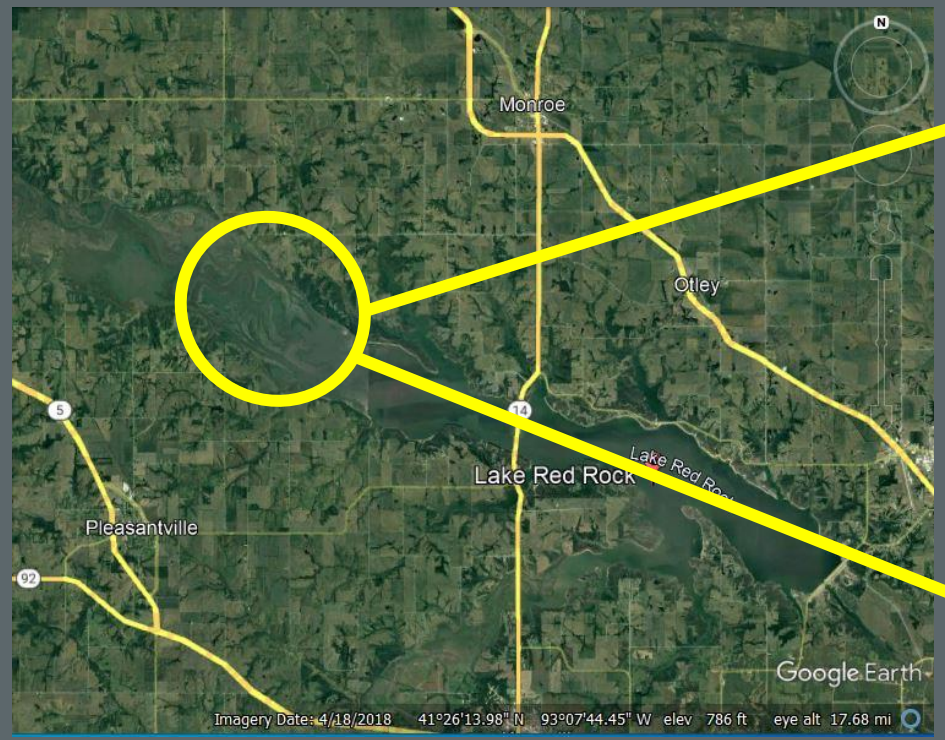
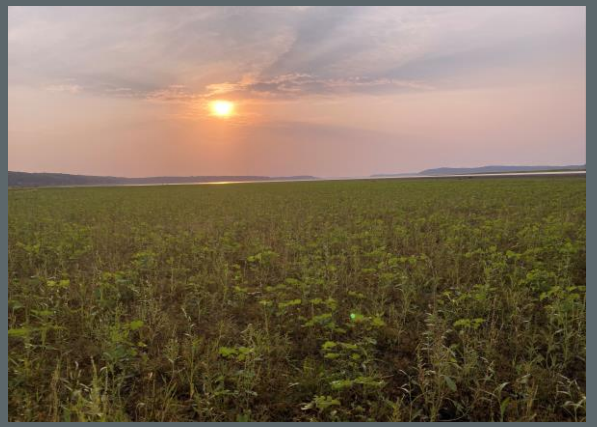


Photo acknowledgment: Google Earth (both images)

JULY

SEPTEMBER

SRP DRAWDOWN CYCLE



AUGUST

METHODS

- Vegetation monitoring
  - 22 July - 12 September 2021 (8 weeks)
  - 19 July - 9 September 2022 (8 weeks)
- Randomly placed 25 line transects in the delta region.
- 20 cm x 50 cm quadrats were sampled along these transects (once per week per transect, 200 per year)
- Quadrat 1 was placed above the conservation pool level.
- Quadrats were added weekly at the receding water line, one per transect.

Vegetation sampling quadrat.

Vegetation transect, showing flag markers placed at what was the previous week's water-line.

DATA COLLECTION

- Recorded each survey week, per plot:
  - Distance from the transect starting point (m)
  - Plant species
  - Number of stems
  - Percent cover
  - Seed presence (binary)

PRELIMINARY FINDINGS

Here, we report preliminary summaries of vegetation data where we examine:

- Species diversity
- Time needed for vegetation establishment
- Vegetation growth as measured by percent cover and presence of seed

QUADRAT SAMPLING SUMMARY

2021

- 194 quadrats were used
  - 125 had vegetation develop
  - 81 developed ≥ 50% plant cover
  - 92 had species that produced seed

2022

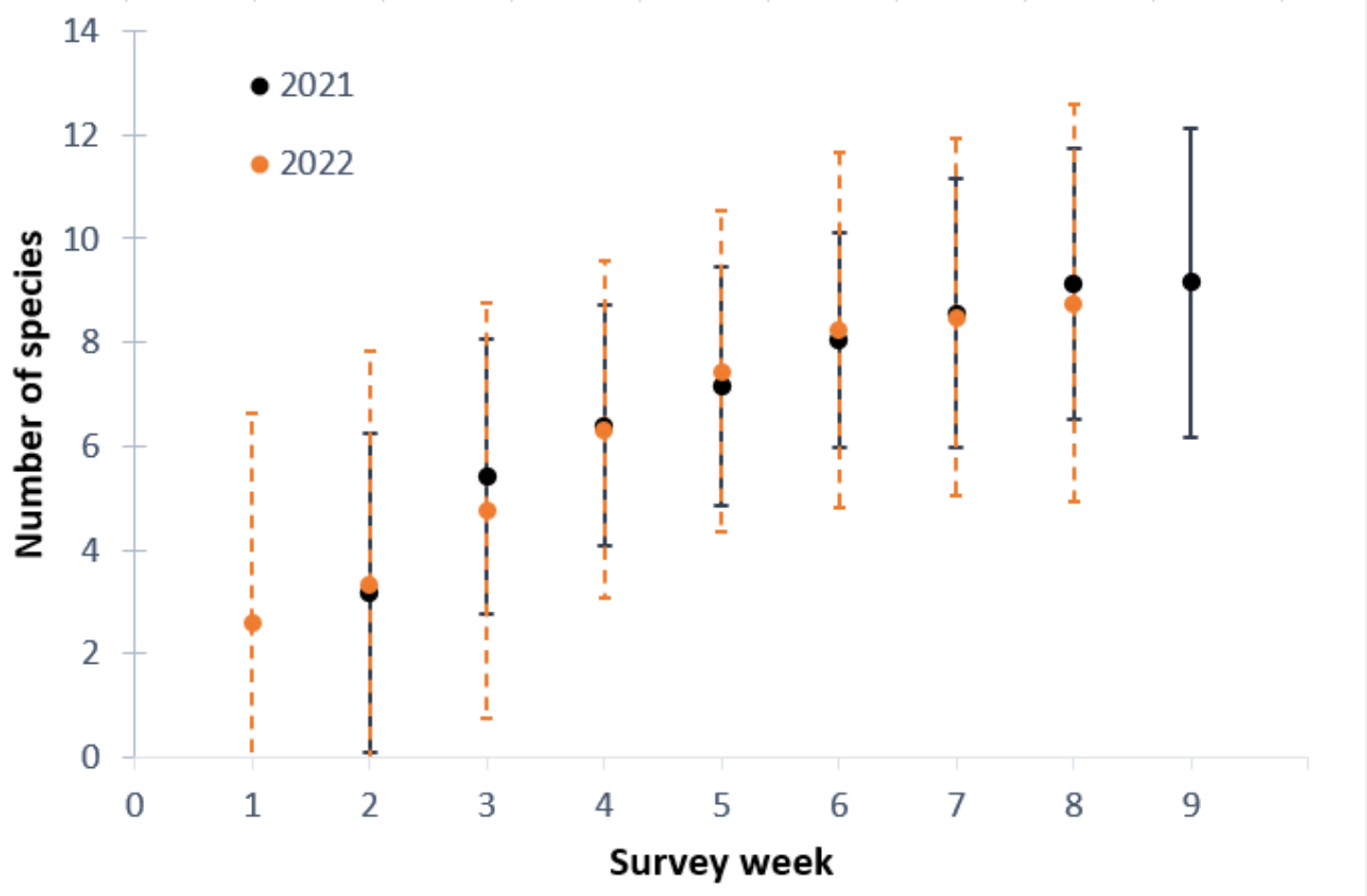
- 165 quadrats were used
  - 116 had vegetation develop
  - 51 developed ≥ 50% plant cover
  - 55 had species that produced seed

RESULTS (SPECIES DIVERSITY)

On the exposed section, transects averaged:

8 *spp.* (SD = 2) in 2021

7 *spp.* (SD = 2) in 2022



Mean number (±95% CI) of plant species present within a survey week across all transects in 2021 and 2022.

SPECIES DOCUMENTED (AFTER EXPOSURE)

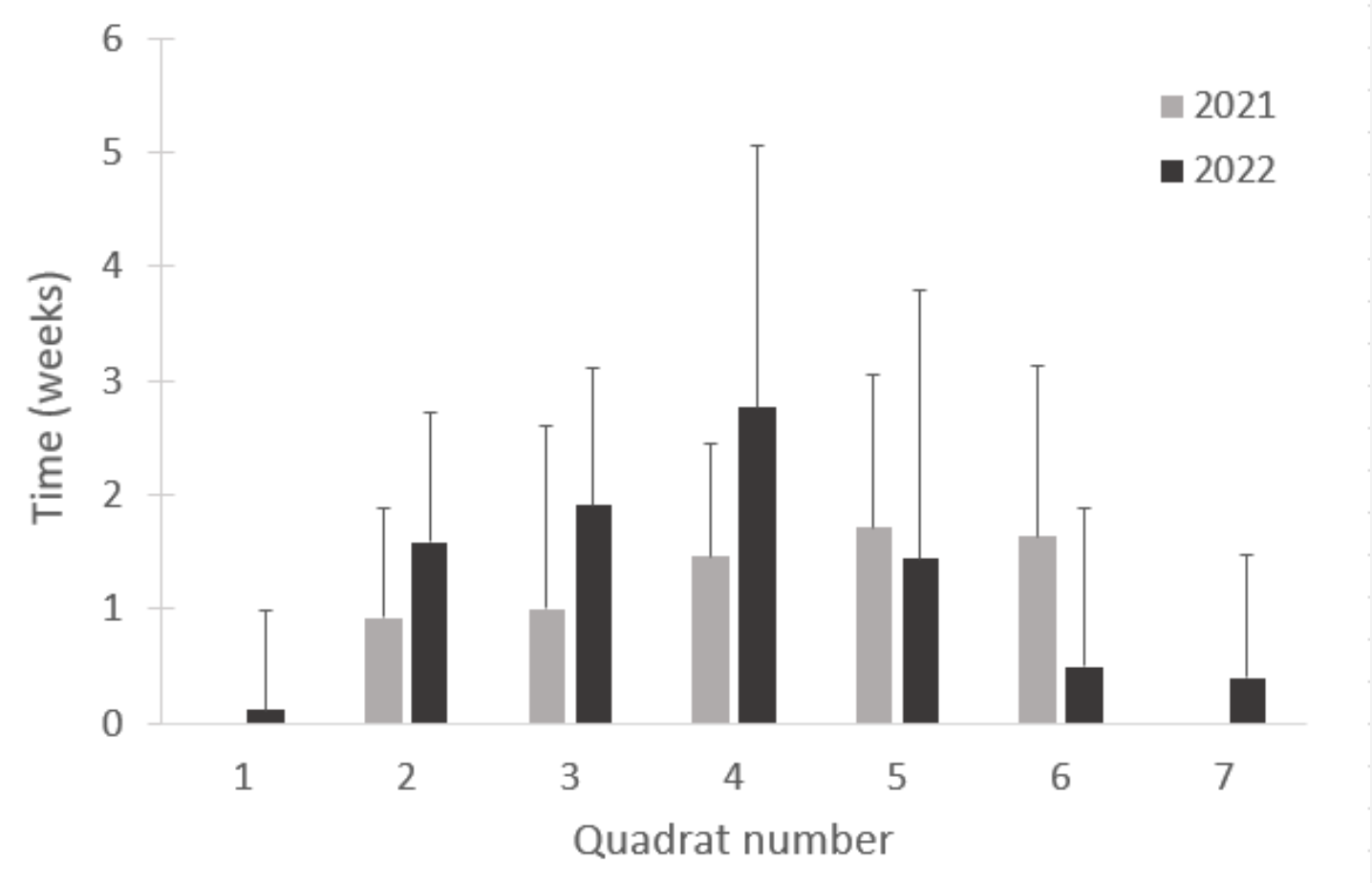
- Barnyardgrass
- Rough cocklebur
- Reed canarygrass
- Rice cutgrass
- Flatsedge spp.
- Palmer's amaranth
- Scarlet toothcup
- Yellowseed false pimpernel
- Pennsylvania smartweed
- Broadleaf arrowhead
- Nodding beggarticks
- Allegheny monkeyflower
- Devil's beggarticks
- Wild mustard
- Lanceleaf frogfruit
- Bog yellowcress
- Willow
- Silver maple
- Eastern cottonwood

RESULTS (VEGETATION PRESENCE)

Quadrats needed an average of 1.47 (SD = 0.86) and 1.30 weeks (SD = 1.14) to have any vegetation present (2021, 2022 respectively).

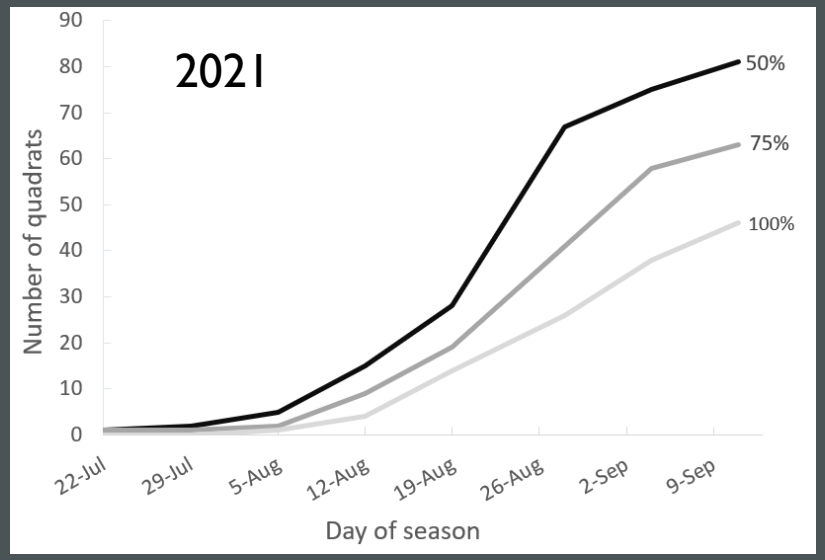
Total number of quadrats to have any vegetation present:

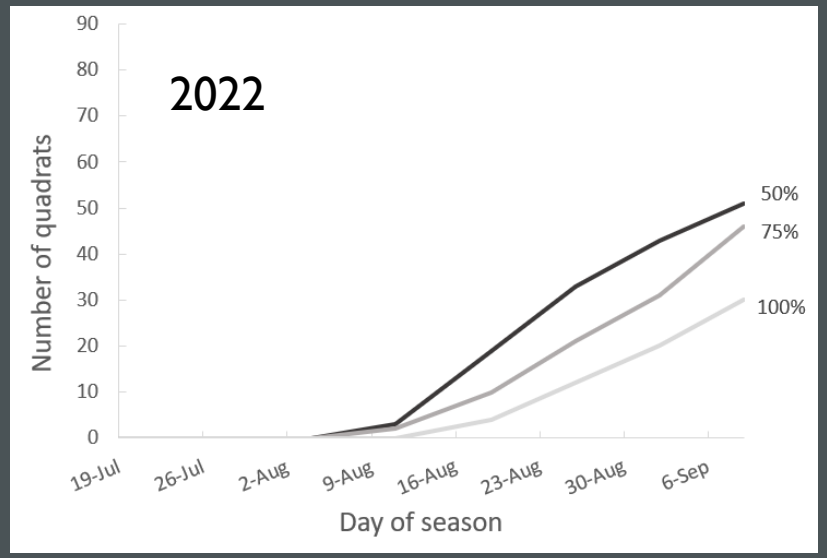
- 125 of 194 in 2021 (~ 64%)
- 116 of 165 in 2022 (~ 70%)



Mean time (±95% CI) a quadrat plot along a transect needed to have vegetation present, 2021-2022.

RESULTS (VEGETATION COVER)





2021

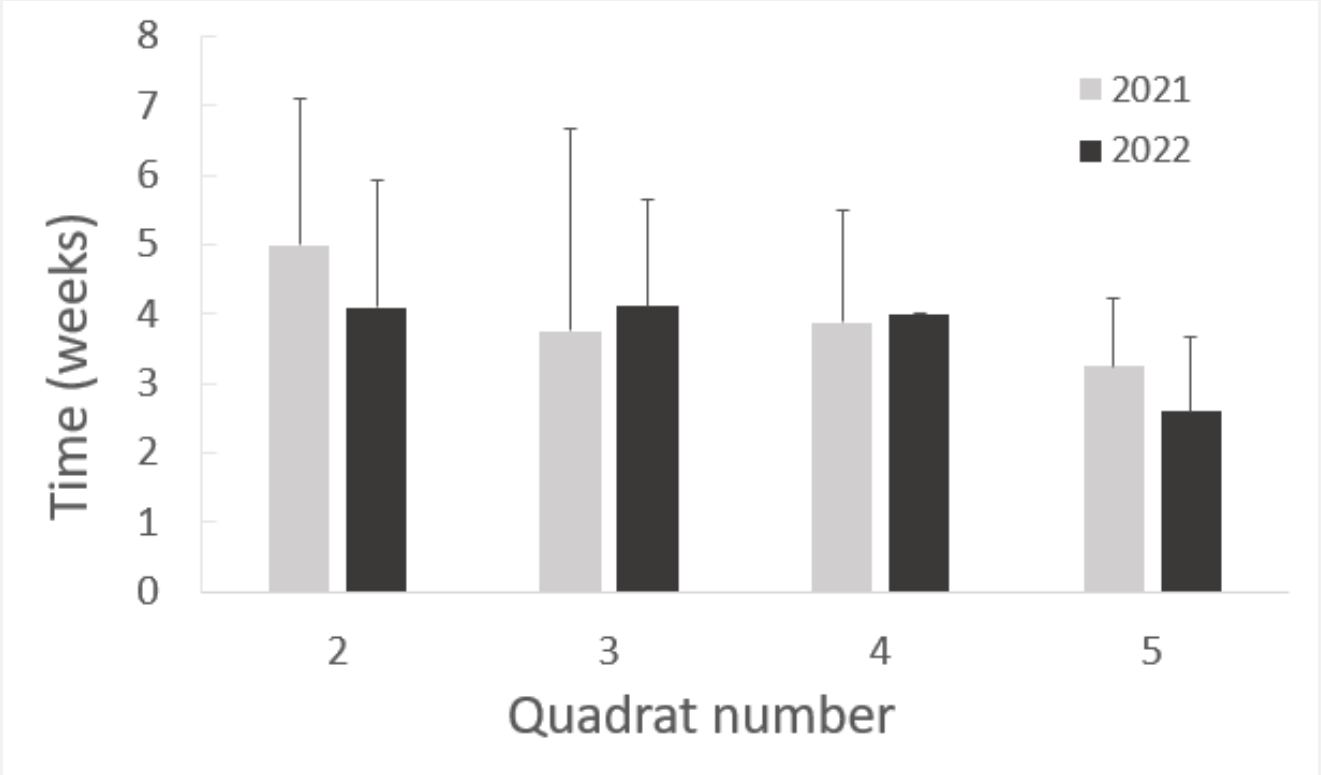
- 81 of 125 quadrats reached at least 50% vegetation cover during the study.
- Of those 81 quadrats, on average it took vegetation
  - 3.38 weeks (SD = 0.90) to reach **50%** cover
  - 3.91 weeks (SD = 1.07) to reach **75%** cover
  - 4.43 weeks (SD = 0.96) to reach **100%** cover

2022

- 51 of 116 quadrats reached at least 50% vegetation cover during the study.
- Of those 51 quadrats, on average it took vegetation
  - 3.29 weeks (SD = 0.97) to reach **50%** cover
  - 3.96 weeks (SD = 1.01) to reach **75%** cover
  - 4.27 weeks (SD = 0.87) to reach **100%** cover

RESULTS (SEED PRESENCE)

- 13 species were able to come to seed between both years
- For the first species (across quadrats) to come to seed it took on average
  - 2.4 weeks (SD=0.89) in 2021
  - 2.8 weeks (SD=0.84) in 2022
- Mean time for vegetation within a quadrat to come to seed
  - 4.1 weeks (SD=1.23) in 2021
  - 3.8 weeks (SD=0.99) in 2022



Mean time (±95% CI) vegetation within a quadrat took to come to seed in 2021 and 2022.

Common species to come to seed:

- Barnyardgrass (*E. crus-galli*)
- Rough cocklebur (*X. strumarium*)
- Flatsedge spp. (*Cyperus spp.*)
- Palmer's amaranth *(A. palmeri)*

DISCUSSION

1. The plant community has low diversity but includes important wildlife foods (e.g., rice cutgrass [*L. oryzoides*] and Pennsylvania smartweed [*P. pensylvanicum*]).
2. Vegetation benefits of this SRP management strategy mainly accrue 2-5 weeks post exposure.
3. Vegetation growth slows by late August.

FUTURE WORK

- On-going data analyses will explore relationships between line/quadrat plant data and explanatory variables (season, pool level, etc.)
- We can use this information to quantify wildlife food benefits (e.g., for migratory waterfowl), which is an important goal of the SRP
- Vegetation, waterbird, and stopover ecology survey data will jointly assess wildlife use and benefits of SRP environmental flows

ACKNOWLEDGMENTS

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QUESTIONS?