Giving-up Density: Do ducks ever really give up on foraging?

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“Giving-up” Density

- GUD: A density threshold of foods at which animals cease foraging or abandon habitats because:
  1) the energy expended searching for and processing foods exceeds that gained from consuming them

     or

  2) the food resources in a patch are depleted below the levels in other, nearby patches

GUD – Evidence

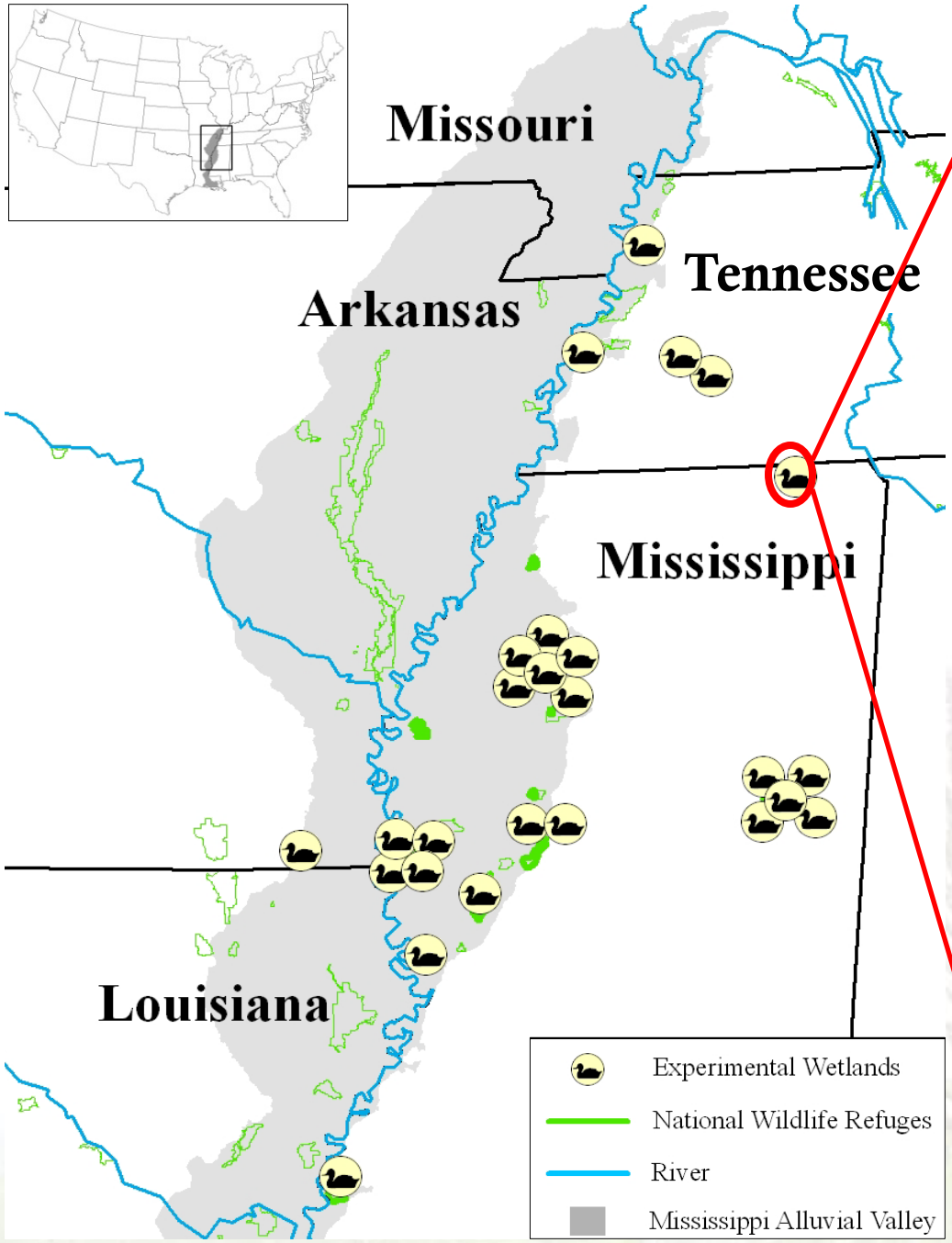
1. Abandonment
2. Use without foraging effort
3. Foraging with little or no depletion

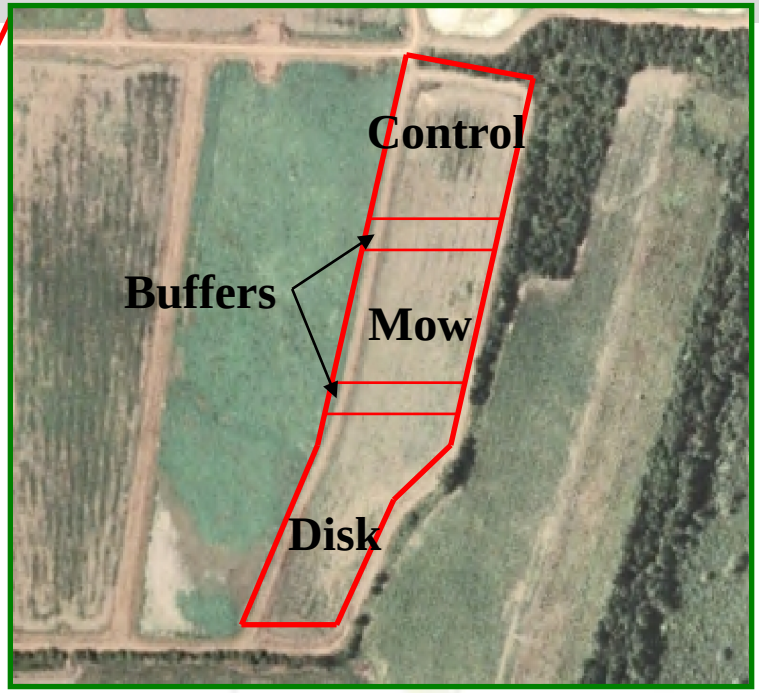
GUD – Importance

1. Basic component of foraging ecology
2. Habitat quality
3. Habitat conservation

Moist-soil Wetlands

Experiment 1





Experiment 1

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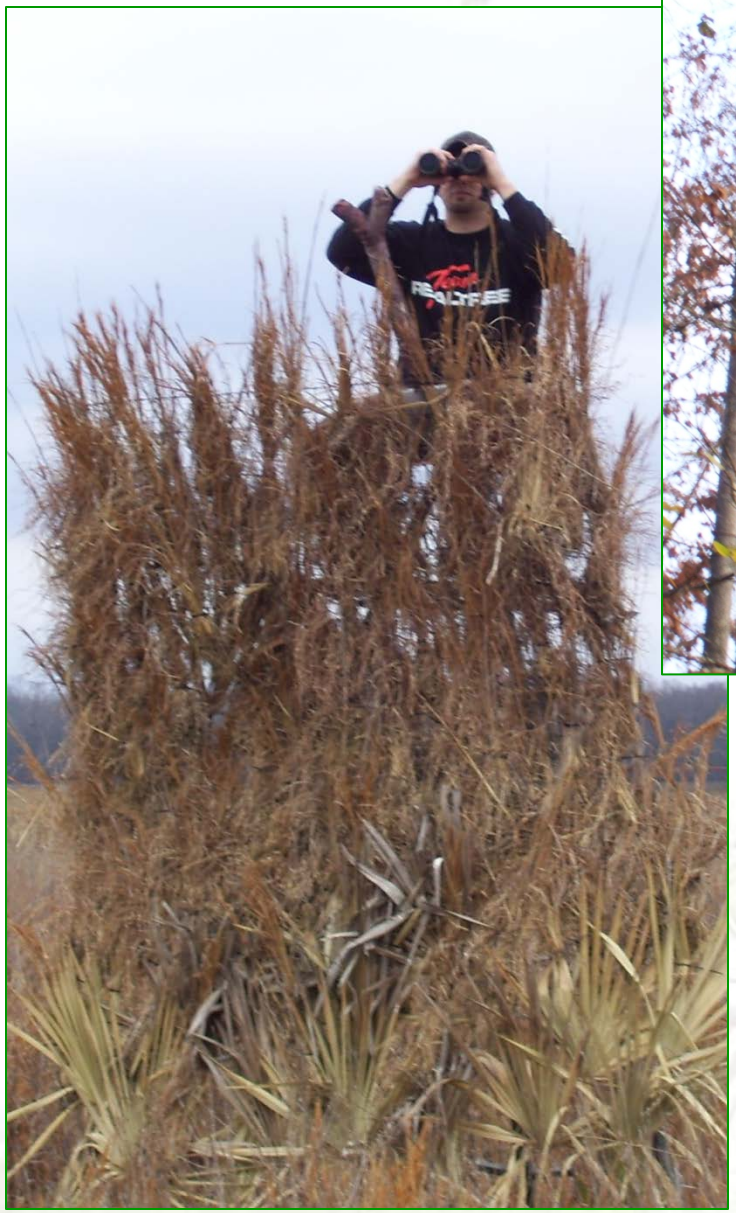
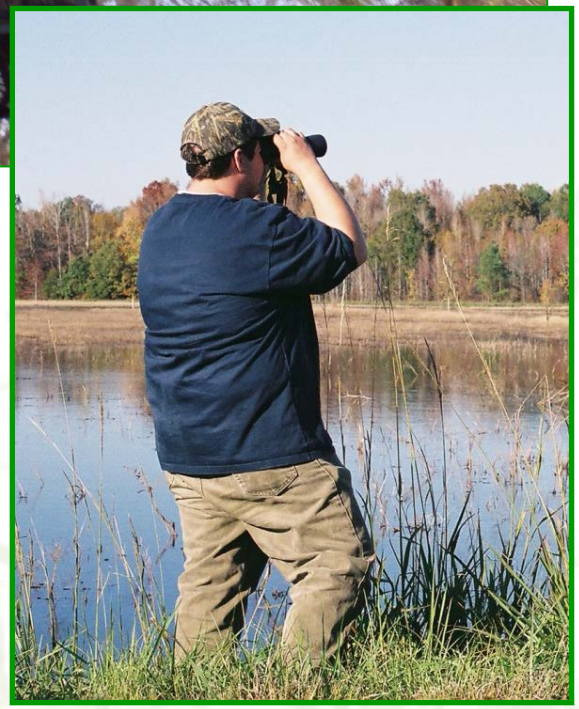
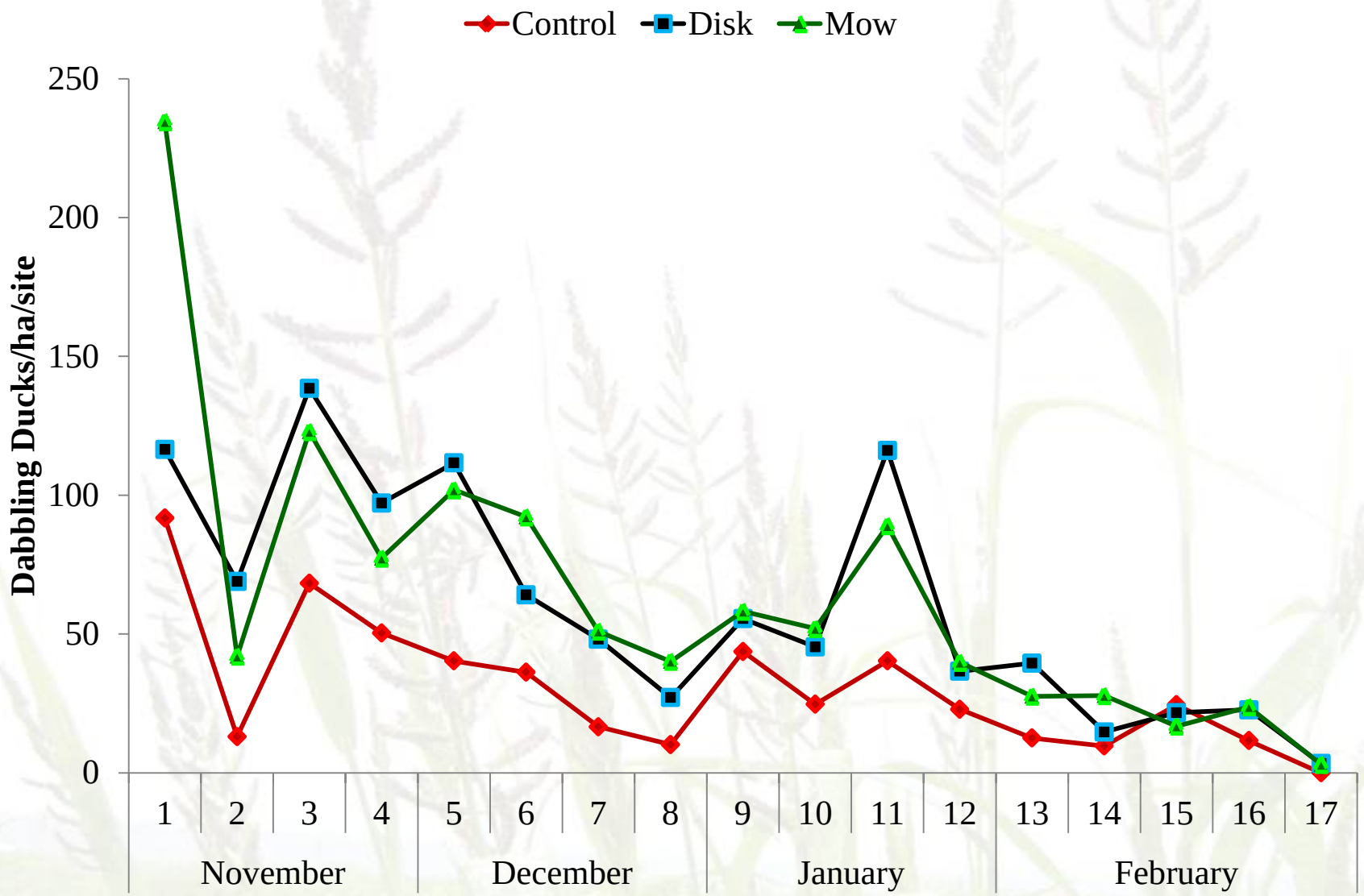
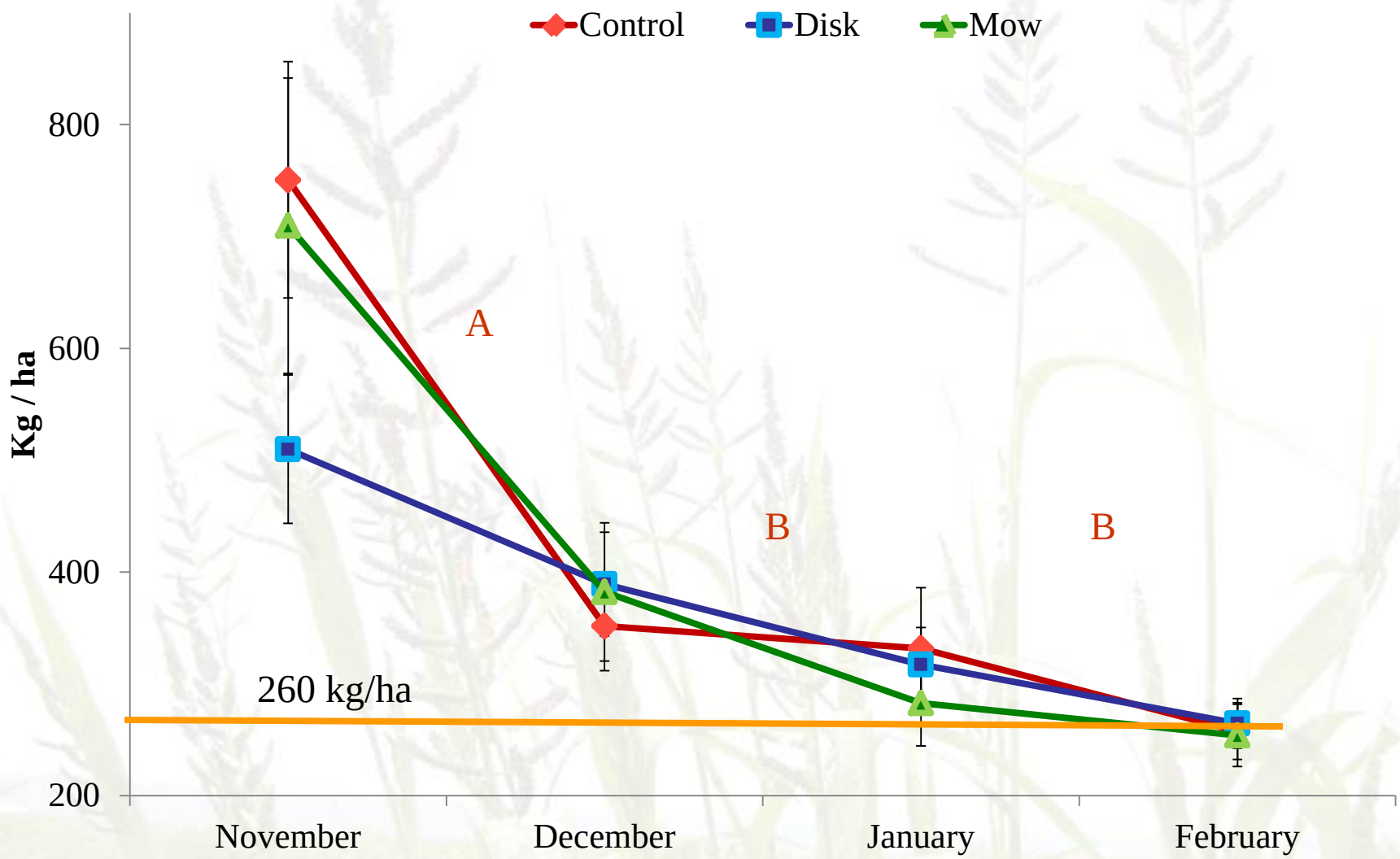




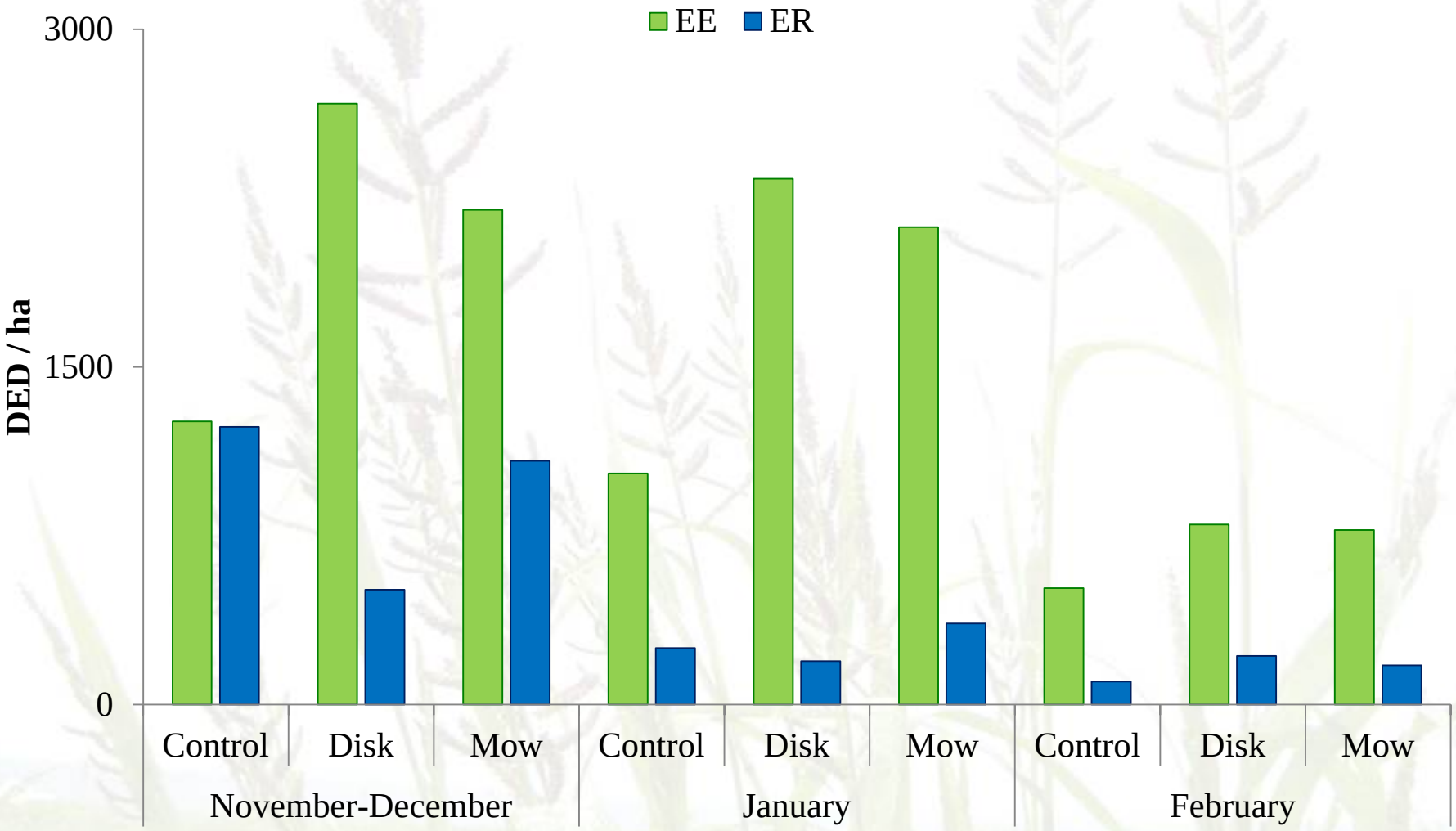
Dabbling Ducks



Seeds and Tubers



Energy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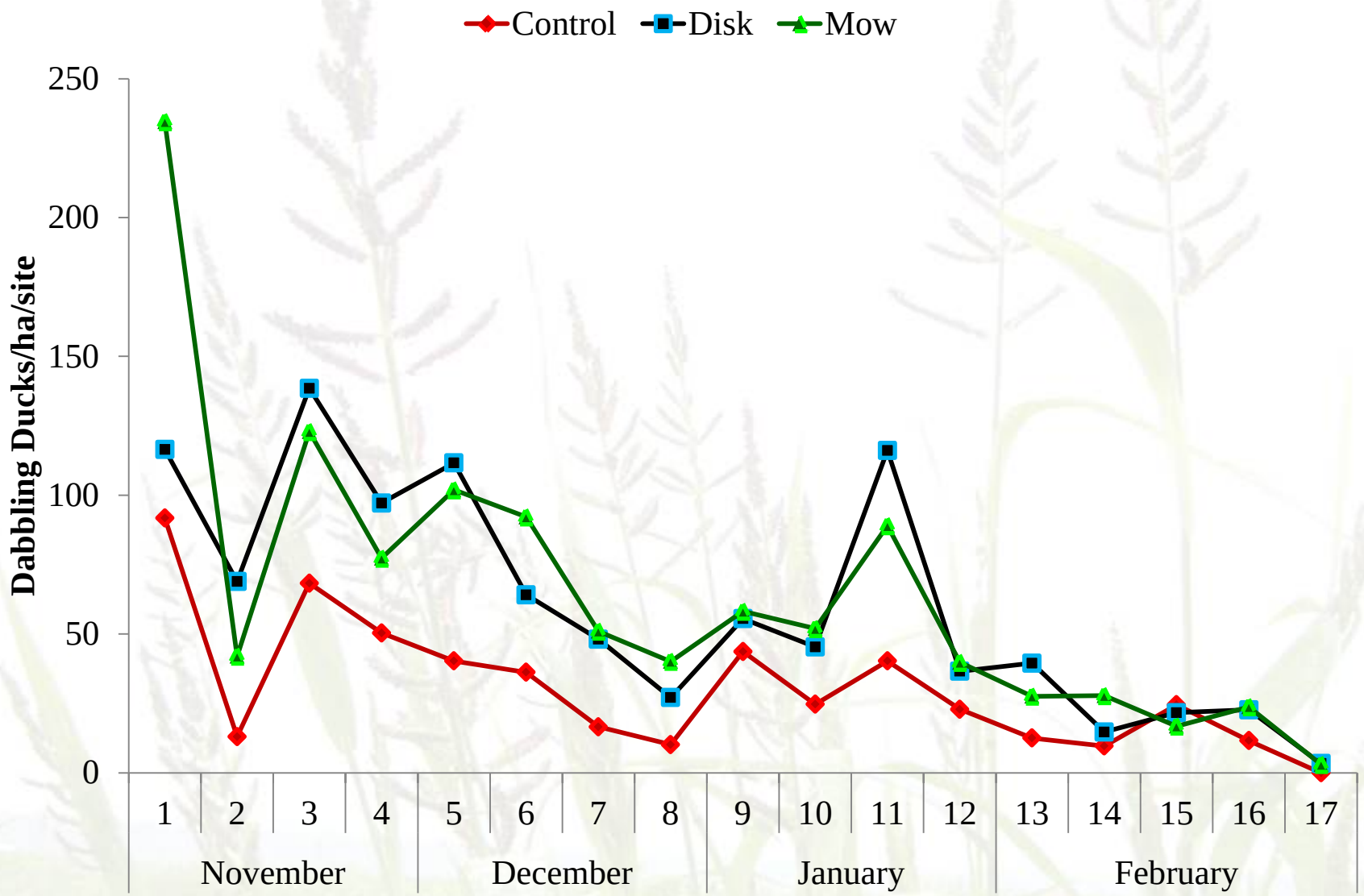
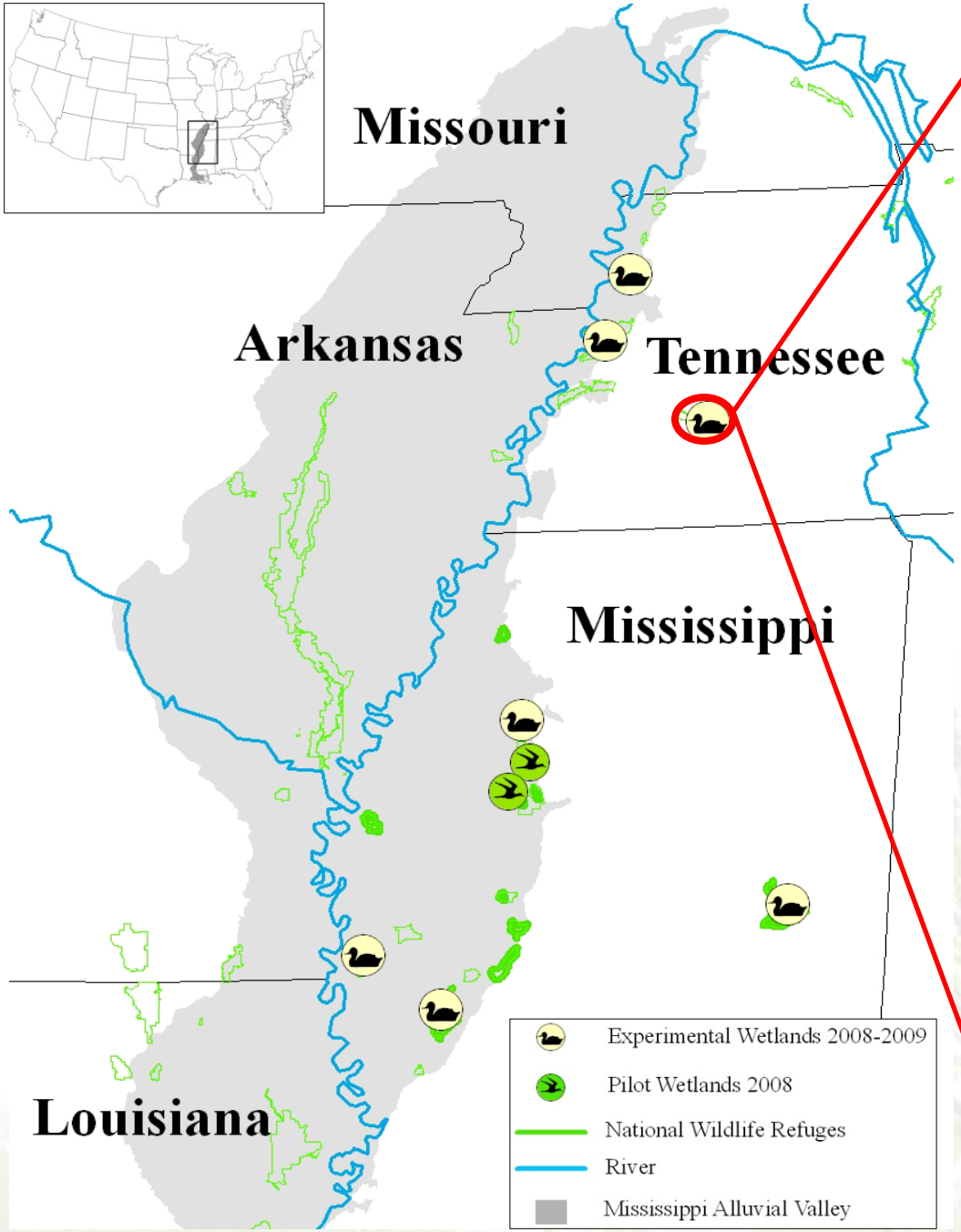
Dabbling Ducks



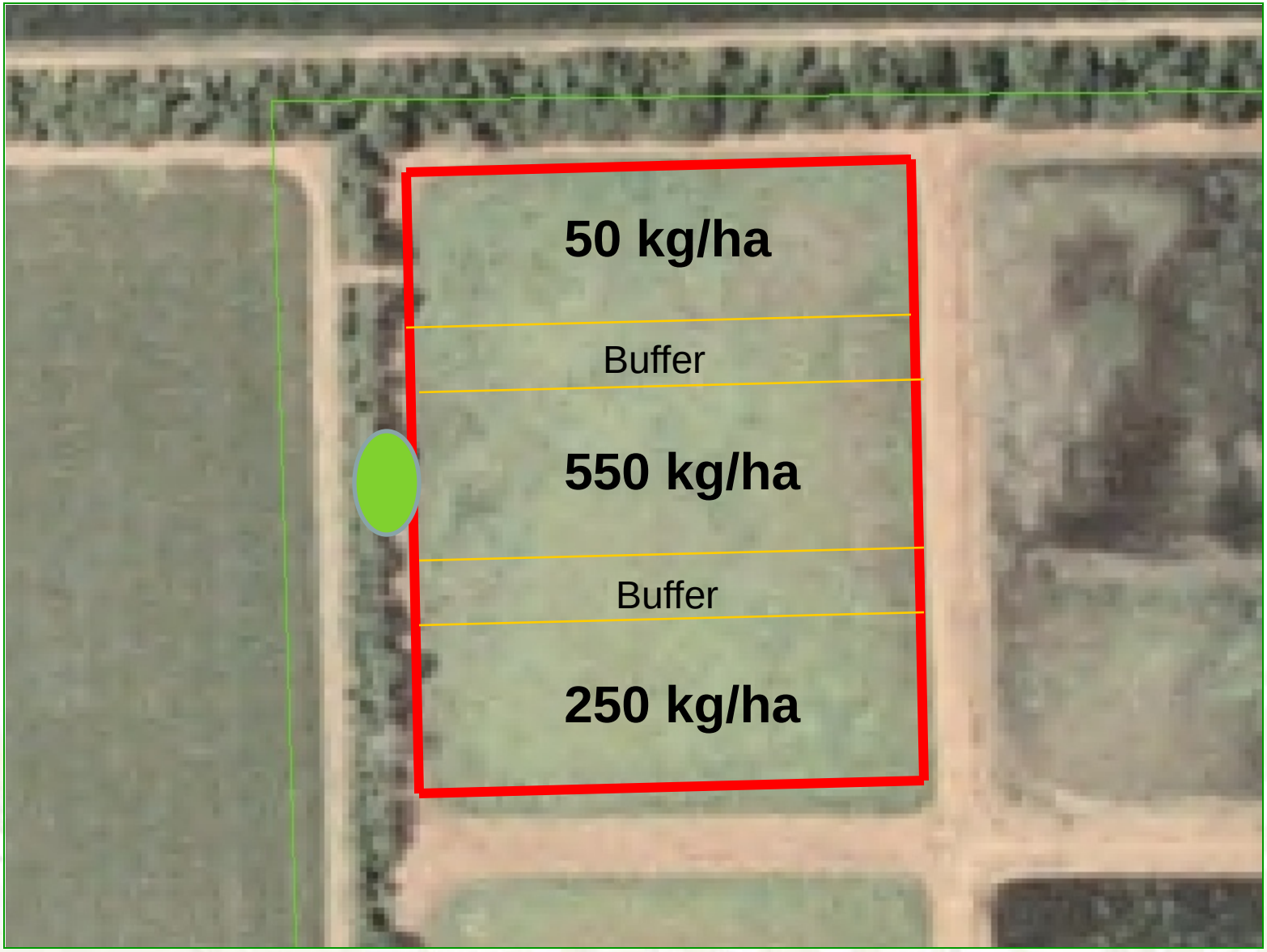
Giving-up Density

- Large-scale experiment to test for dabbling duck response to differing food densities during winter
- Reduce variables in Experiment 2
  - # seed taxa
  - vegetation differences
  - substrate and burial depth
- Is there a site selection (use) threshold
- Replicated experiment by Greer et al. (2009)

Experiment 2

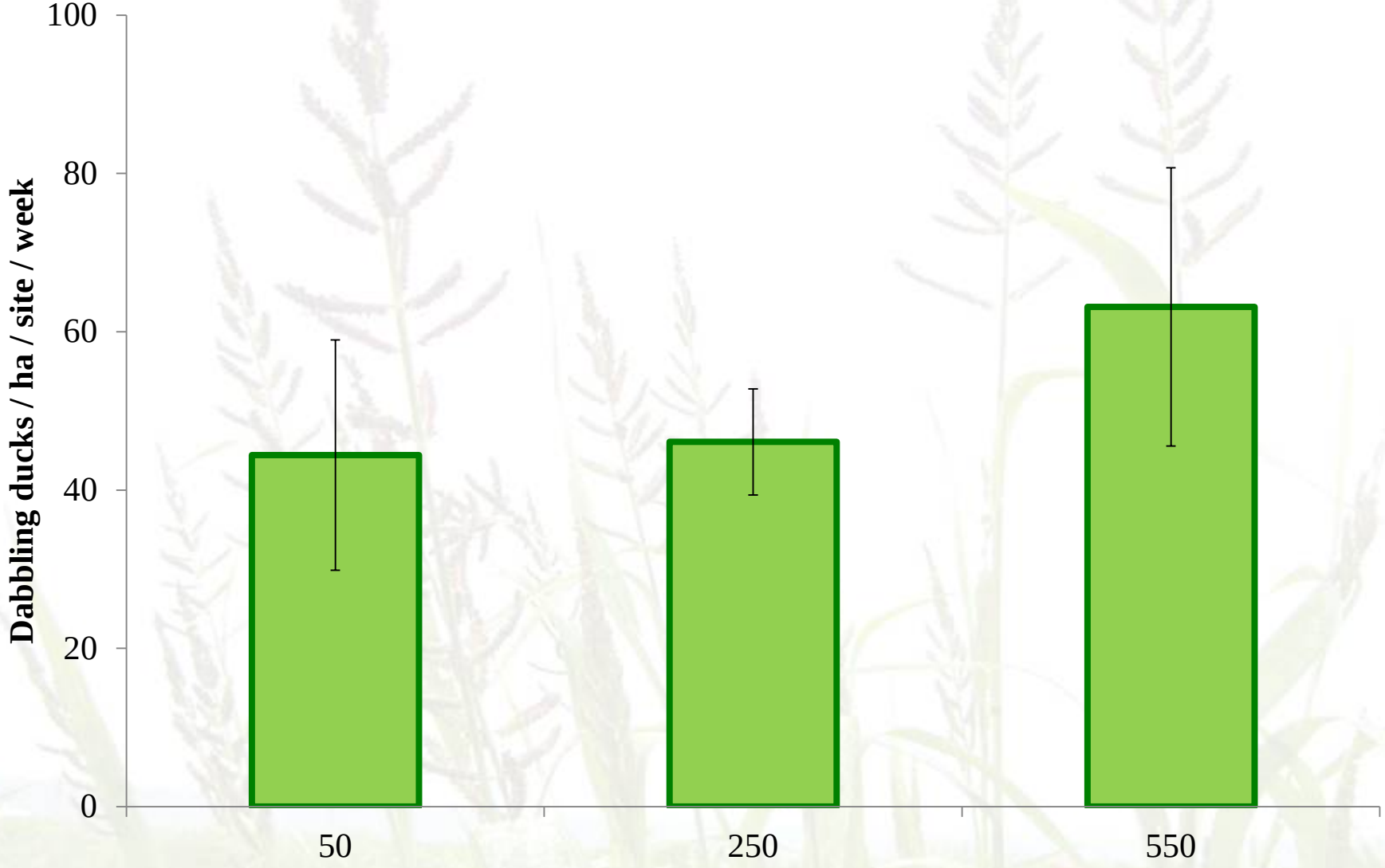


Design

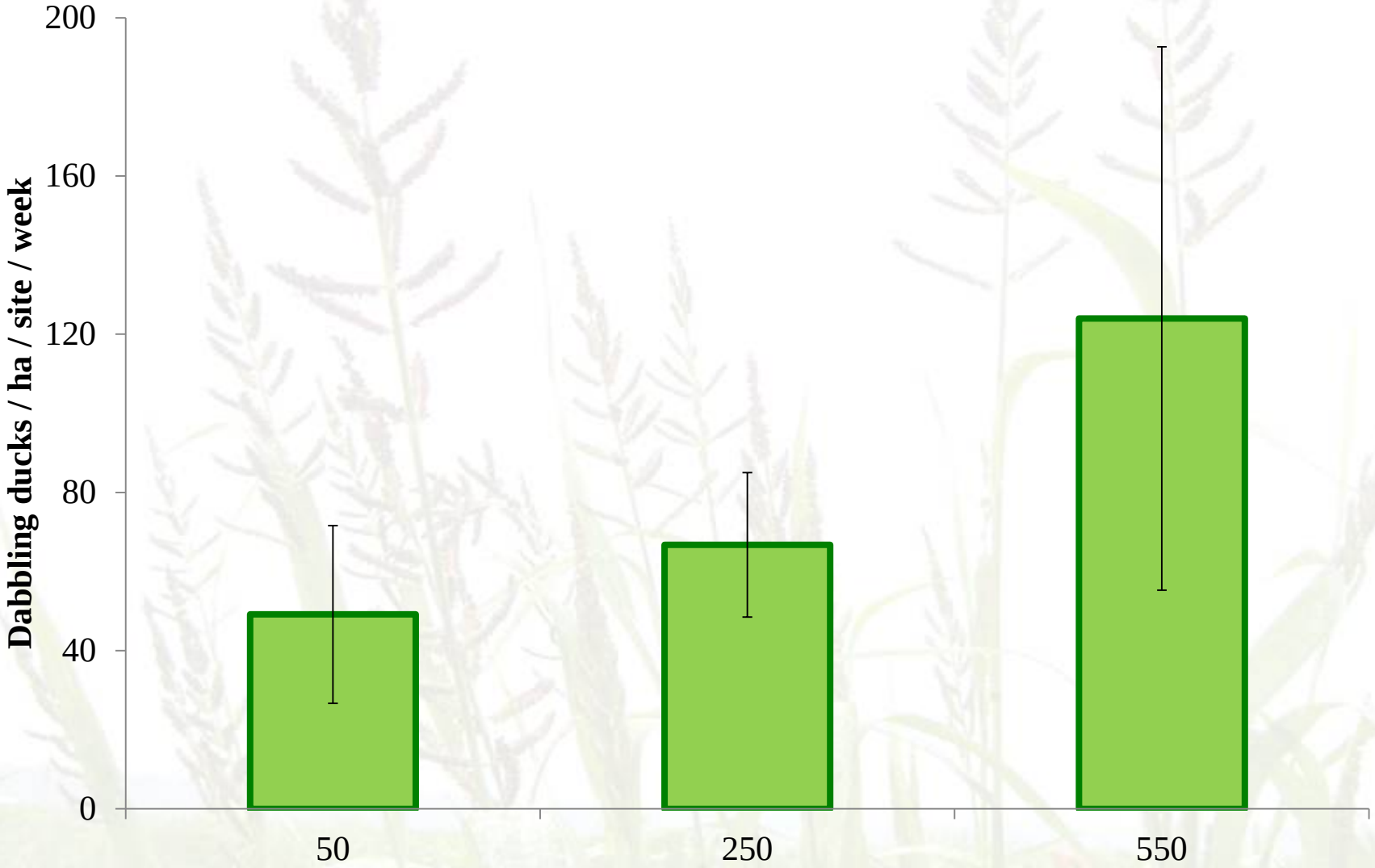


Design

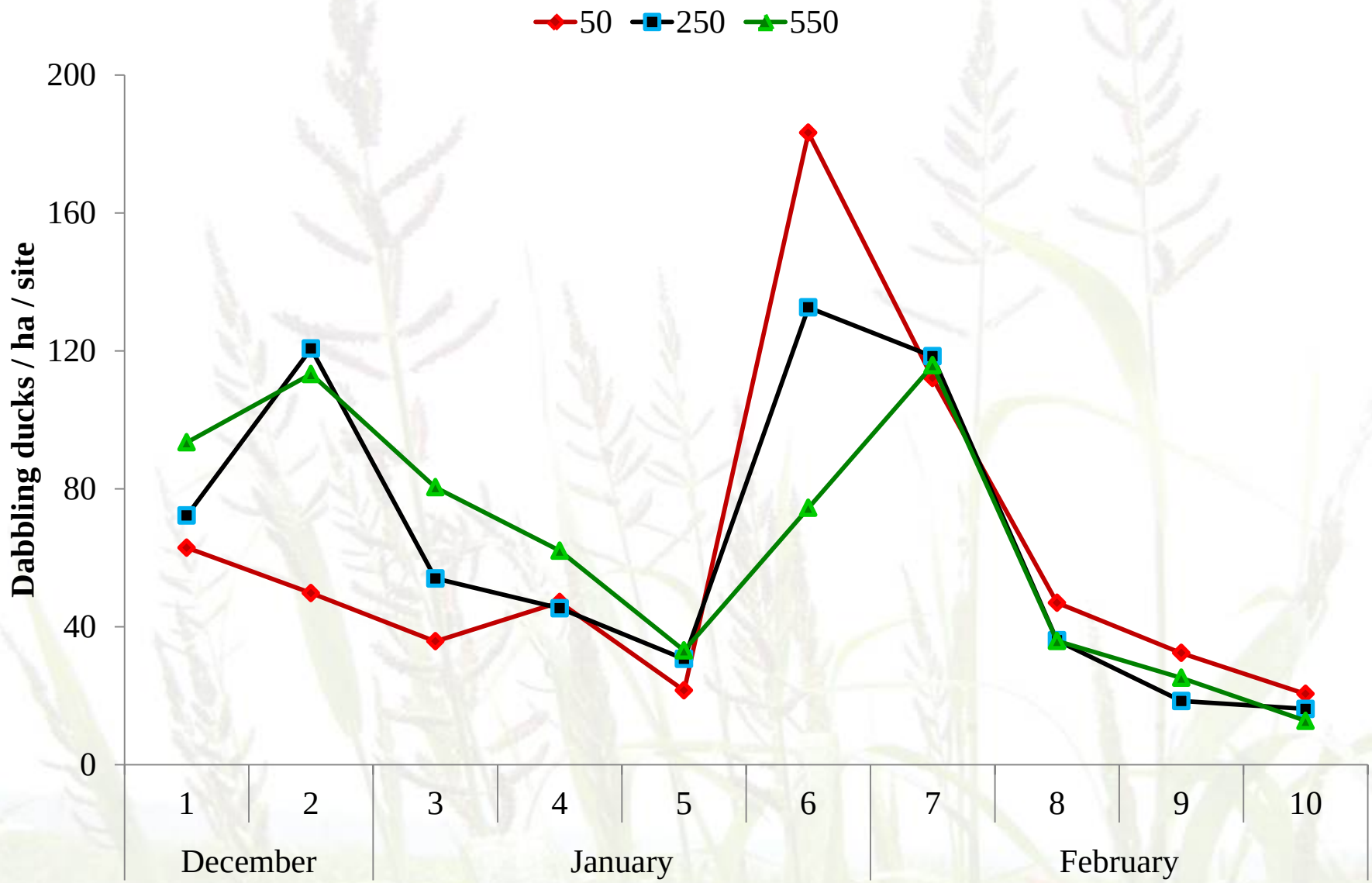
Dabbling Duck Abundance December – February



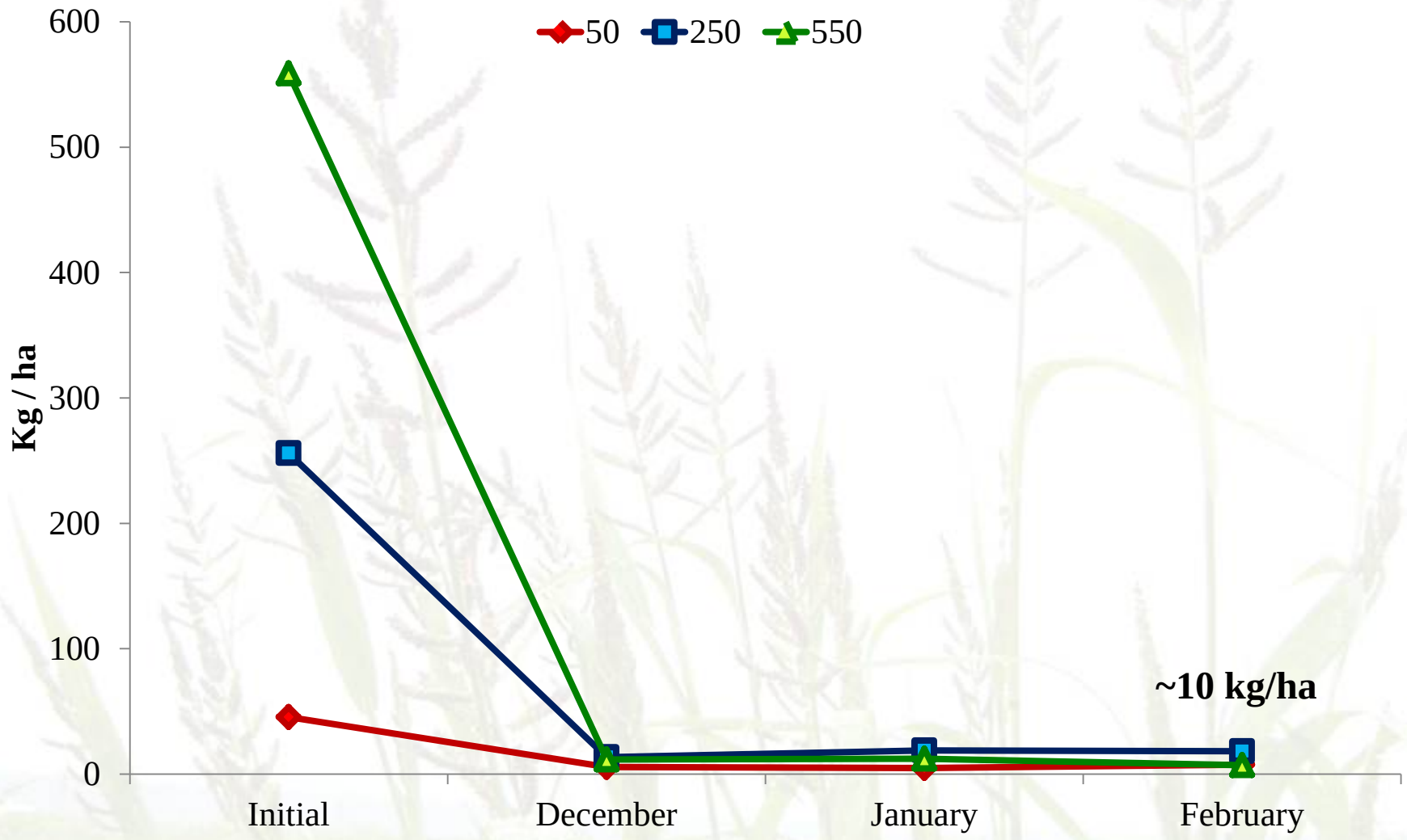
Dabbling Duck Abundance December – Early January



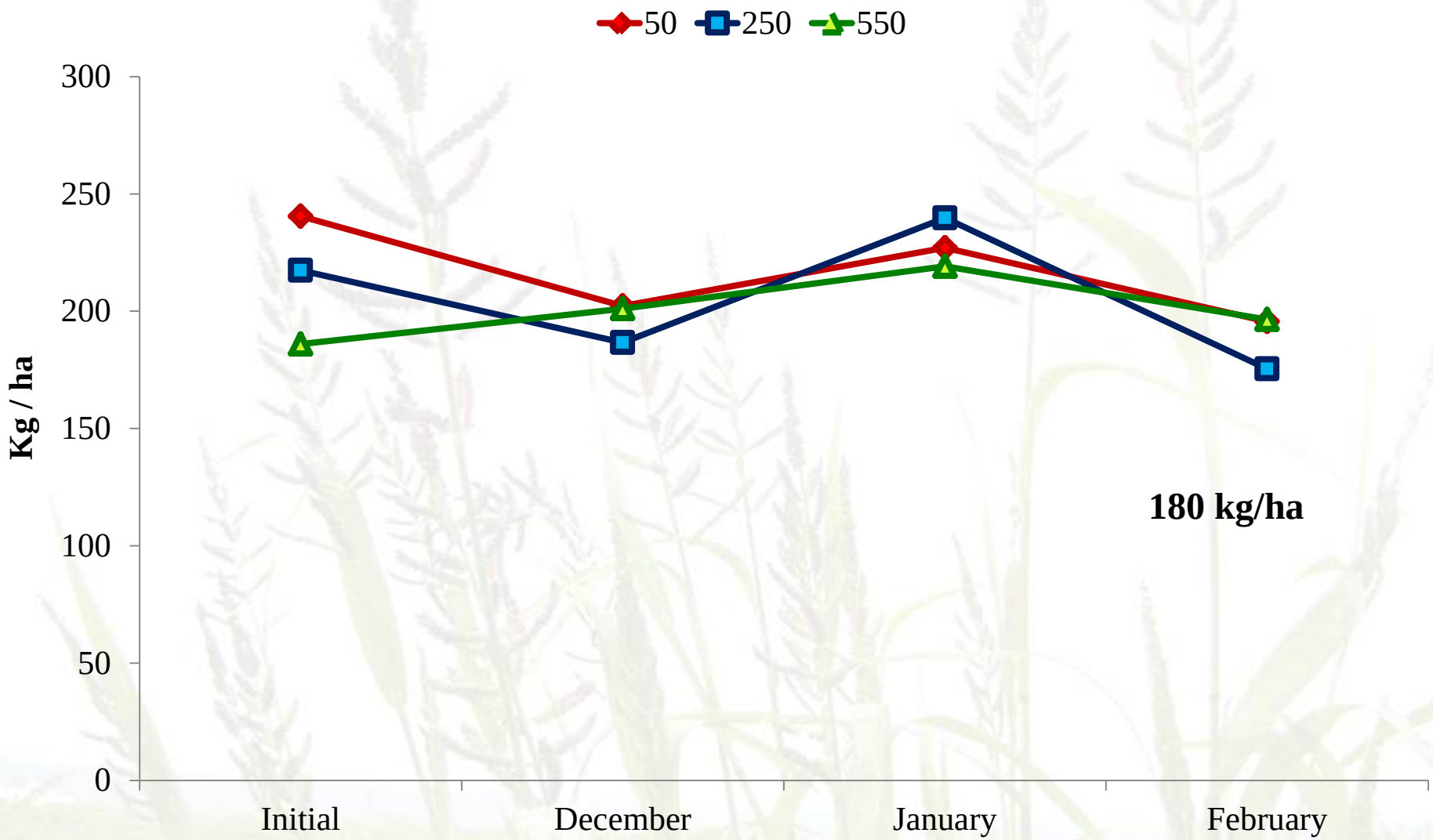
Dabbling Duck Abundance



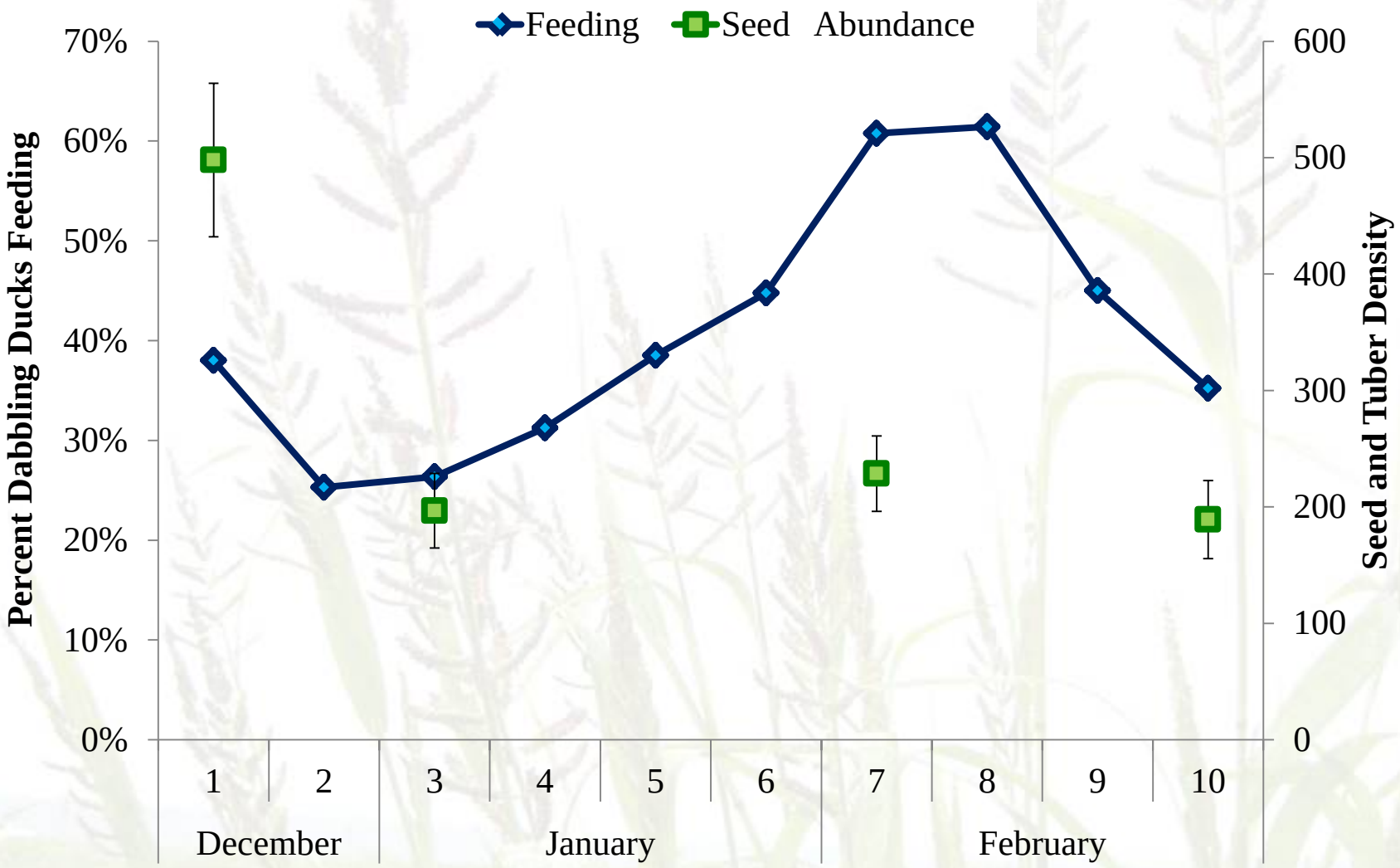
Millet Abundance



Natural Seed and Tuber Abundance



Dabbling Duck Abundance



Conclusions

- Ducks did not “give up” foraging
- Mean Food Availability Threshold = 10 kg/ha – 180 kg/ha
- FAT was similar across treatments at each location, but variable among sites
    - food taxa
    - winter severity
    - habitat quantity and quality
- Increased Food Availability Threshold may indicate lower moist-soil food availability and increased habitat needs

Synthesis

1. Residual seed and tuber abundance in control, disked, and mowed plots (~260 kg/ha)

2. FAT in experimental plots (~180 kg/ha)

3. Median = 220 kg/ha → 40% reduction in food availability

4. Additional 30% seeds & tubers not consumed by waterfowl → 70% decrease in food availability

5. 600 kg/ha → 210 kg/ha

6. Spatial models may better-predict carrying capacities than daily ration models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