Beef cattle grazing management in Rainwater Basin wetlands

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We know vegetation in RWB wetlands is…

- Productive enough for grazing
  - ~4,000 lbs/acre moist-soil plants
  - ~12,000 lbs/acre cattails, river bulrush, or reed canarygrass
- Nutritious enough for grazing
  - Worst case scenario- Repeatedly grazed vegetation averages 7% or higher crude protein during growing season
- Grazing in wetlands produces income
  - 2018 Average pasture rent $46-47 per month per cow/calf pair in southern and southeast Nebraska

Grazing management desired outcomes

- Seed production for waterfowl
  - Good conditions for annual plant growth
  - Good growth and survival of seed producing species
  - Promote prolific seed production
  - Promote good foraging conditions
- Invasive species control
  - Reduce abundance of invasive species
  - Reduce impact of invasive species

Impacts of grazing for invasive species management

- Grazing alone, as done currently, is not very efficient at reducing reed canarygrass abundance or shifting vegetation to more desirable states (Hillhouse, H. L., S. J. Tunnell and J. Stubbendieck. 2010. Spring Grazing Impacts on the Vegetation of Reed Canarygrass Invaded Wetlands. Rangeland Ecology & Management, 63:581-587. Tables 14, 15, 16, Rainwater Basin Joint Venture Public Lands Working Group. 2016. Best management practices for Rainwater Basin wetlands. Rainwater Basin Joint Venture Report, Grand Island, NE USA)

- Grazing reduces aboveground biomass in reed canarygrass dominated areas (Hillhouse, H. L. 2018. Impacts of grazing on seed production in Rainwater Basin wetlands. Wetlands Ecology and Management)

- Grazing can increase the effectiveness of herbicide, especially across multiple years (Table 13, 15, 16, , Rainwater Basin Joint Venture Public Lands Working Group. 2016. Best management practices for Rainwater Basin wetlands. Rainwater Basin Joint Venture Report, Grand Island, NE USA)

Impacts of grazing on seed production

- Grazing produces better growing conditions (more bare ground, less litter) for annual moist-soil vegetation (Hillhouse, H. L., S. J. Tunnell and J. Stubbendieck. 2010. Spring Grazing Impacts on the Vegetation of Reed Canarygrass Invaded Wetlands. Rangeland Ecology & Management, 63:581-587.) but potentially also better conditions for reed canarygrass seedlings (personal observation)

- Grazing results in similar 1-, 2-, and 3-year probability of maintaining moist-soil vegetation as moist-soil vegetation (1-year 74% grazed vs 72% rest) (Tables 9, 10, 11, Rainwater Basin Joint Venture Public Lands Working Group. 2016. Best management practices for Rainwater Basin wetlands. Rainwater Basin Joint Venture Report, Grand Island, NE USA)

- But… grazing during the growing season can reduce moist-soil seed production up to 80% depending on the duration (Hillhouse, H. L. 2018. Impacts of grazing on seed production in Rainwater Basin wetlands. Wetlands Ecology and Management)

So- the problems…

- Case studies and personal observations suggest that grazing CAN be more efficient and effective than has been shown in research to date
- Current grazing practices can reduce invasive species, but at the cost of reduce wetland seed production
- Insufficient information to motivate additional grazing RWB wetlands

Why is grazing less effective than expected?

Wetland forage quantity and quality study: Methods (2015-2017, 3 sites)

- Treatments representative of regional grazing scenarios
  - One-time harvests in May, July, September, and April
  - Two repeat harvest treatments (May+Sept, May+July+Sept)

  - Mid May (vigorous early growth)
    - Typical time cattle currently moved onto public wetlands

  - Late July (vigorous mid-season growth, reproduction in progress)
    - Transition between cool and warm season pasture, or continuous grazing

  - Late September (many plants starting to senesce)
    - Fill gap between summer pasture and grazing stubble, reduce standing biomass

  - Mid April (mostly dormant)
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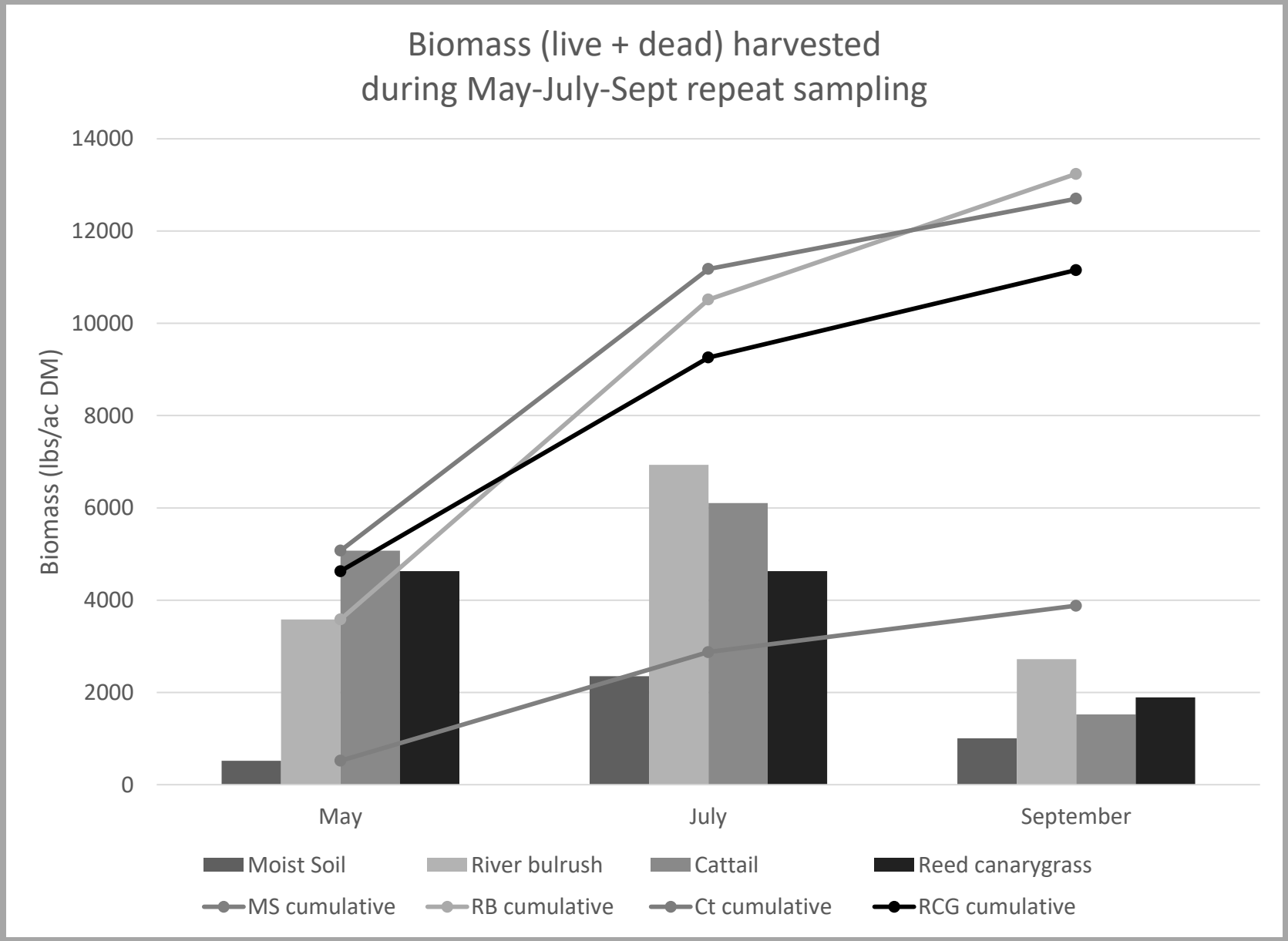
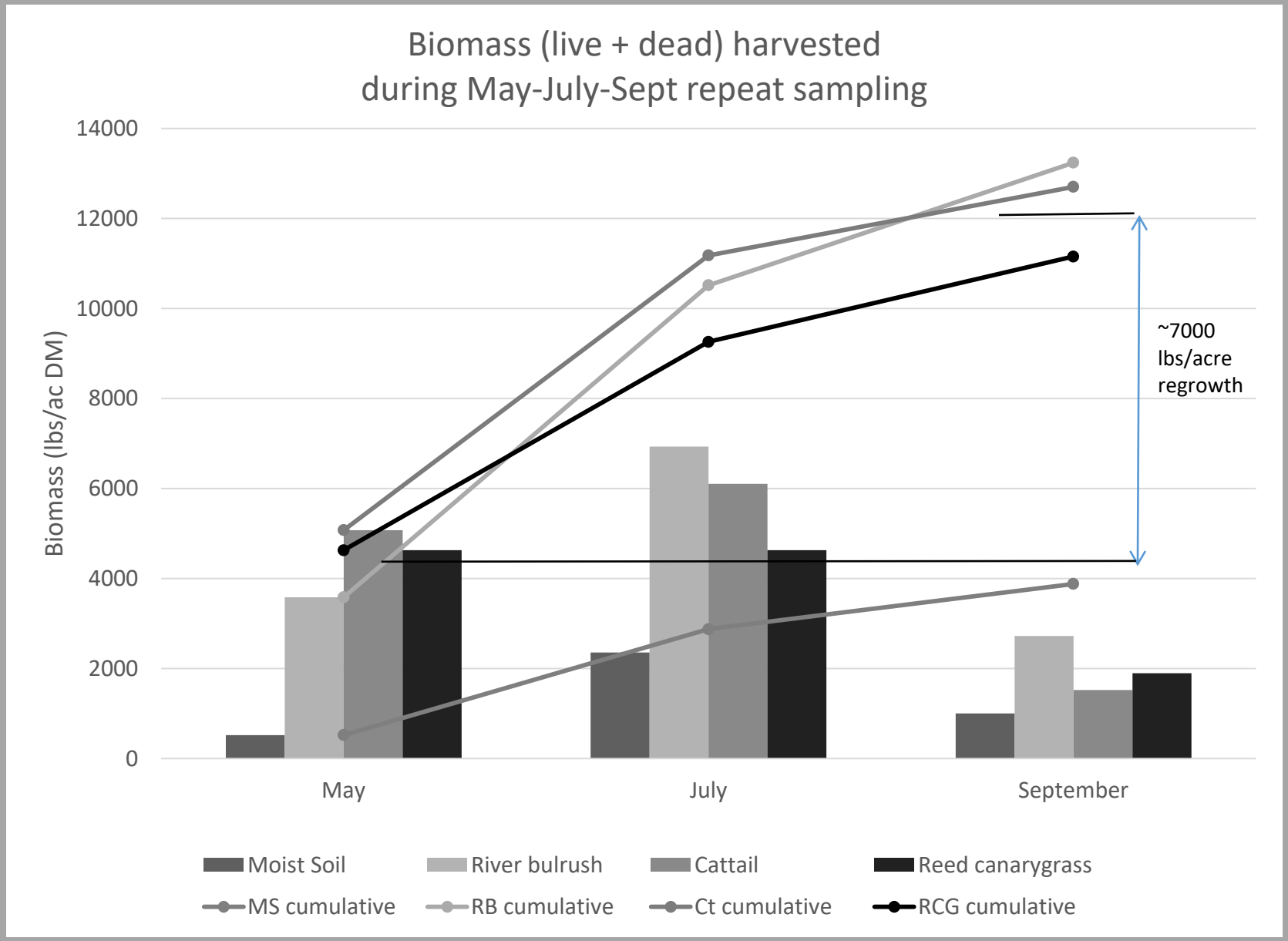

Biomass (live + dead) harvested
during May-July-Sept repeat sampling
Biomass (lbs/ac DM)
14000
12000
10000
8000
6000
4000
2000
0
May
July
September
Moist Soil
River bulrush
Cattail
Reed canarygrass
MS cumulative
RB cumulative
Ct cumulative
RCG cumulative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Biomass (lbs/ac DM)
14000
12000
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8000
6000
4000
2000
0
May
July
September
~7000
lbs/acre
regrowth
Moist Soil
River bulrush
Cattail
Reed canarygrass
MS cumulative
RB cumulative
Ct cumulative
RCG cumulative

RWB current practices forage example

- From recent forage availability research:
  - **Average 7000 lbs/acre** of May-September regrowth in reed canarygrass, cattails, or river bulrush in previously ungrazed wetlands (less in moist-soil vegetation)

- Data from 2010-2011 research (Hillhouse, H. L. 2018. Impacts of grazing on seed production in Rainwater Basin wetlands. Wetlands Ecology and Management)
  - Average occupancy ending ~Sept 15: 135 days (105-165)
  - Average AU/acre: 0.275 (producer target 4 acres/animal, AU = animal unit = 1000 lb equivalent)

- Average forage need: 4% body weight/day, so 40 lbs forage/day. (NRCS, U. S. D. A. 2009. Balancing your animals with your Forage. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS /stelprdb1097070.pdf.)
- Estimated use of forage by herds above during grazing season:
  - 0.275 AU/acre* 40 lbs/day consumed/AU/acre * 135 days
    = 1485 lbs forage consumed/acre

- Estimated consumption 21% of forage produced (actual range 16-27%)

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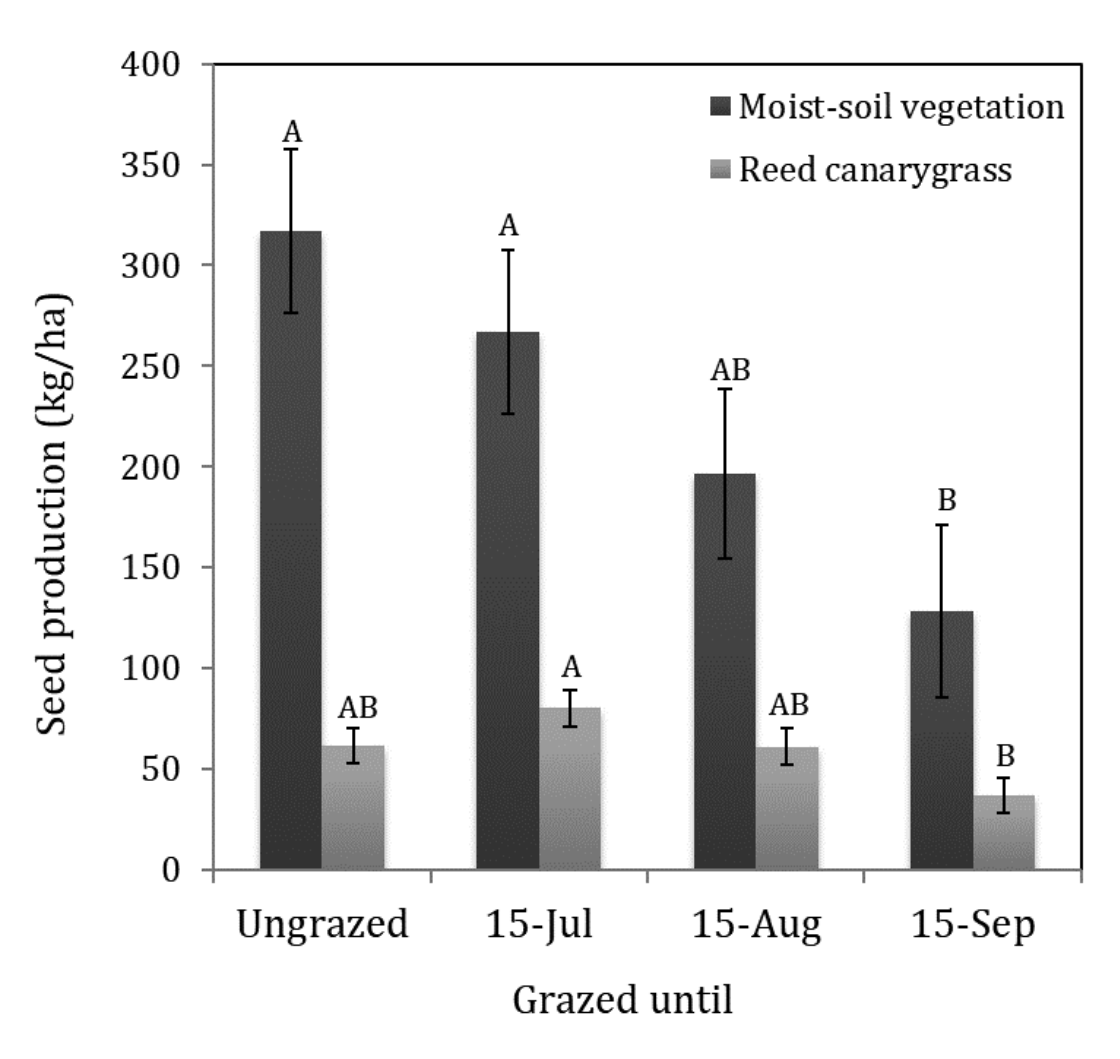
- **Estimated consumption 21% of forage produced (actual range 16-27%)**
  - **Recommended consumption to maintain season-long grazing is 20%**

From the forage perspective- we're grazing to maintain our "pastures"

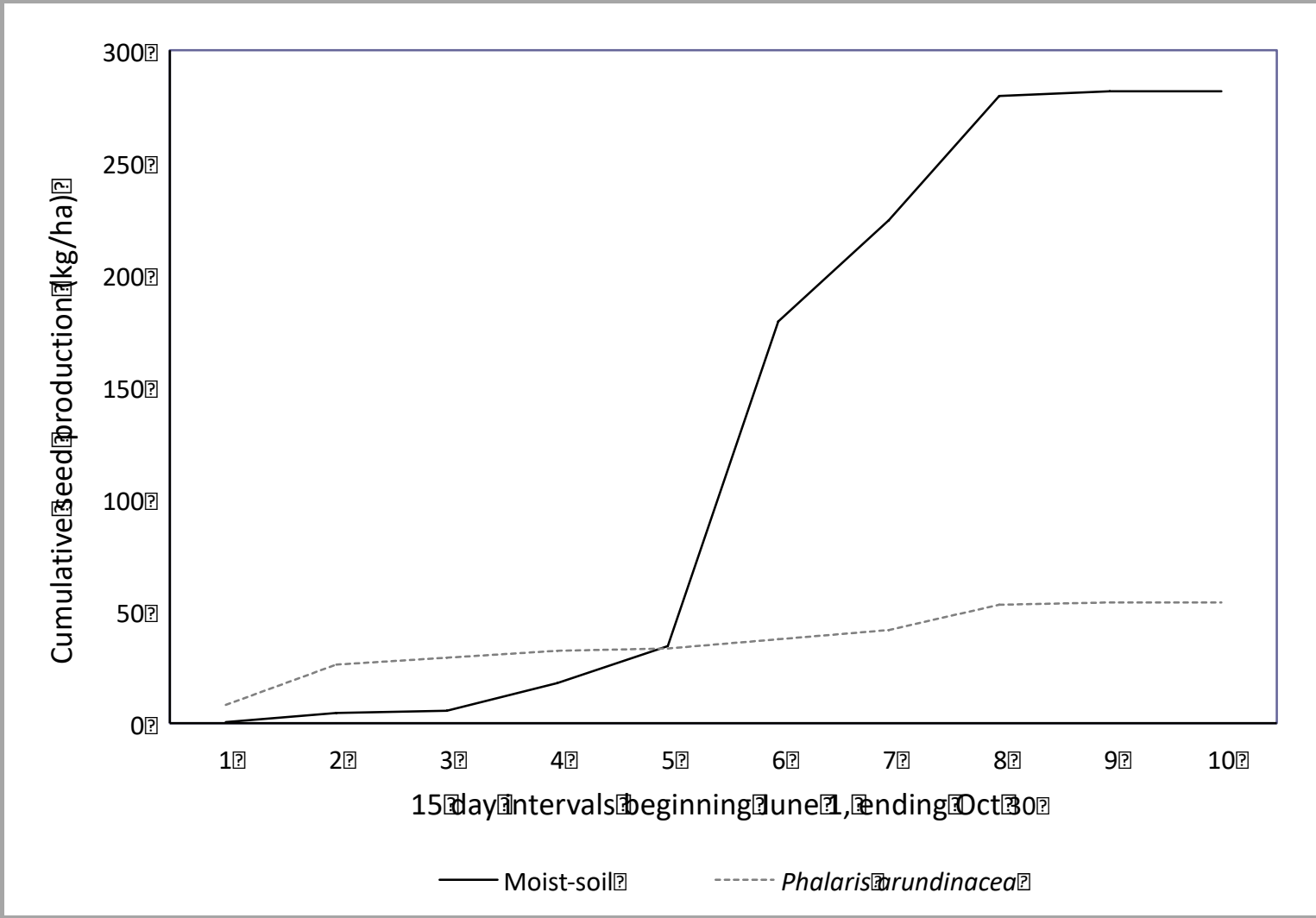
What about seed production?

Grazing impacts on seed production

(Hillhouse, H. L. 2018. Impacts of grazing on seed production in Rainwater Basin wetlands. Wetlands Ecology and Management.)



The timing of seed production (combined data from Hillhouse, H. L. 2018. Impacts of grazing on seed production in Rainwater Basin wetlands. Wetlands Ecology and Management. and Hillhouse, Zilli, and Anderson. 2018. Timing and Protocols for Estimating Seed Production in Moist-Soil and *Phalaris arundinacea* Dominated Areas in Rainwater Basin Wetlands. Wetlands. 38 (3), 461-468.)



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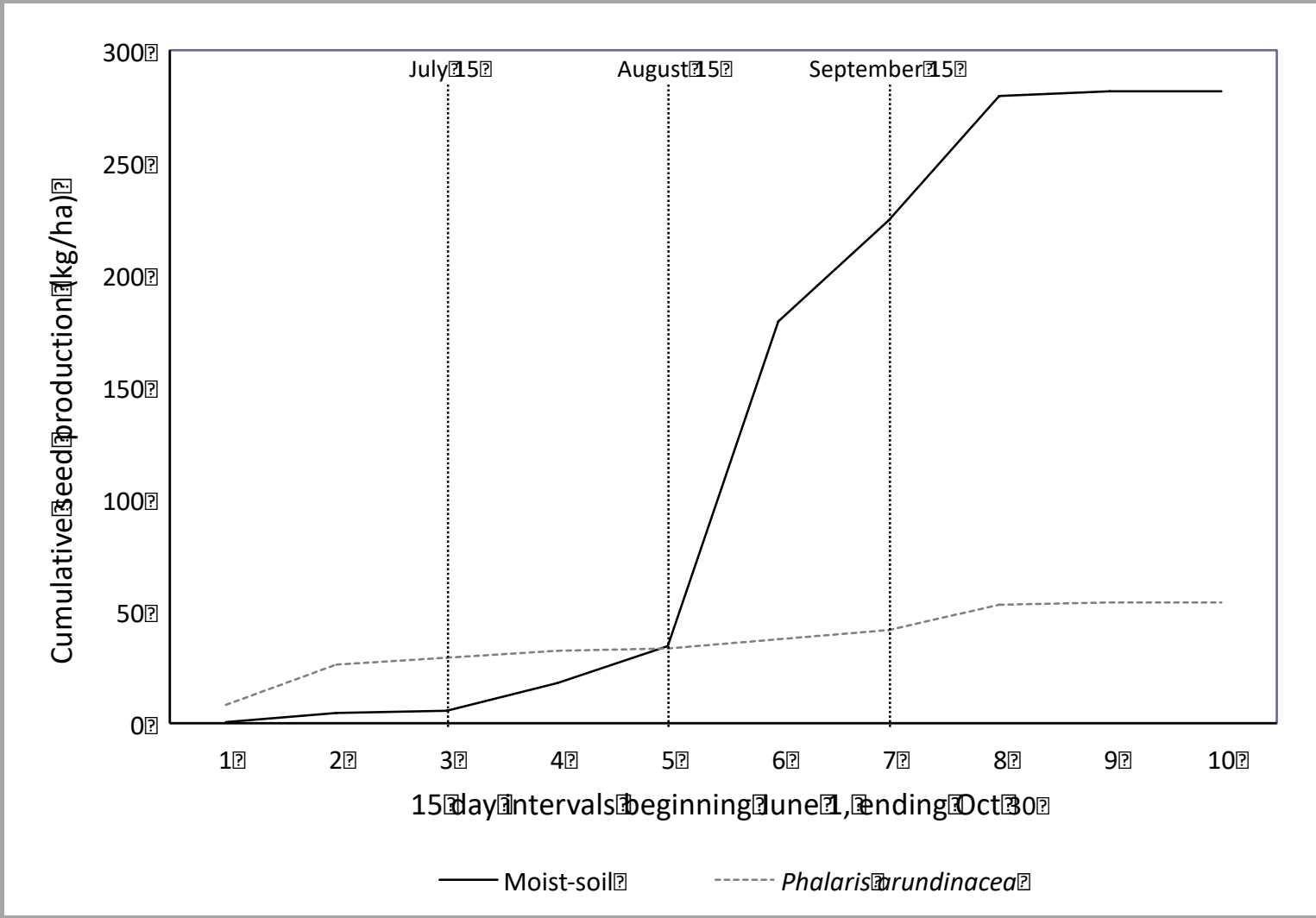
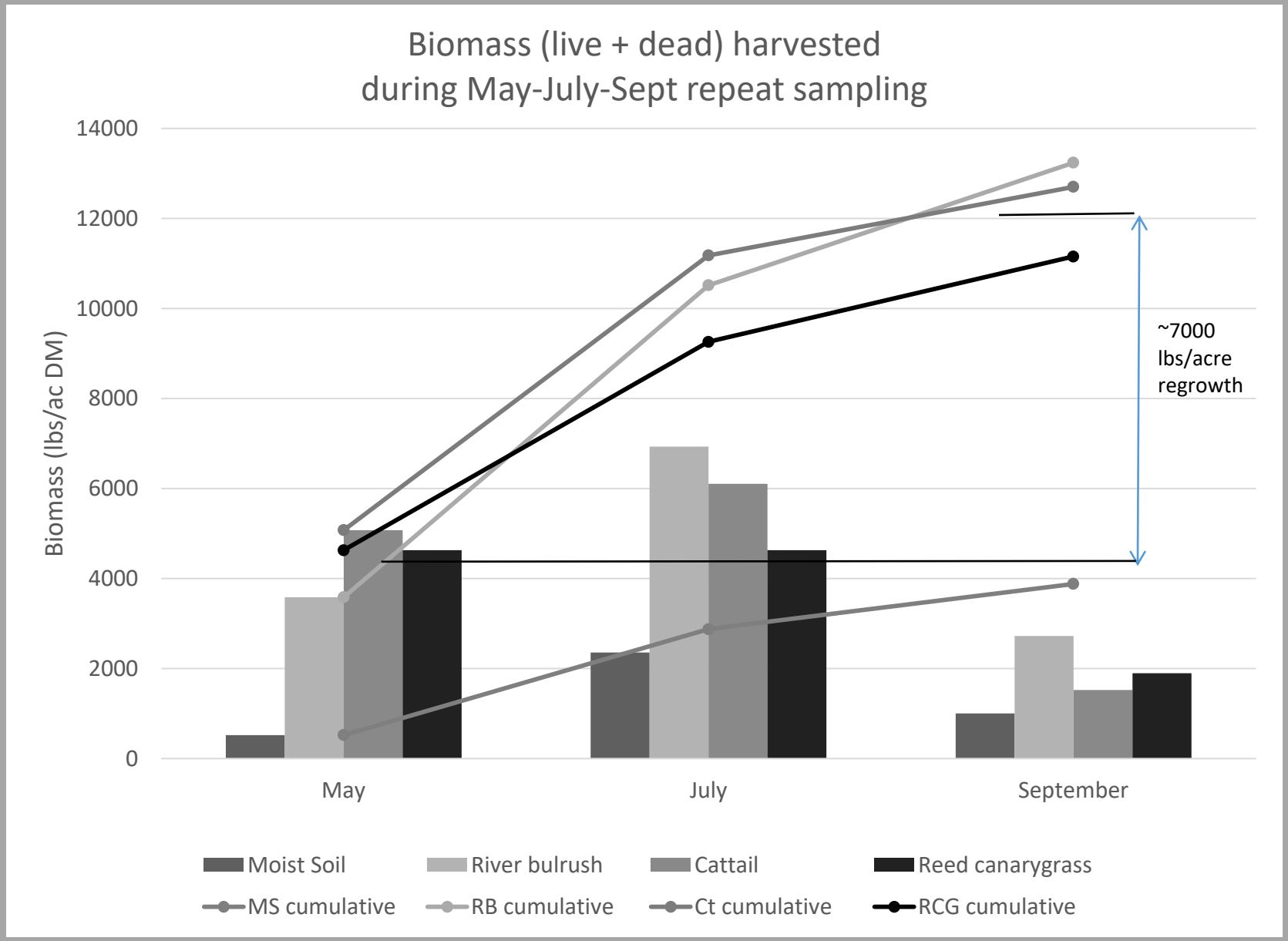


From a seed production perspective, we're grazing at the wrong time.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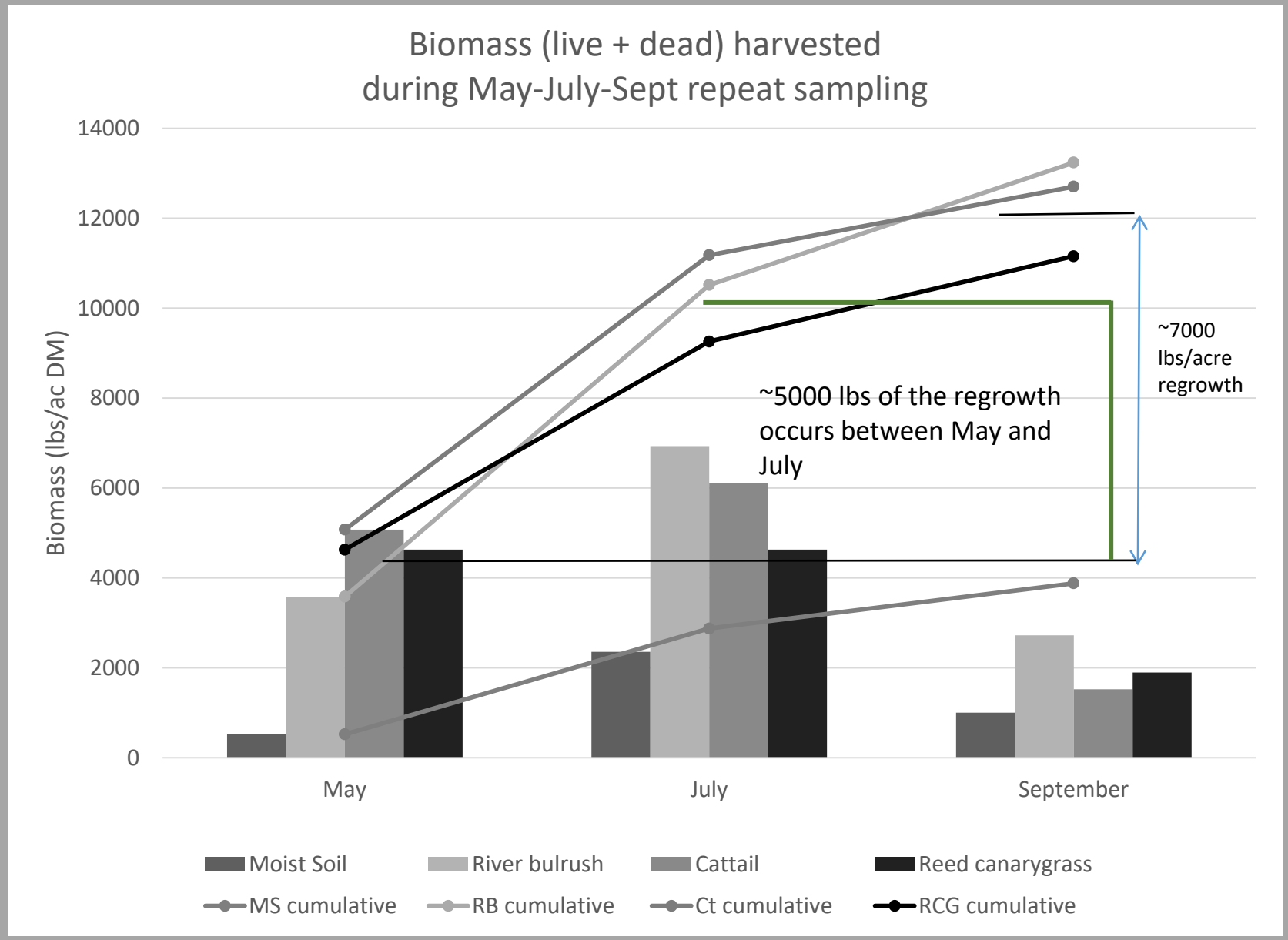
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~5000 lbs of the regrowth occurs between May and July
~7000 lbs/acre regrowth
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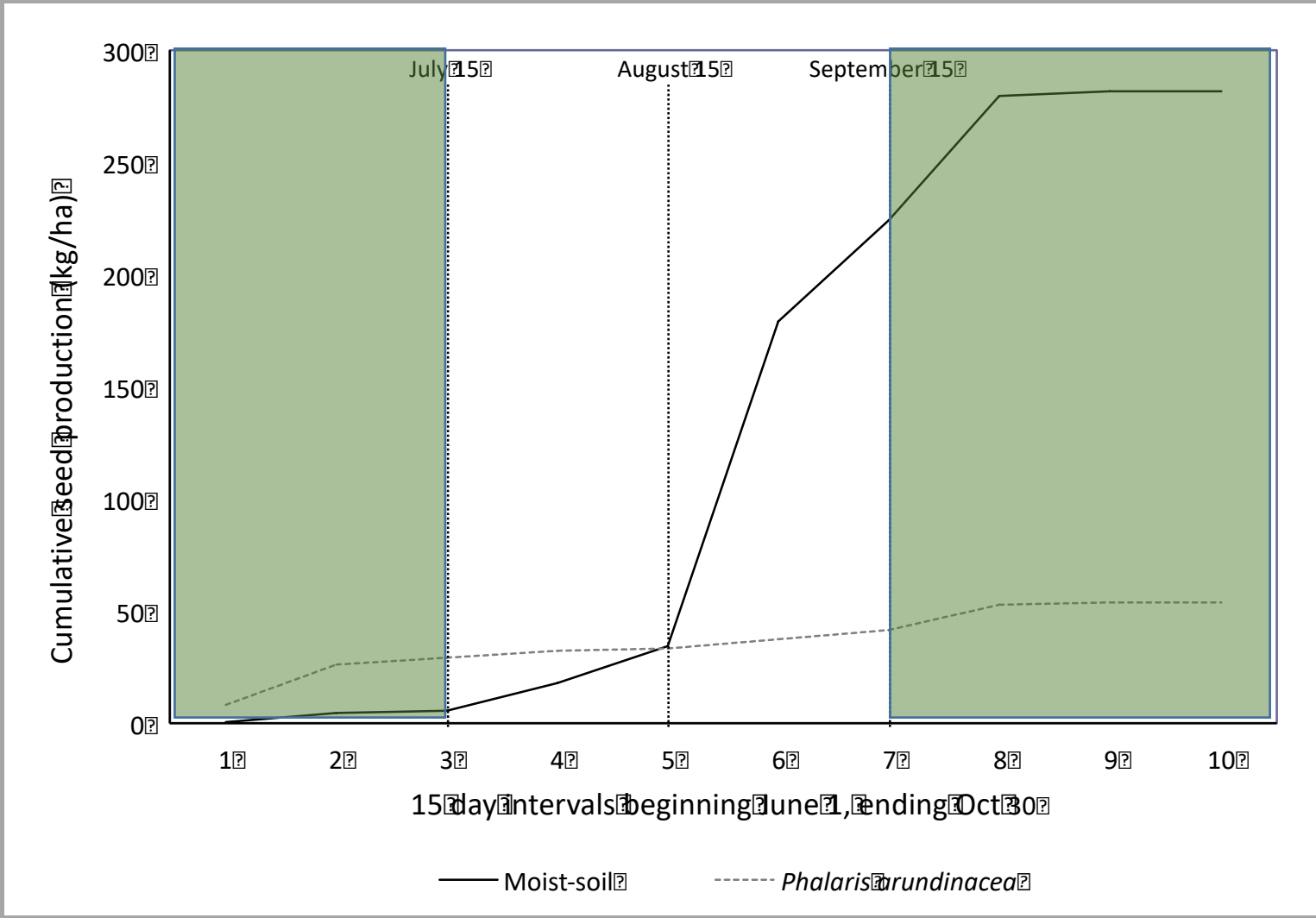

What do we need to change to better meet management goals with grazing?

- Time grazing to have biggest impacts invasive species by targeting period(s) of strongest growth
  - Reed canarygrass has substantial growth by May and strong regrowth in late summer/fall
  - Cattails and river bulrush do most of their growing between May and July
- Target grazing at times of low impact on seed producing species
- Cross fence to better target desired plant community and allow increased grazing intensity
- Note- Need more research on…
  - How can we more efficiently use grazing to target invasive species?
  - How can be better balance invasive species control and seed production?
  - What impact does early/late/dormant season grazing have on wetland species?

Questions?

References

- Hillhouse, H. L. 2018. Impacts of grazing on seed production in Rainwater Basin wetlands. Wetlands Ecology and Management.
- Hillhouse, H. L., S. J. Tunnell and J. Stubbendieck. 2010. Spring Grazing Impacts on the Vegetation of Reed Canarygrass Invaded Wetlands. Rangeland Ecology & Management, 63:581-587
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- Hubbard, Daniel. E. 1988. Using your wetland for forage, S. D. C. F. a. W. R. U. U.S. Fish and Wildlife Service, South Dakota Cooperative Extension Service, South Dakota State University, and U.S Department of Agriculture. FS 853.
- Jansen, J. and J. Stokes. 2018. Nebraska Farm Real Estate Market Highlights 2017-2018. Department of Agriculture and Economics, University of Nebraska-Lincoln
- National Research Council, 2000. Nutrient Requirements of Beef Cattle
- NRCS, U. S. D. A. 2009. Balancing your animals with your Forage. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1097070.pdf.
- Rainwater Basin Joint Venture Public Lands Working Group. 2016. Best management practices for Rainwater Basin wetlands. Rainwater Basin Joint Venture Report, Grand Island, NE USA