

Cattle grazing for invasive *Phragmites australis* (common reed) management in Northern Utah wetlands

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What is *Phragmites* and why manage it?

Phragmites australis (hereafter *Phragmites*) is an invasive grass that has taken over wetlands and disturbed, moist areas across North America.^{1,2} Once established, it expands aggressively to form dense, tall (5-10 feet) patches. Because of its negative impacts on wildlife, particularly birds, many land managers seek to manage or contain it.^{3,4} Here we provide suggestions for how cattle grazing can be integrated into *Phragmites* management programs in northern Utah.

Traditional methods of *Phragmites* management

The most effective way to manage *Phragmites* is to apply an herbicide (glyphosate or imazapyr) in the fall, which is translocated to the roots and rhizomes.^{4,5} Following herbicide application, the dead biomass must be removed through common approaches like burning, mowing, and trampling. However, burning is difficult because of air quality issues and proximity to urban centers in northern Utah.^{3,4} Mowing and trampling can be time consuming and expensive, and afterward, a thick layer of plant material remains and is slow to decompose.^{6,7} In fact, Utah state wetland managers spend about \$100 / acre mowing and trampling areas where *Phragmites* has been herbicide-treated. Despite this huge investment in mowing and trampling, it will likely still take 2-3 years before the litter breaks down to allow sufficient light for native plant seeds to germinate.⁴

Alternative tool for *Phragmites* management: grazing

Grazing with cattle is another *Phragmites* management tool. Grazing requires minimal labor beyond fence installation and is inexpensive.⁸ Grazing not only removes plant biomass but also provides other benefits including breaking up dead plant material through trampling, stressing *Phragmites* through grazing, and increasing biodiversity.⁸⁻¹¹ In fact, managers can actually make money from ranchers based on an AUM charge (~\$20 / AUM), or managers can accept in-kind services, such as fence installation, for the use of the *Phragmites*-dominated wetlands for grazing. Using this mutually beneficial method, state agencies in Utah have been able to manage



Fence installation for containing cattle in target areas.
Image: Karin Kettenring



Cattle grazing greatly reduced Phragmites biomass and litter on right side of fence line. Standing Phragmites in ungrazed plot left of fence line. Image: Brittany Duncan

thousands of acres of *Phragmites* each year with minimal effort (i.e., just managing grazing contracts).

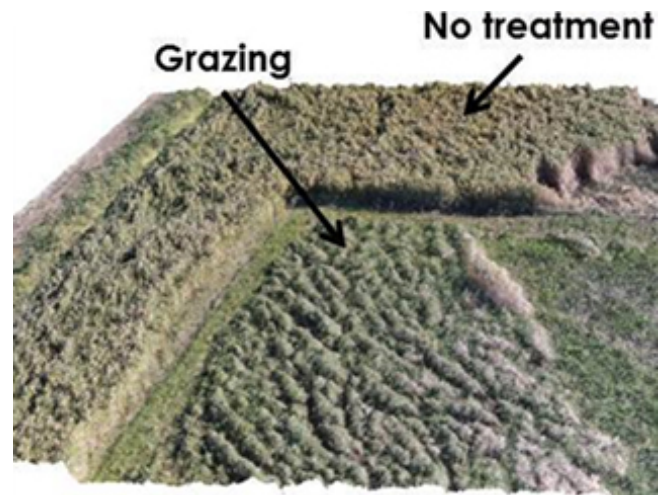
Although grazing is economical, it is limited in where it can be applied and by the fact that grazing alone does not kill *Phragmites*.^{9,11} Grazing should only be used in areas that meet the following criteria: (a) water can be drawn down,⁹ (b) cattle have limited access to native plants,¹² (c) water quality (nitrogen and phosphorus) impacts from grazing can be properly managed as detailed below,¹² and (d) cattle can be sufficiently contained as described below.¹³ Ideally, grazing can be integrated into an herbicide sequence to kill *Phragmites* instead of only containing it.^{9,11}

Suggested timeline for and details of grazing management (see timeline image)

1. **Mowing (optional):** Although grazing alone will significantly reduce *Phragmites* biomass, mowing in the first year prior to grazing will allow cattle to more evenly trample litter and more effectively graze; this reduces live *Phragmites* biomass significantly more than grazing alone.¹⁴ In the winter, before grazing, mow area when the ground is frozen to reduce the chance of the machinery getting stuck. If the whole area cannot be mowed, mow an access trail for the cattle.
2. **Draw down:** Draw down water prior to grazing to increase cattle access to *Phragmites*, minimize cattle injuries or sickness, and reduce water quality impacts through nutrient loading of nitrogen and phosphorus from cattle excretions.^{12,15}
3. **Graze:** The ideal timing of grazing is: (a) when the site has been drained of water, (b) when

there is enough *Phragmites* biomass for the cattle to eat (typically the ranchers will have a sense of this), and (c) before *Phragmites* has gone to seed. The duration of grazing will be limited by the amount of feed available or the ability to keep the land dry. There has been no rigorous evaluation of appropriate cattle stocking rates and grazing timing to minimize nutrient impacts to wetlands. However, over a 2 year timeframe, one study found that cattle grazing at a rate of 1.2 AUM/acre (with a mix of cow-calf pairs, yearling heifers, and/or bulls) throughout the summer (roughly June through mid-September) decreased *Phragmites* biomass by 67% compared to ungrazed areas while having a negligible impact on water quality through nutrient loading.⁹ If grazing at higher stocking rates or for longer periods of time, consider monitoring nitrogen and phosphorus levels to manage nutrient impacts.

4. **Remove cattle, rest land, and re-flood:** After cattle are removed from the land, wait at least 2–4 weeks to allow manure to degrade and be volatilized.¹⁶ Then re-flood the site if possible to minimize carbon loss from the soil.^{10,17}

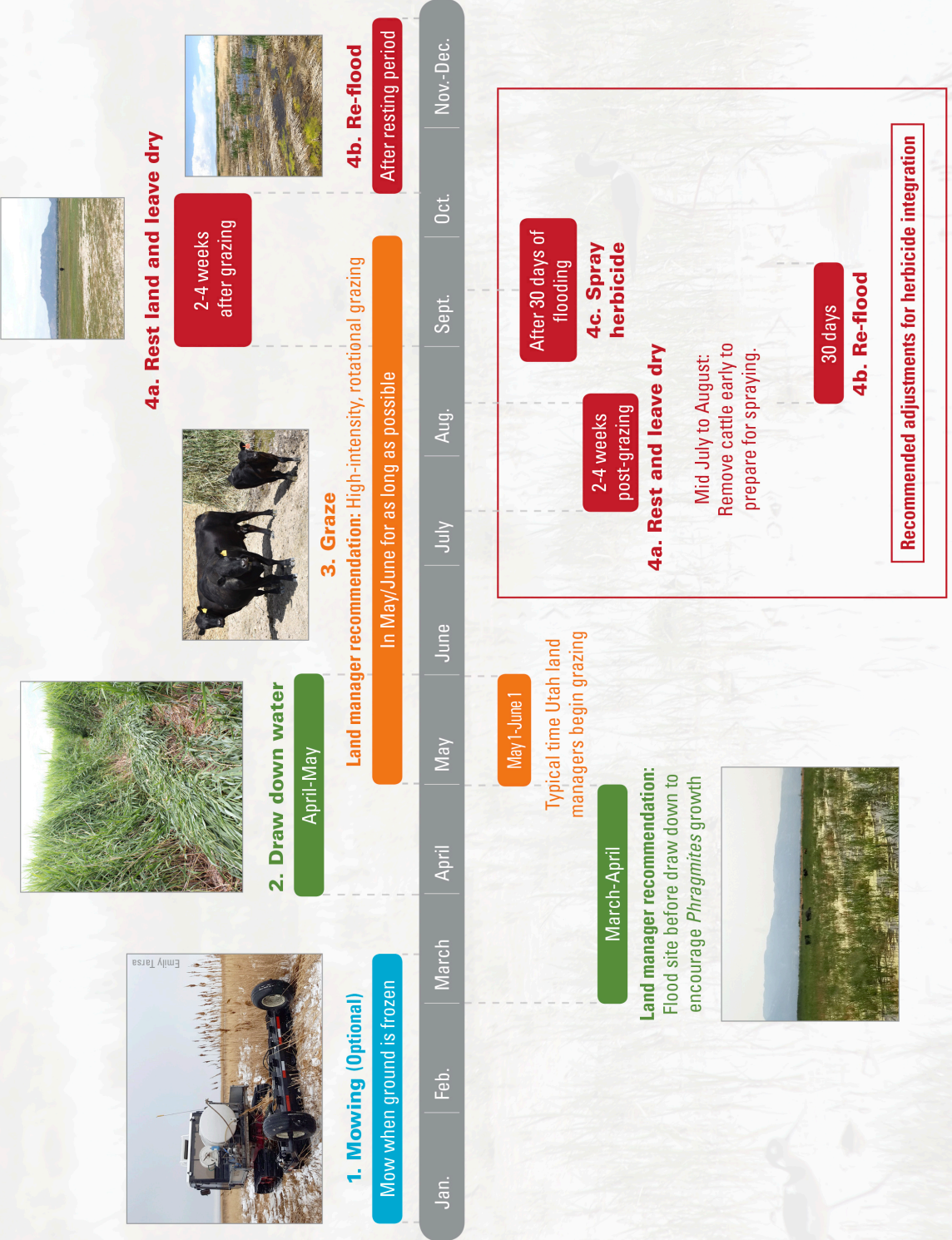


Drone-captured aerial imagery showing an ungrazed area (“No treatment”) relative to grazed area (“Grazing”) with a mowed fence line in between demarcating the two areas. Image: Rebekah Downard

Integrating grazing with herbicide and reseeding

If grazing alone is not meeting *Phragmites* management goals, it may be beneficial to integrate grazing with herbicide, although this management sequence is not yet thoroughly tested in this region.^{5,11} Preliminary recommendations for spraying with

Suggested timeline for grazing management of *Phragmites*



herbicide after grazing are to remove cattle by mid-July to early-August to allow for adequate *Phragmites* stem regrowth (~30 days).⁴ Then re-flood sites ≥ 2 -4 weeks after grazing is completed. After 2 or 3 years of *Phragmites* grazing and herbicide application, consider seeding native plants if you find that native plant return is limited. Native plants are not only highly desirable for wildlife (particularly waterfowl), but also provide competition to help minimize the extent of *Phragmites* reinvasion in the future.⁴ Also, it is important to maintain desirable native plant cover to minimize erosion where cattle access water (e.g., riparian areas or dikes) by reseeding if necessary.¹⁸

Tips from the professionals—Utah Division of Wildlife Resources (DWR) land managers

While there is still minimal research on grazing *Phragmites*, wetland managers in Utah have extensive on-the-ground grazing experience. Here are some tips for what they have found works best.

- **Pre-grazing:** Flood the area in early spring, before grazing, to produce enough *Phragmites* feed for the cattle and provide habitat for migrating birds. Then, draw down water by approximately May 1.
- **Fencing:** the DWR uses solid 2-strand barbed wire electric fencing, rather than permanent 5-strand barbed wire fencing, because it is equally effective and less expensive. Install T-posts every 15-20 feet with 2 strands of barbed wire and run a good electric fence charger from a power source (e.g., solar panel or car battery). Natural barriers, such as water channels or open water, can also be used to contain cattle.
- **Cattle Selection:** Use cattle that have grazed in wetland habitats, are familiar with navigating in mud and water to prevent injuries (e.g., hoof rot or getting stuck in mud), and are familiar with eating *Phragmites*.
- **Grazing:** In Utah, DWR land managers have typically begun grazing between May 1 and June 1, once phragmites reaches approximately 2-3 feet tall, and then graze as long as possible into the fall. They have found a high intensity, short duration (roughly every 2-3 weeks), and rotational grazing pattern works well. They have used flooding to force the cattle to move (but be cautious as flooding fresh manure could lead to water quality issues).

- **Working with ranchers:** Use yearly contracts for allotments. This approach will give the land manager the flexibility to find dedicated ranchers who are responsive in case of problems (e.g., getting cattle out of a site on short notice, fixing fences, etc.). It is difficult and costly to find a place to move cattle mid-summer. Therefore, be as adaptable as possible by having a back-up plan, such as a nearby alternative site, if problems occur on the primary site.

Additional resources

1. Chambers RM, Meyerson LA, Saltonstall K. 1999. Expansion of *Phragmites australis* into tidal wetlands of North America. *Aquat Bot.* 64:261-273.
2. Kettenring KM, de Blois, S, Hauber, DP. 2012. Moving from a regional to a continental perspective of *Phragmites australis* invasion in North America, *AoB Plants* pls040.
3. Rohal CB, Kettenring KM, Sims K, Hazelton EL, Ma Z. 2018. Surveying managers to inform a regionally relevant invasive *Phragmites australis* research program. *J Environ Manage.* 206:807-816.
4. Rohal C, Hambrecht K, Cranney C, Kettenring K. 2017. How to restore *Phragmites*-invaded wetlands. Utah Agricultural Experiment Station Research Report 224, Logan, UT. 2pp.
5. Hazelton ELG, Mozdzer TJ, Burdick DM, Kettenring KM, Whigham DF. 2014. *Phragmites australis* management in the United States: 40 years of methods and outcomes. *AoB Plants* 6: plu001.
6. Cranney CR. 2016. Control of large stands of *Phragmites australis* in Great Salt Lake, Utah Wetlands. Masters thesis, Utah State University, Logan, UT.
7. Rohal C. 2018. Invasive *Phragmites australis* management in Great Salt Lake wetlands: context dependency and scale effects on vegetation and seed banks. PhD dissertation, Utah State University, Logan, UT.
8. Brundage J. 2010. Grazing as a management tool for controlling *Phragmites australis* and restoring native plant biodiversity in wetlands. Masters thesis, University of Maryland, College Park, MD.

9. Duncan BL. 2019. Impacts of cattle grazing as a tool to control *Phragmites australis* in wetlands on nitrogen, phosphorus, and carbon. Masters thesis, Utah State University, Logan, UT.
10. Davidson KE, Fowler MS, Skov MW, Doerr SH, Beaumont N, Griffin JN. 2017. Livestock grazing alters multiple ecosystem properties and services in salt marshes: a meta-analysis. *J Appl Ecol.* 54:1395-1405.
11. Volesky JD, Young SL, Jenkins KH. 2016. Cattle grazing effects on *Phragmites australis* in Nebraska. *Invasive Plant Sci Manag.* 9:121-127.
12. Croel RC, Kneitel JM. 2011. Cattle waste reduces plant diversity in vernal pool mesocosms. *Aquat Bot.* 95:140-145.
13. Personal communication with UDWR managers.
14. Duncan BL. Unpublished data.
15. Gupta RB, Fincher MG, Bruner DW. 1964. A study of the etiology of foot-rot in cattle. *Cornell Vet.* 54:66-77.
16. Barker JC, Hodges SC, Walls FR, Services C. 2002. Livestock manure production rates and nutrient content. *North Carolina Agric Chem Man.* Chapter X: Fertilizer Use:1-4.
17. Fisher B, Bradbury RB, Andrews JE, Ausden M, Bentham-Green S, White SM, Gill JA. 2011. Impacts of species-led conservation on ecosystem services of wetlands: Understanding co-benefits and tradeoffs. *Biodivers Conserv.* 20:2461-2481.
18. Belsky AJ, Matzke A, Uselman S. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *J Soil Water Conserv.* 54:419-431.

Acknowledgments

We thank the ranchers, dedicated hunter volunteers, and USU volunteers who made this project (Brittany Duncan’s MS thesis research) possible. The primary research synthesized in this document was supported by Utah Division of Water Quality; Utah Division of Forestry, Fire & State Lands; and Wasatch Front Water Quality Council.

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This document can be cited as:

Duncan, B., R. Hansen, K. Hambrecht, C. Cranney, J.J. Follstad Shah, K.E. Veblen, and K.M. Kettenring. 2019. Cattle grazing for invasive *Phragmites* management in Northern Utah wetlands. Utah State University Extension Fact Sheet NR/Wildlands/2019-01pr, Logan, UT. 5pp.



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