

## **ML 2016 Project Abstract**

For the Period Ending February 28, 2022

**PROJECT TITLE:** MITPPC sub-project 2: Understanding the benefits and costs of using goats for invasive plant control

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**FUNDING SOURCE:** Environment and Natural Resources Trust Fund

**LEGAL CITATION:** ML 2016, Ch. 186, Sec. 2, Subd 6a

\$3,750,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota for the Invasive Terrestrial Plants and Pests Center to conduct research to prevent, minimize, and mitigate the threats and impacts posed by terrestrial invasive plants, pathogens, and pests to the state's prairies, forests, wetlands, and agricultural resources. This appropriation is available until June 30, 2023, by which time the project must be completed and final products delivered.

**APPROPRIATION AMOUNT:** \$410,267

**AMOUNT SPENT:** \$410,267

**AMOUNT REMAINING:** \$0

### **Sound bite of Project Outcomes and Results**

Targeted grazing by goats demonstrates some benefits for the control of invasive *Rhamnus cathartica* and the enhancement of native plant communities. While *P. tenuis* transmission to goats remains a concern during invasive plant management, co-grazing goats with waterfowl may mitigate this seasonal disease risk.

### **Overall Project Outcome and Results**

The use of goats for invasive plant control is increasing, yet few data exist on the effects of goat browsing on invasive species populations or native plant community composition. The cost of this management strategy is also elevated in some regions due to mortality caused by a parasite of white-tailed deer, *Parelaphostrongylus tenuis*, that goats may be exposed to when browsing in areas where infected deer defecate. To address these issues, we used *Rhamnus cathartica* as a target species to quantify the short- and long-term effects of goat browsing for invasive plant control and non-target impacts on associated native plant communities. We found that goats provide temporary suppression of *R. cathartica* abundance but this invasive shrub rebounds following grazing cessation. Native vegetation was similarly temporarily suppressed, but in some cases native plant diversity reached higher levels following grazing treatments. A broader synthesis and meta-analysis of the targeted grazing literature revealed similar patterns for the effects of goats and other livestock used for targeted grazing of invasive or undesired plant populations. Importantly, consumption by goats kills the seed of *R. cathartica*, and other invasive plants with larger seeds, indicating that goats are unlikely to exacerbate invasions by spreading them to new areas. Finally, in evaluating the *P. tenuis* risk to goats, we conducted a retrospective study of *P. tenuis*-associated mortalities of small ruminants in Minnesota over a 19-year period, as well as examined whether co-grazing goats with waterfowl could reduce transmission risk through waterfowl consumption of the gastropod intermediate hosts that harbor this parasite. Overall, we determined that the *P. tenuis*-associated mortality rate of goats is low (<1%), though it is unclear how browsing for invasive plant control might affect this level. Through our co-grazing experiments, we found more gastropods in habitats after goats had browsed alone; however, we did not observe these increases when goats were co-grazed with waterfowl. In addition, waterfowl did not negatively affect overall gastropod abundance or diversity. Thus, waterfowl could reduce *P. tenuis* risk to goats without harming gastropod communities.

### **Project Results Use and Dissemination**

Research highlights were regularly disseminated throughout the duration of our project. Over the course of our research, our project was featured in eight popular press articles within the midwest region, one Minnesota radio station and PBS's Prairie Lawn and Garden show. Our project team leveraged our research in 11 education events targeting primary, secondary, higher education-level students, and community members, and seven presentations to university, local, regional, and national scientific, natural resource management, and public audiences. We've also had four manuscripts published in peer-reviewed scientific journals, with a fifth nearing submission. Project highlights have also been shared on [Twitter](#).