

Managing Habitat in Moist-soil Units of the Upper Mississippi River Floodplain through Flooded Soil Manipulations in the Face of a Changing Climate

Introduction

Moist-soil management balances disturbance techniques and water level manipulations to produce optimal roosting, loafing, and foraging habitat for migrating waterbirds as well as a myriad of breeding and resident species. Soil manipulations are important to maintain suitable habitat for a variety of species while managing moist-soil habitats. These manipulations are traditionally done through disking after spring drawdown but before fall flood-up.

Benefits of Disking Moist-Soil

- Sets Back Succession
- Triggers Annual Seed Producing Plants
- Reduces Invasive and/or Nuisance Species
- Provides Shorebird Habitat
- Provides Invertebrates

Drawbacks of Disking Moist-Soil

- Drawdown – Disk – Re-flood (increase in pumping cost)
- Promotes Invasive and/or Nuisance Species if not Flooded
- Small Window of Opportunity – Cannot Draw Down Until Late in Growing Season with High River (every 1 to 3 years)



Figure 1: Performing soil manipulations prior to drawdown in the spring can save both time and money.

Benefits of Rolling Moist-Soil

- Sets Back Succession
- Triggers Annual Seed Producing Plants
- Reduces Invasive and/or Nuisance Species
- Provides Shorebird Habitat
- Provides Invertebrates
- * Expands Window of Opportunity to Conduct Manipulations
- * Reduces Pumping Costs

Drawbacks of Rolling Moist-Soil

- Wetland Fauna Mortality

Mick D. Hanan¹, Brian Loges², and Jason Wilson¹

¹U.S. Fish and Wildlife Service, Great River and Clarence Cannon National Wildlife Refuges, Annada, MO 63330. ² U.S. Fish and Wildlife Service, Two Rivers National Wildlife Refuge, Brussels, IL 62013



Study Area

Clarence Cannon National Wildlife Refuge is located at Pool 25 of the Mississippi River. It lies one mile east of Annada, Missouri in Pike County, and has over 2,000 acres of moist soil habitat.

Methods

Habitat Management

Refuge staff used a rolling technique to manipulate soil by pulling a smooth drum field roller with a tractor throughout shallow flooded units until the desired soil conditions were achieved (Figure 1).

- Saturated Soil to <12" Water Depth
- Shallower Water Showed More Favorable Results (saturated soil to 6")
- 1 – 3 Passes to Achieve Desired Soil Condition

This technique was used in 2 management units (MSU 7 and MSU 5) with separate management objectives in mind. MSU 7 (Figure 2) was rolled to reduce domination of reed canary grass (*Phalaris arundinacea*). MSU 5 (Figure 3) was rolled to set back succession and promote growth of annual seed producing plants.



Figure 2: Unit 7 on Clarence Cannon NWR in 2011. Area on right was rolled in April and flooded throughout the growing season for cool season plants. Area on left was not treated and remained dominant in reed canary grass (*P. arundinacea*).

Results and Discussion

Preliminary assessments and observations depict a favorable response in treated areas over untreated areas.

Unrolled

- MSU 7 – dominated by *P. arundinacea* (87.5% absolute cover)
- MSU 5 – dominated by *Eleocharis palustris* (59.37% absolute cover) and *Leersia oryzoides* (31.37 % absolute cover)

Rolled

- MSU 7 – *Leersia oryzoides* (63.87 % absolute cover), *Cyperus esculentus* (30.73% absolute cover), and *P. arundinacea* (16.5 % absolute cover)
- MSU 5 – *Echinochloa crus-galli/muricata* (82.50% absolute cover) and *Leersia oryzoides* (31.37 % absolute cover)

Desirable Plants

Echinochloa spp., *Cyperus* spp., *Leersia* spp.

Undesirable Plants

P. arundinacea, *Eleocharis palustris*

*Diversity is an overall goal for habitat management of moist-soil units at the refuge



Figure 3: Unit 5 on Clarence Cannon NWR in 2011. Portions of unit on right side of picture were not treated and remained a dominant stand of spikerush (*Eleocharis* spp.) and cutgrass (*Leersia* spp.). The portion of the unit on the left side was rolled prior to drawdown and resulted in much more desirable vegetation.

Management Implications

Within the constraints of an altered river and surrounding landscape accelerated by climate change managers can now implement a management technique for soil disturbance that will set back succession and maintain a diverse plant community even in years where high water hinders the timing for a typical draw-down.

