

Drainage Water Management Effect on Water Table Recession Rate

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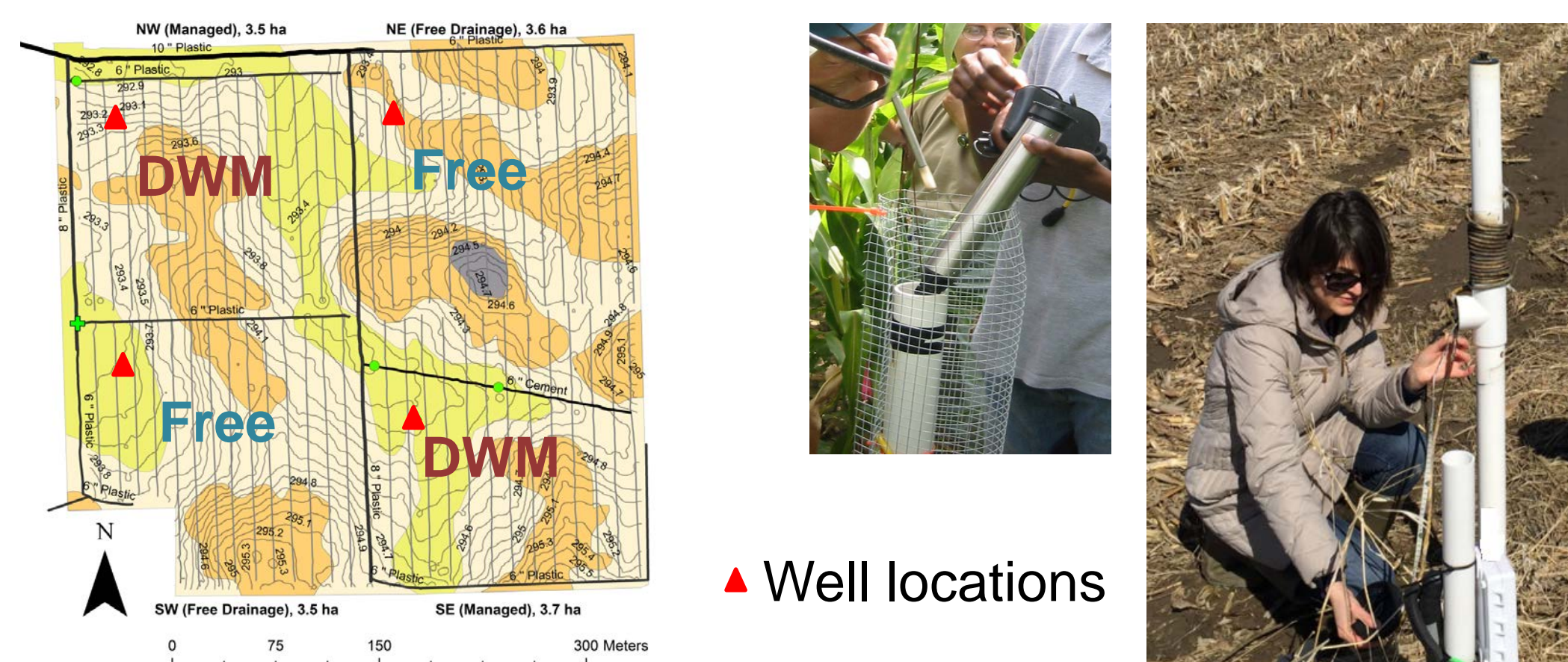
Introduction

- Controlled drainage can be used to hold water in the field, reducing nitrate loss, and give farmers control over water levels in the field. However, it may reduce the flow rate to the drainage pipe, and thus increase the time needed for the water table level to fall.
- Farmers want to know how to best manage this so it does not negatively affect crop yield or their ability to get out in the field to plant and harvest.
- Question is whether the outlet should be lowered prior to or directly after a rainfall event to reduce the amount of time that water table is at a harmful level. Our goal is to answer this question using water table recession rate.

Methods

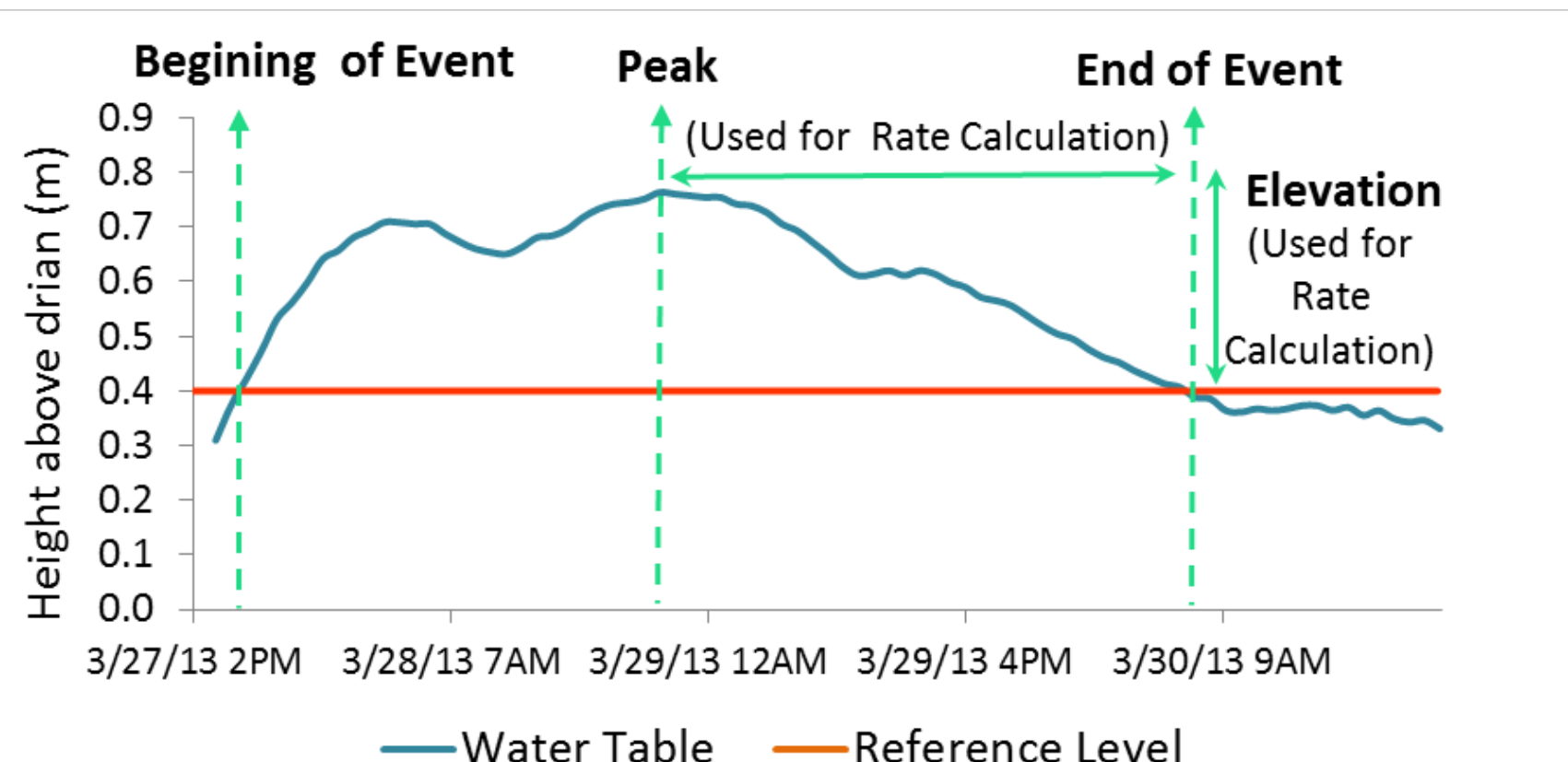
Site: DPAC, eastern Indiana.

Water table observation wells in each plot, equipped with level loggers, take measurements every hour.



Over a period of 9 years from 2006 to 2014, recession rates were obtained using height of water table above drain.

- Identifying an event and determining recession rate:**



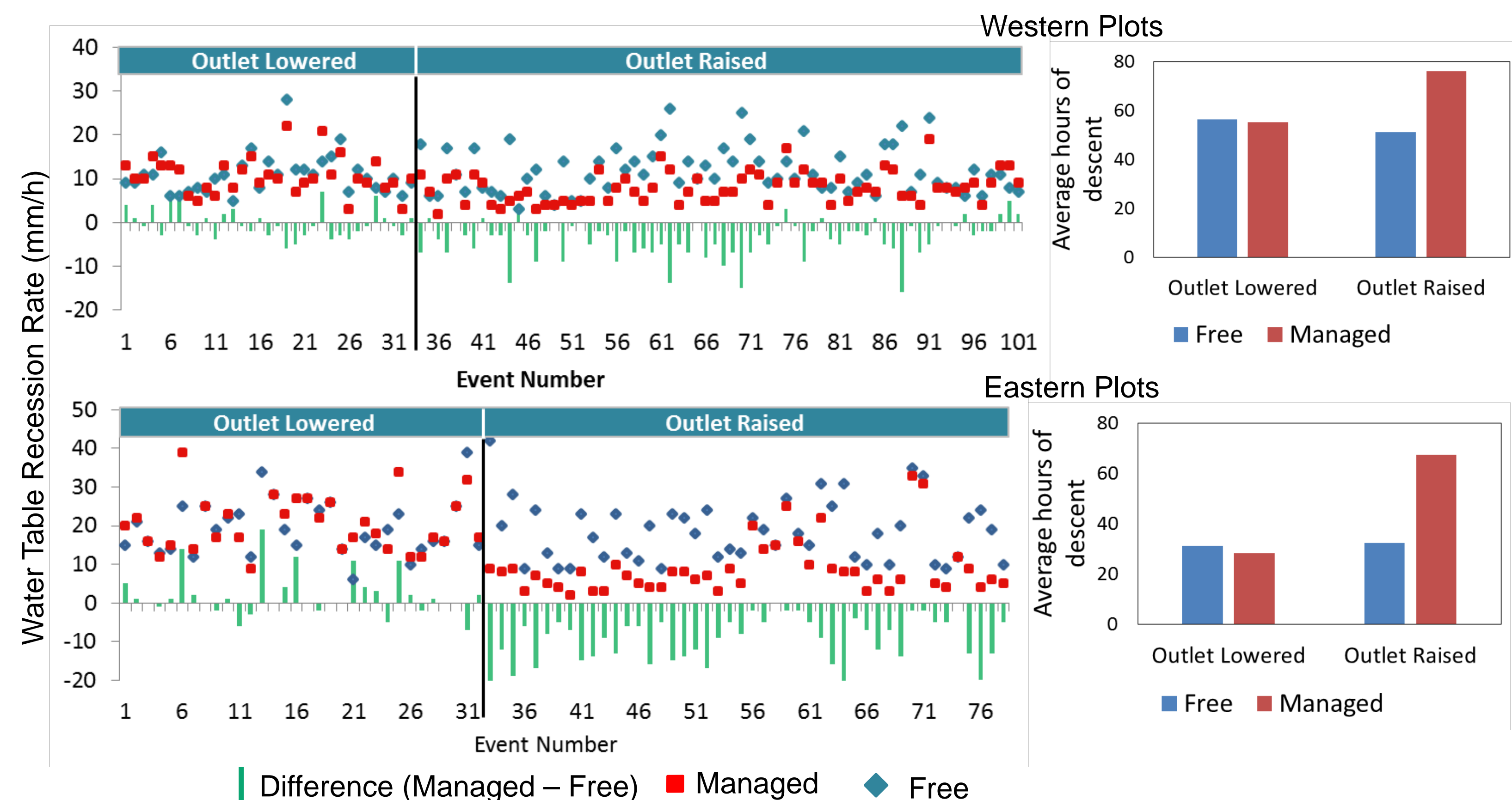
Defining reference level:

Raised outlet period: outlet elevation

Lowered outlet period: 0.4 m above the drain

Results

The water table recession rate, grouped by management treatment assigned to an arbitrary event number.



Controlled drainage:

- ✓ Increased the difference in recession rate between managed and free plots.
- ✓ Decreased the rate of recession.
- ✓ Increased the time of water table fall from surface to 60 cm depth.

In the paired watershed statistical approach the significance of relationship between paired observations was tested using analysis of ANOVA and the significance of the effect of management is determined using analysis of ANCOVA.

- ✓ Results indicated that the overall outlet lowered and raised period regressions were significantly different.

Conclusions

We found that controlled drainage has a statistically significant effect on the water table recession rate.

Raising the outlet decreased rate of water table recession by 38 to 54 %, increasing the time needed for the water table level to fall from the surface to 60 cm depth by approximately 26 to 38 hours..

Recommendation

Lowering the outlet before storm events would reduce the amount of time that water table is at a level that could be detrimental to trafficability or crop yield. Whether the benefits of lowering the outlet outweighs the cost depends on the sensitivity of the crop and the probability of a severe storm.

Acknowledgments

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