

Nonlinear Response of Prairie Pothole Landscapes to Climate Change and Land Management

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Website: <http://wetlandscape.sdstate.org/>



Overarching Goal

- Complete and test new simulation model (WETLANDSCAPE) to examine non-linear or threshold effects caused by climate change and land management on complexes of glaciated prairie wetlands.



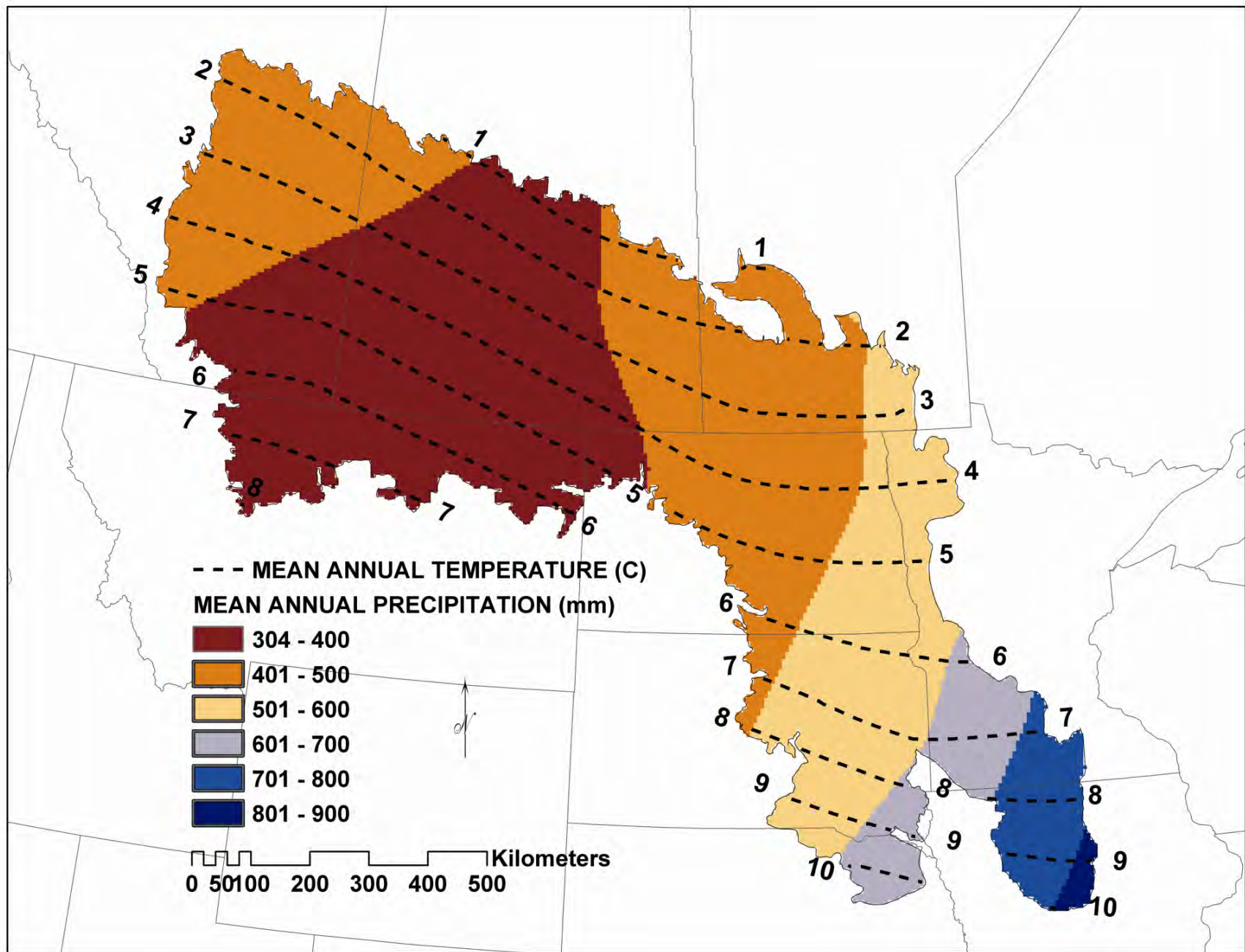


 **Prairie Pothole Region**

 **Weather Stations**

0 100 200 400 600 800 Kilometers

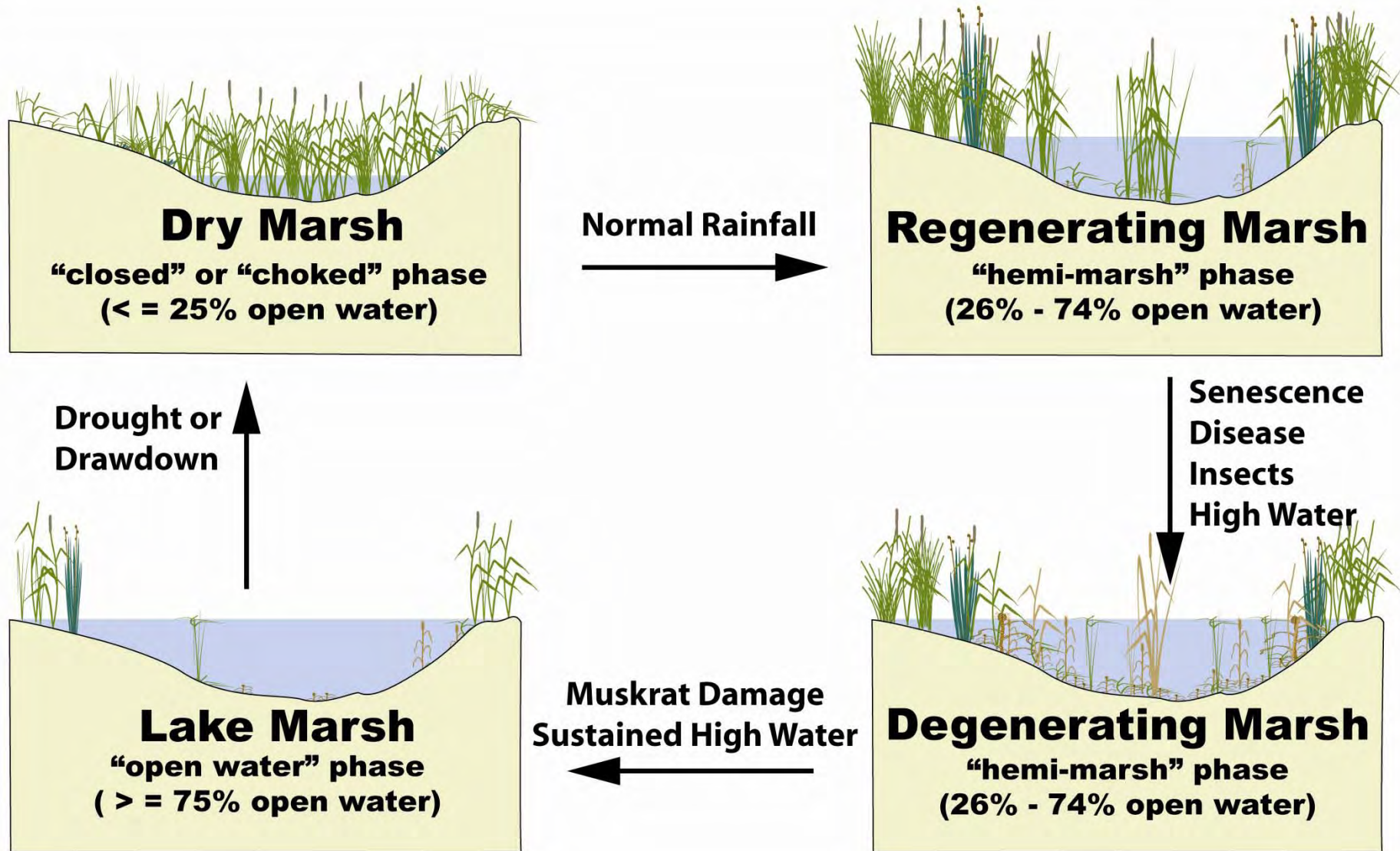




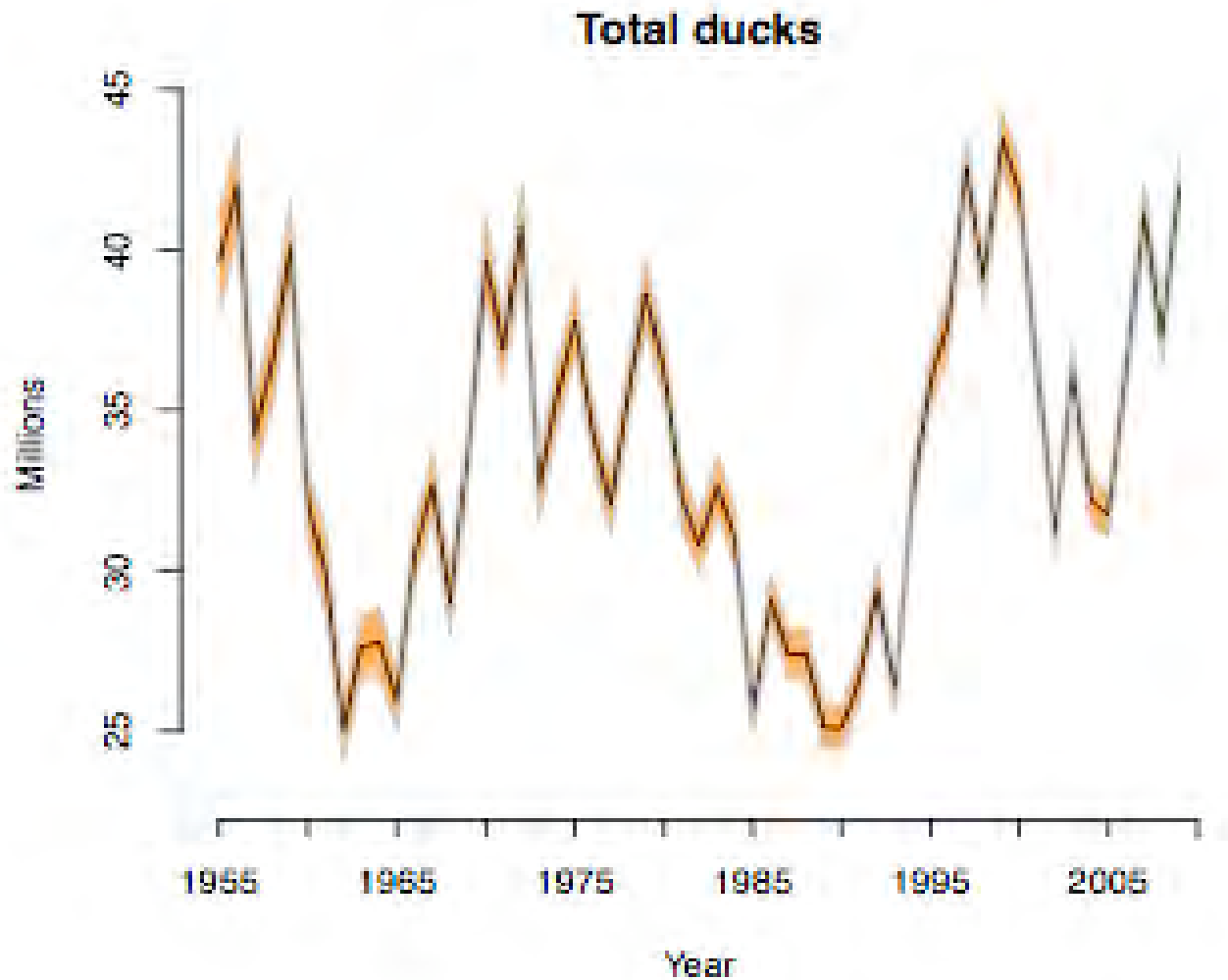
Orchid Meadows Flyover

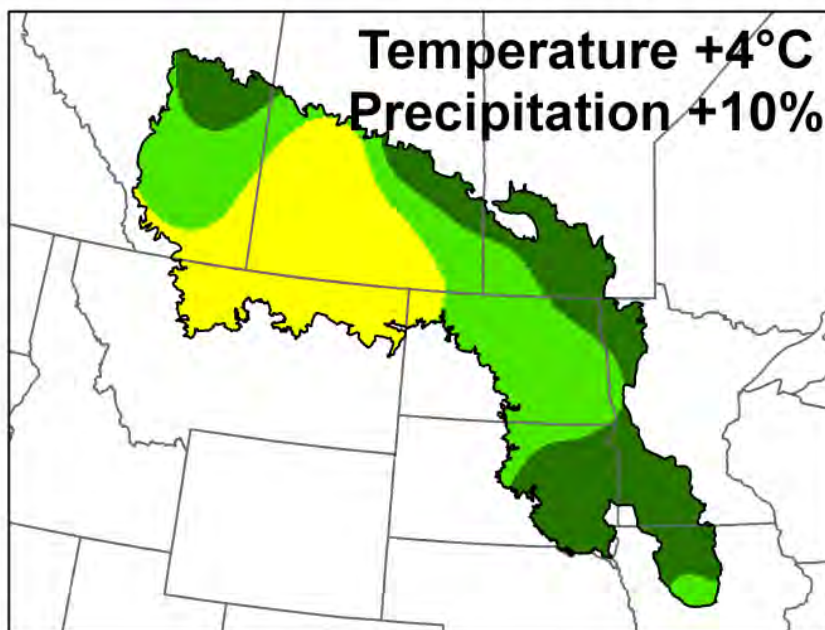
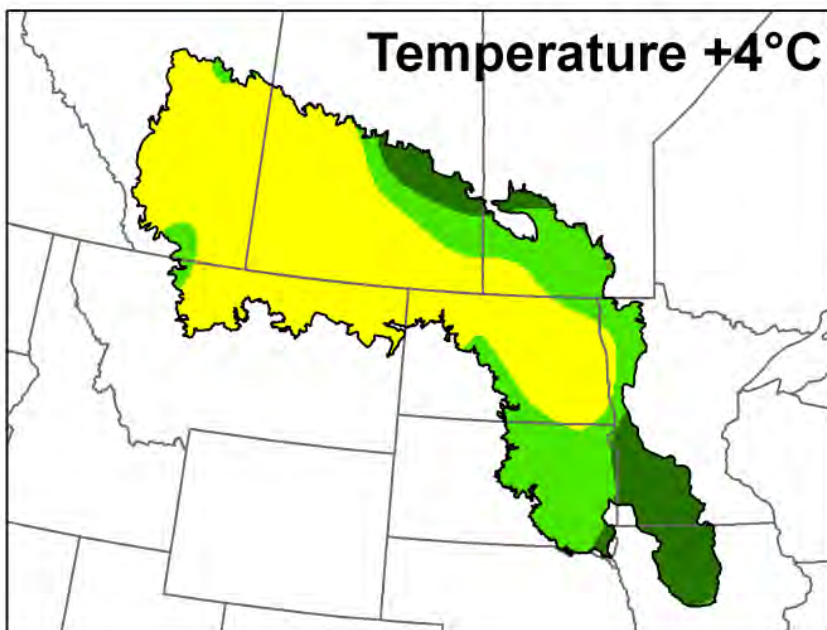
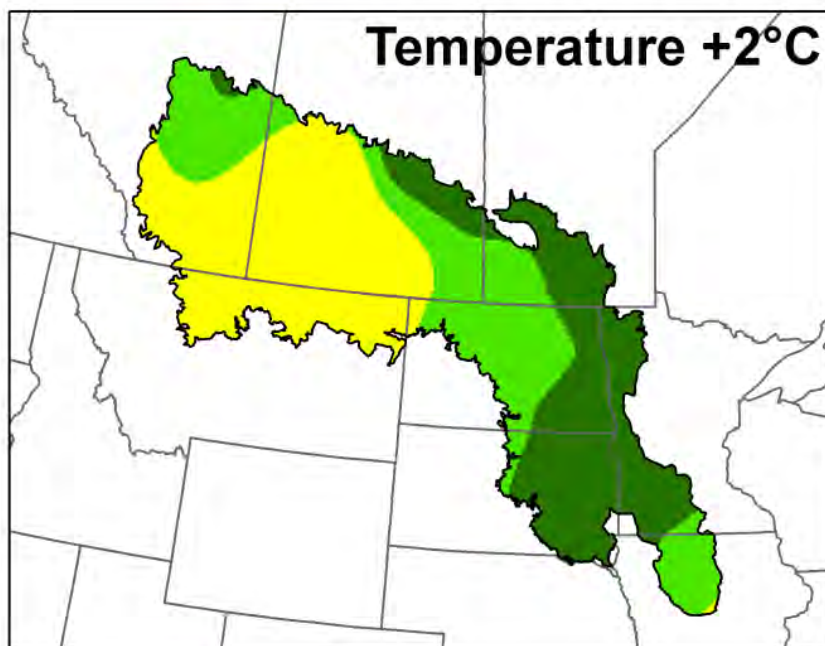
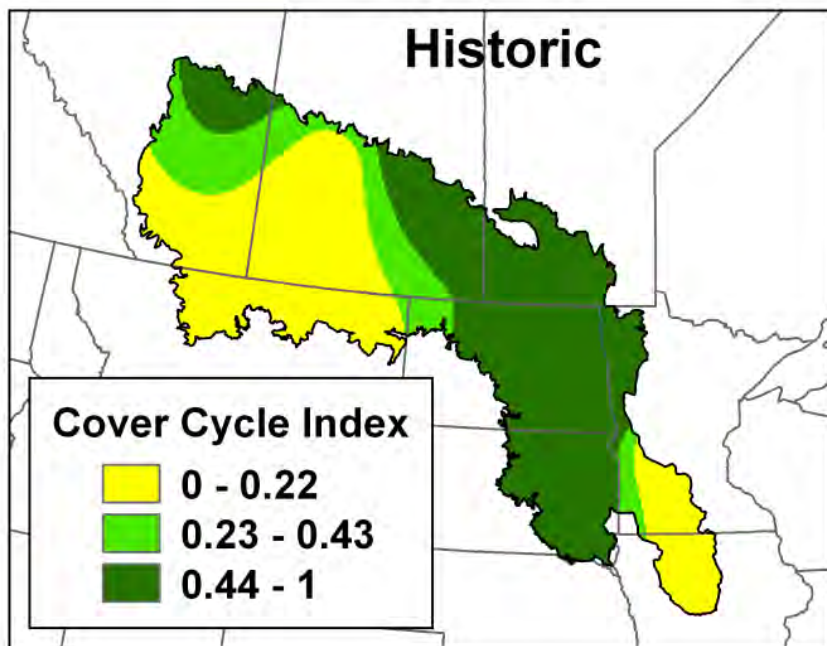


Wetland Vegetation Cover Cycle



Total Ducks (1955-2009)





• Snowmelt Management • Watching Extinction

BioScience

Organisms from Molecules to the Environment

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Prairie Wetland Landscape
in a Changing Climate

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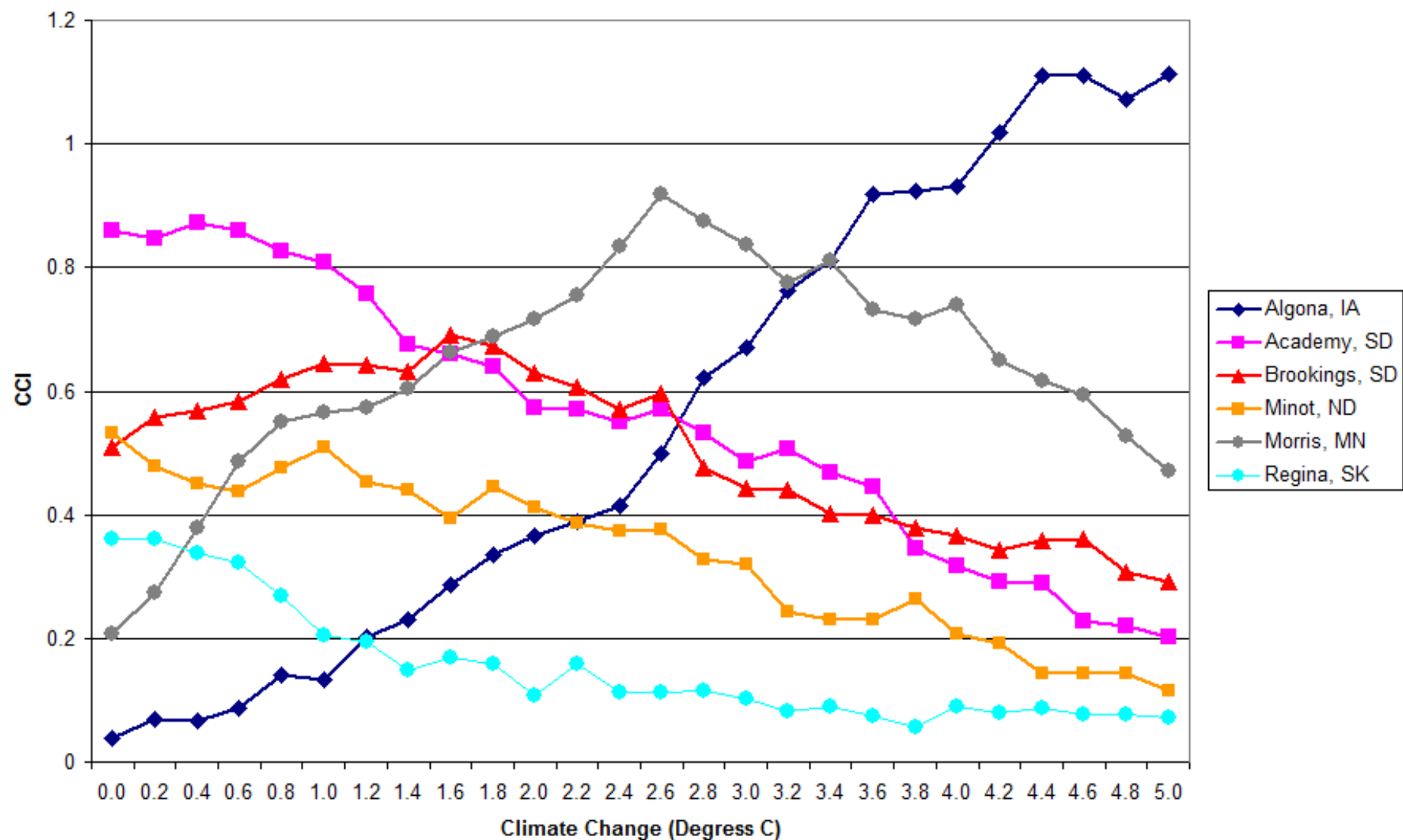
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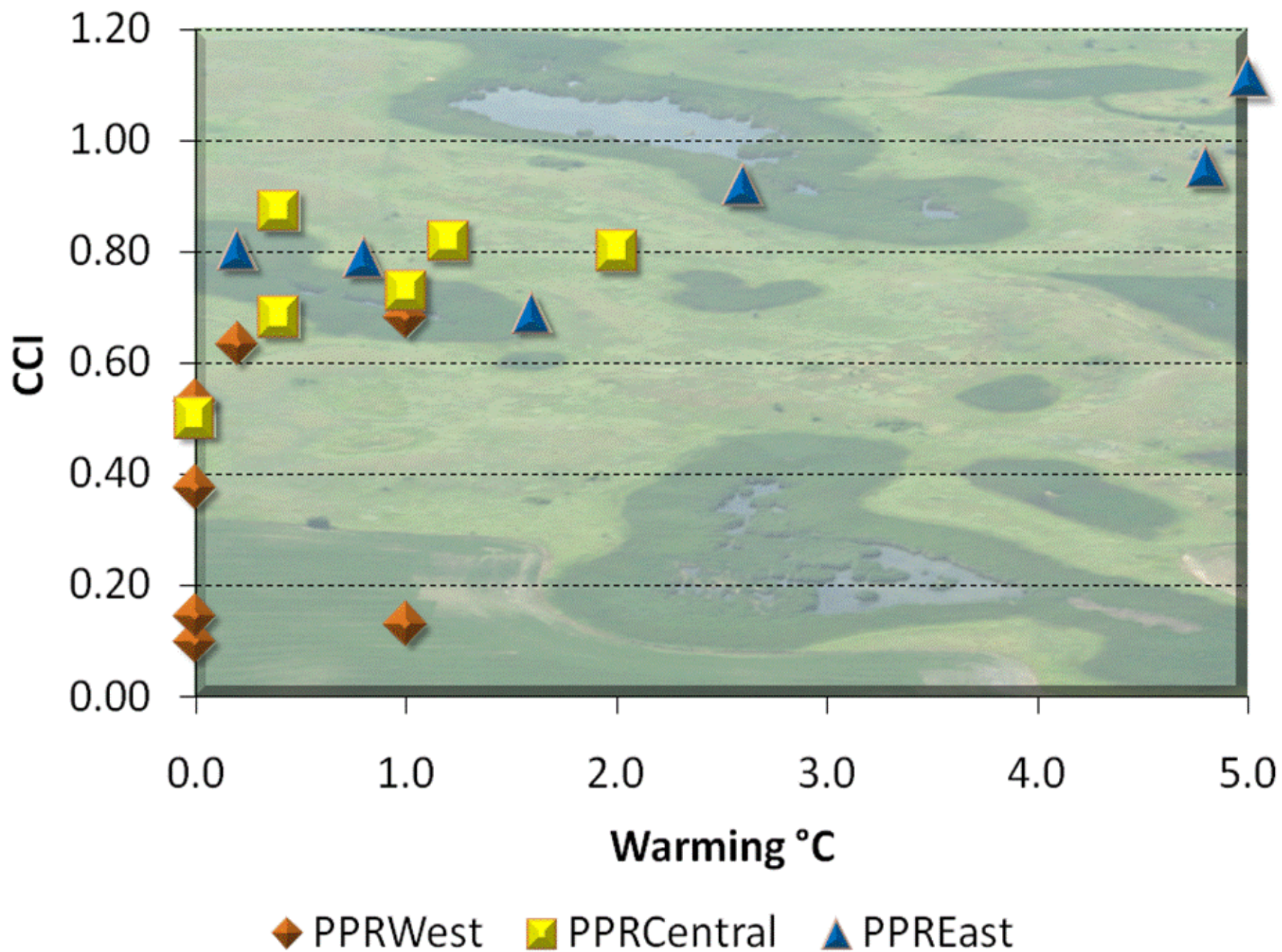


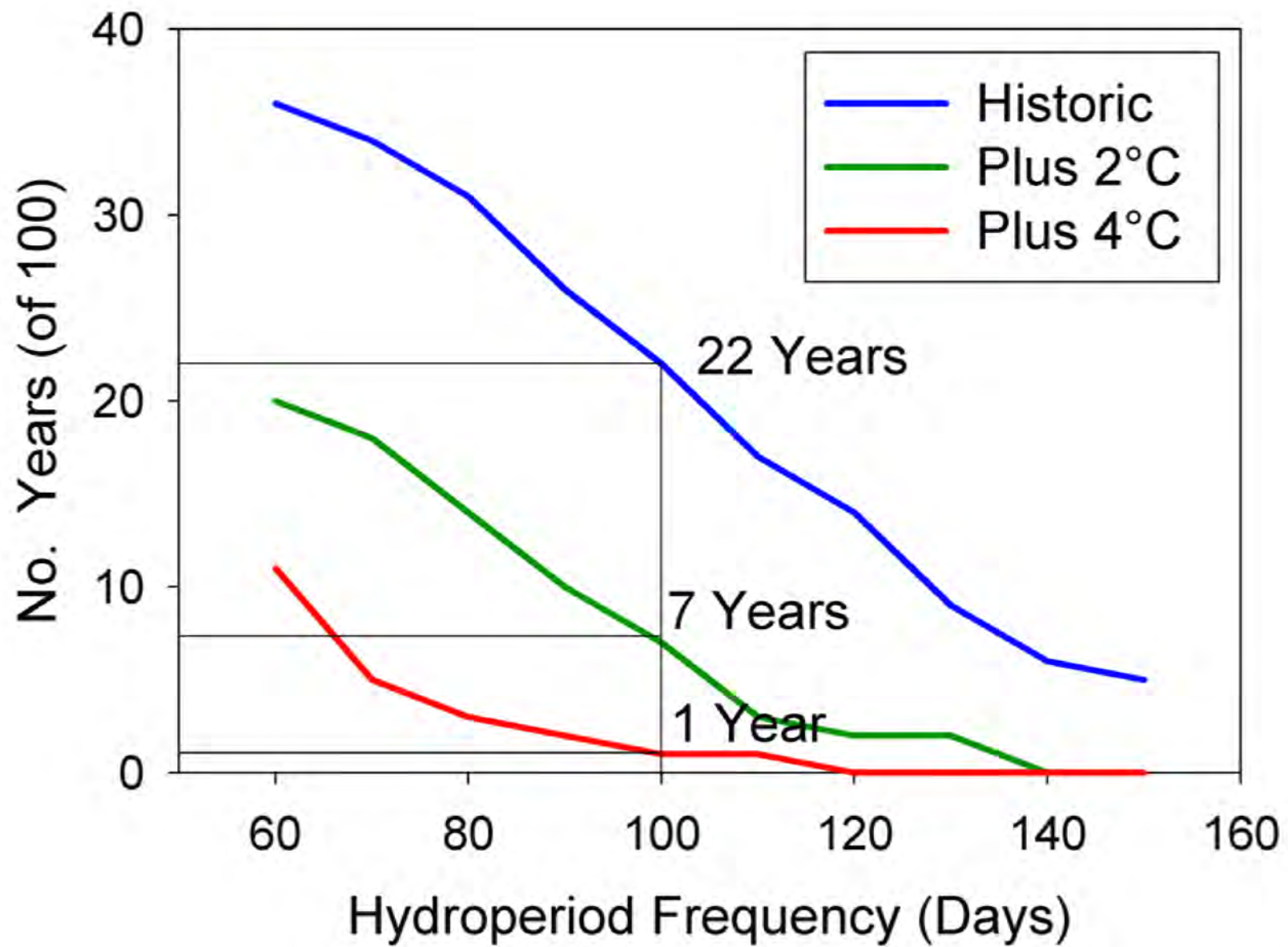
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Cover Cycle Index

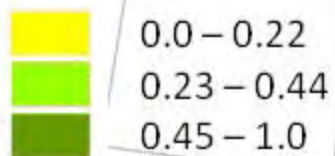




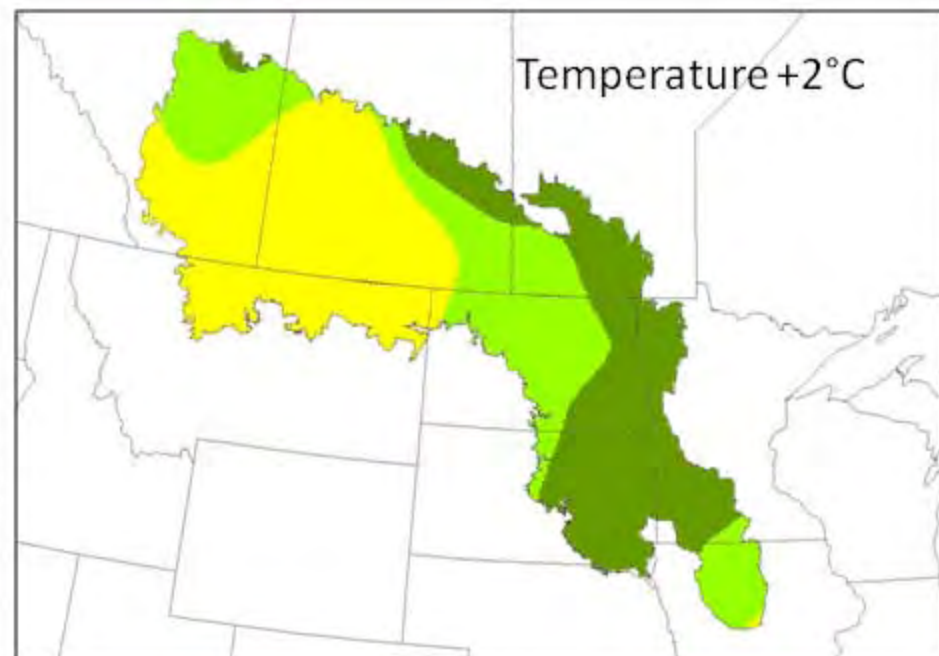
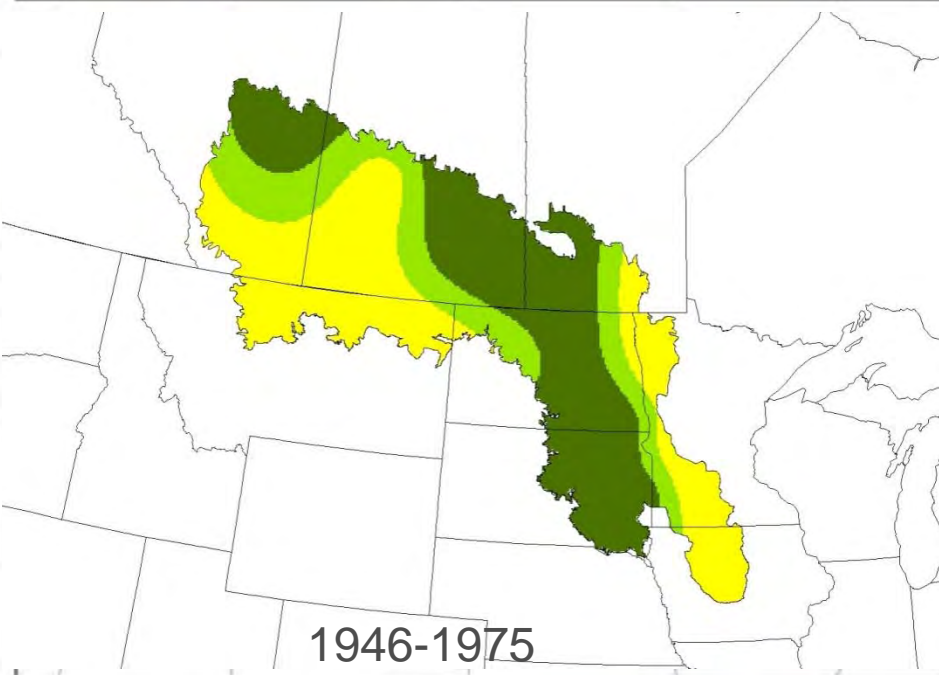


Historic

Cover Cycle Index



Temperature +2°C



1946-1975

1976-2005

Conclusions

- WLS confirms that prairie wetlands are **highly vulnerable** to climate warming
- Climate warming will cause an **eastward shift** in the most favorable wetland climate, towards heavily farmed areas where most wetlands have been drained and grassland tilled.
- Productive area of the PPR **will shrink** as the climate warms



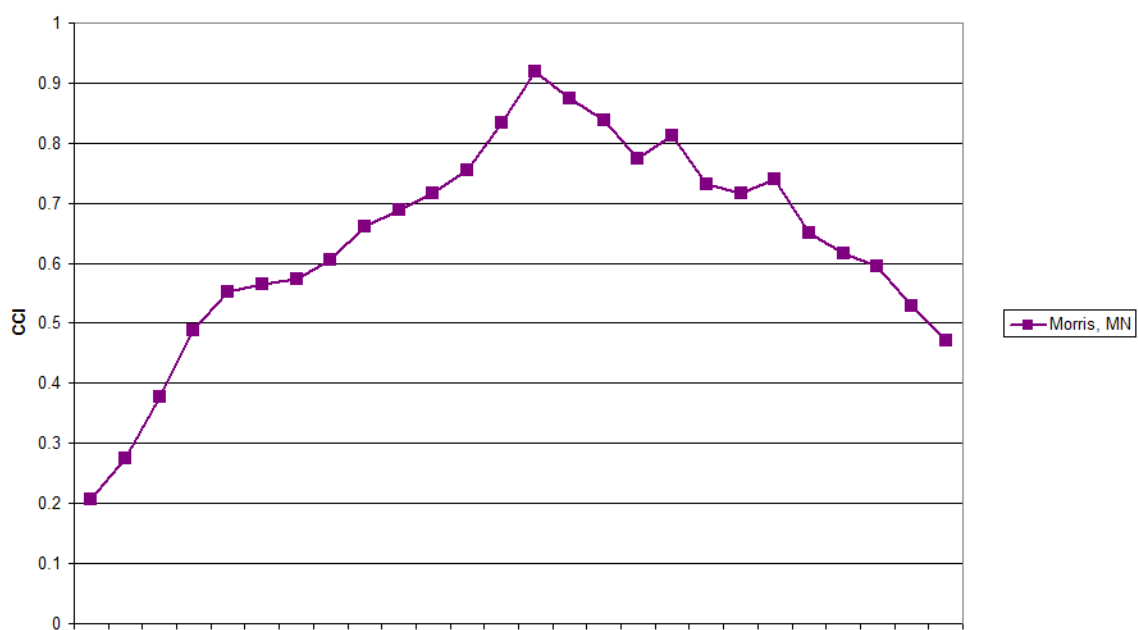
Conclusions

- Climate change poses a **conservation challenge** because the highest wetland densities occur in the western PPR where the effects of climate change are expected to be more severe.
- Wetlands in nearly all PPR ecoregions will lose significant productivity if warming exceeds a **2 degrees C threshold**.
- 30-year hindcast simulations provide evidence that **wetlands have already been affected by climate change** in the most vulnerable ecoregions.

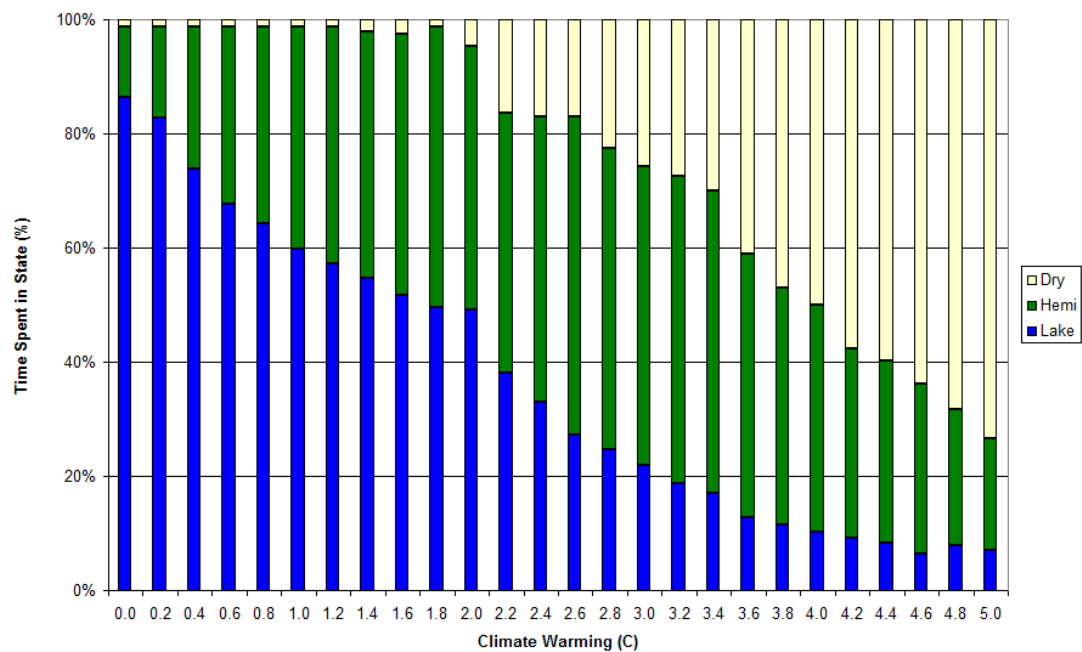




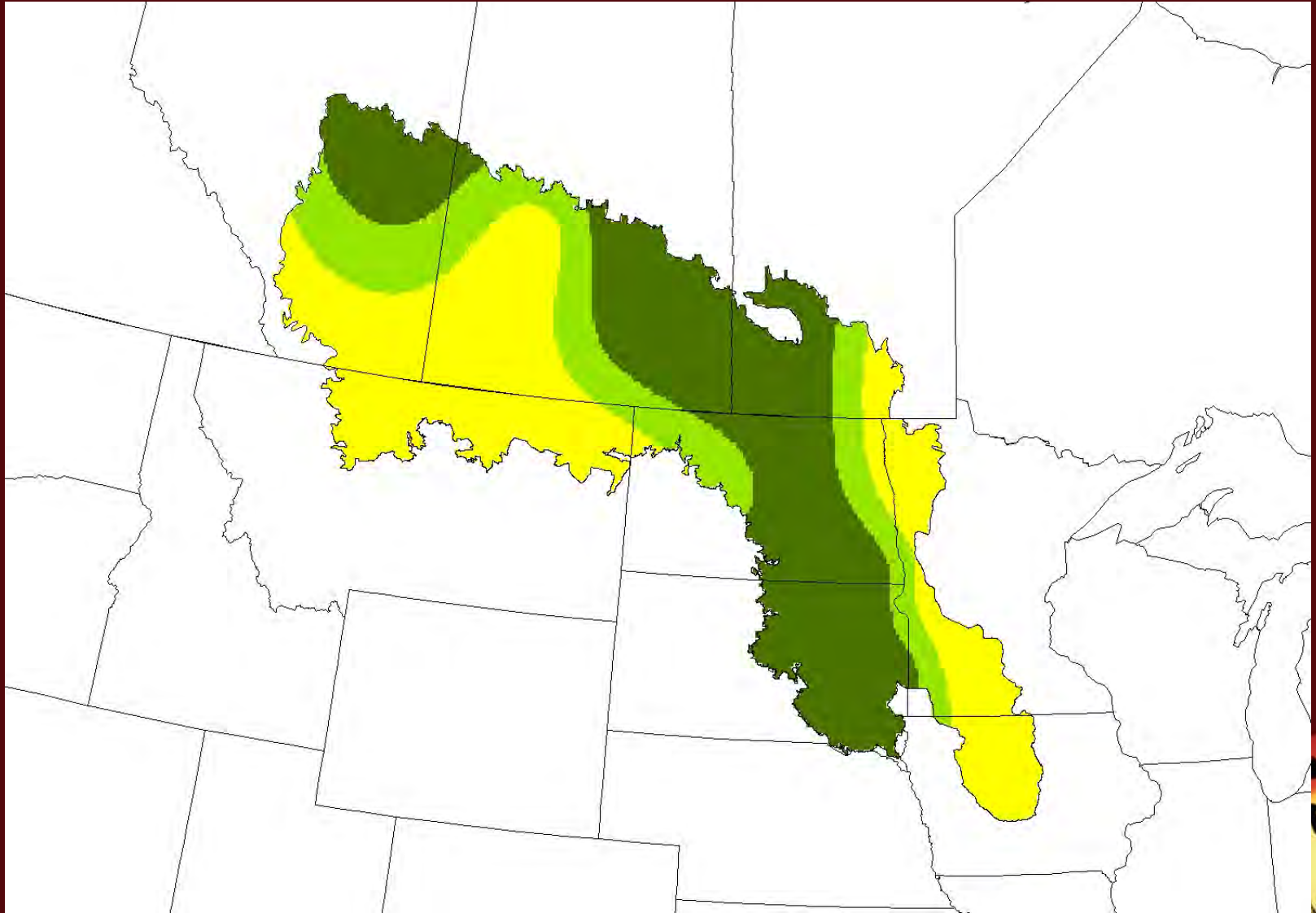
Thank you



Morris, MN



1946-1975



1976-2005

