

# Manoomín

*In a changing world*



# What is Manoomin?





# Southern (*Zizania aquatica*)



Southern (*Zizania aquatica*)  
Northern (*Zizania palustris*)





# A North American Resource



An annual, aquatic grass





# Habitat Preferences

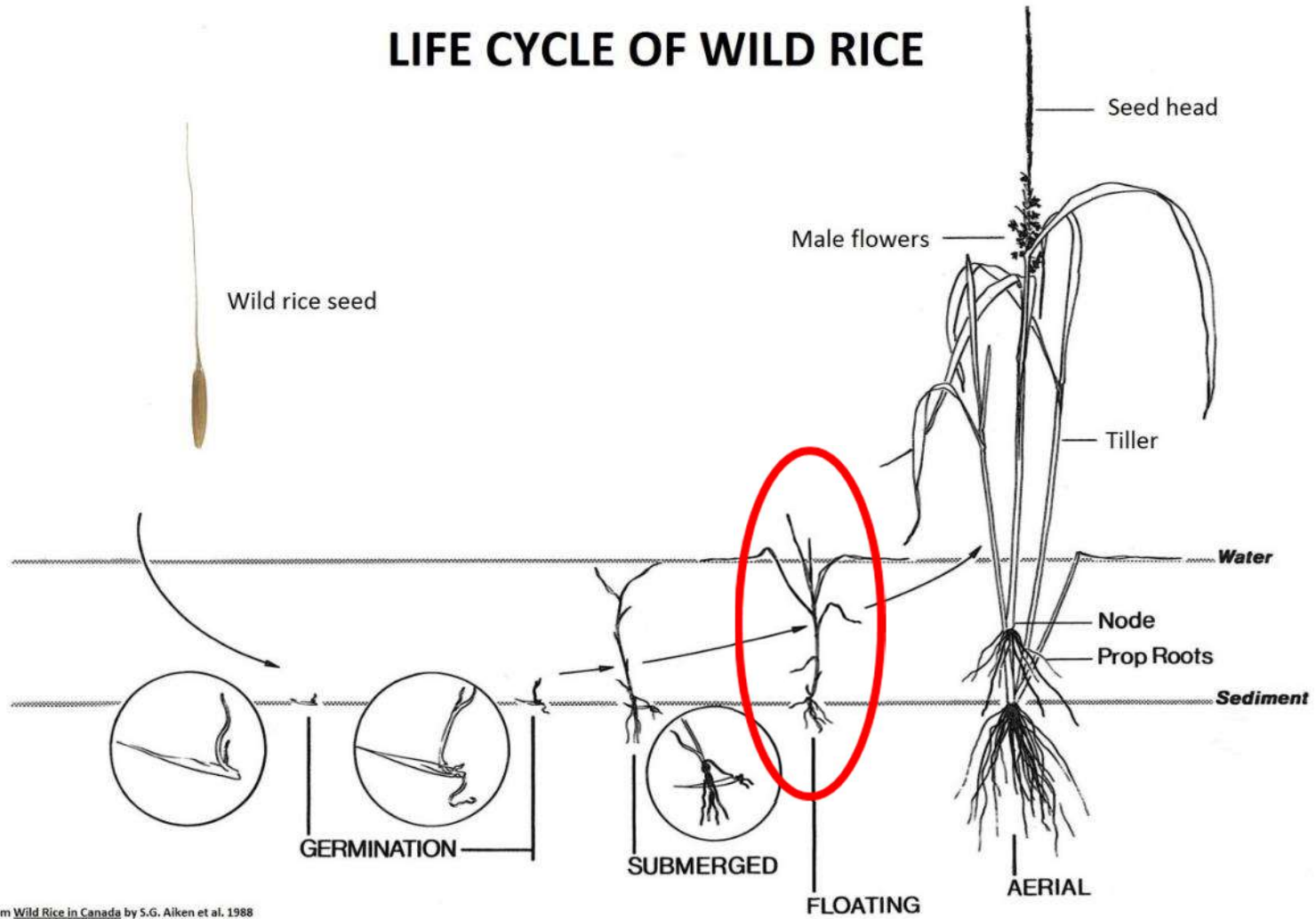
- Water depths in 0.5-3 foot range
- Water not acidic or darkly stained
- Annual water level fluctuations not excessive but year-to-year conditions not too stable
- Organic, mucky substrate (preferred)
- Areas low in sulfates/sulfides
- And, rice requires gently....

# Slowly Flowing Water





# LIFE CYCLE OF WILD RICE



From Wild Rice in Canada, A.G. Aiken, et al.

# Seasonal Variation





# Annual Variation



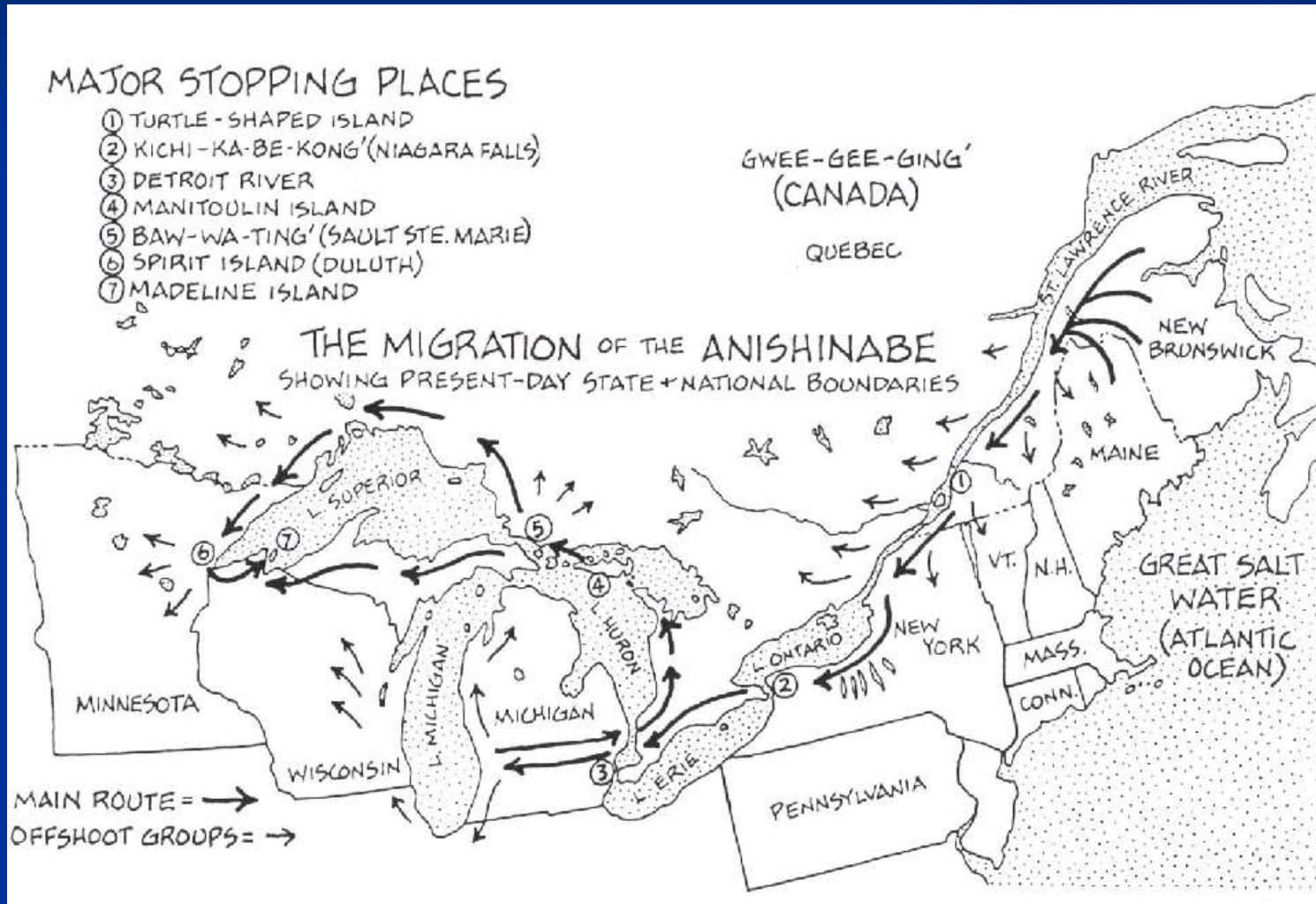


# Tremendous Value Culturally:





# The Anishinabe (Ojibwe) Migration Story



From the Mishomis Book, by Edward Benton-Banai



# And Ecologically:





# The Goose and Swan Issue







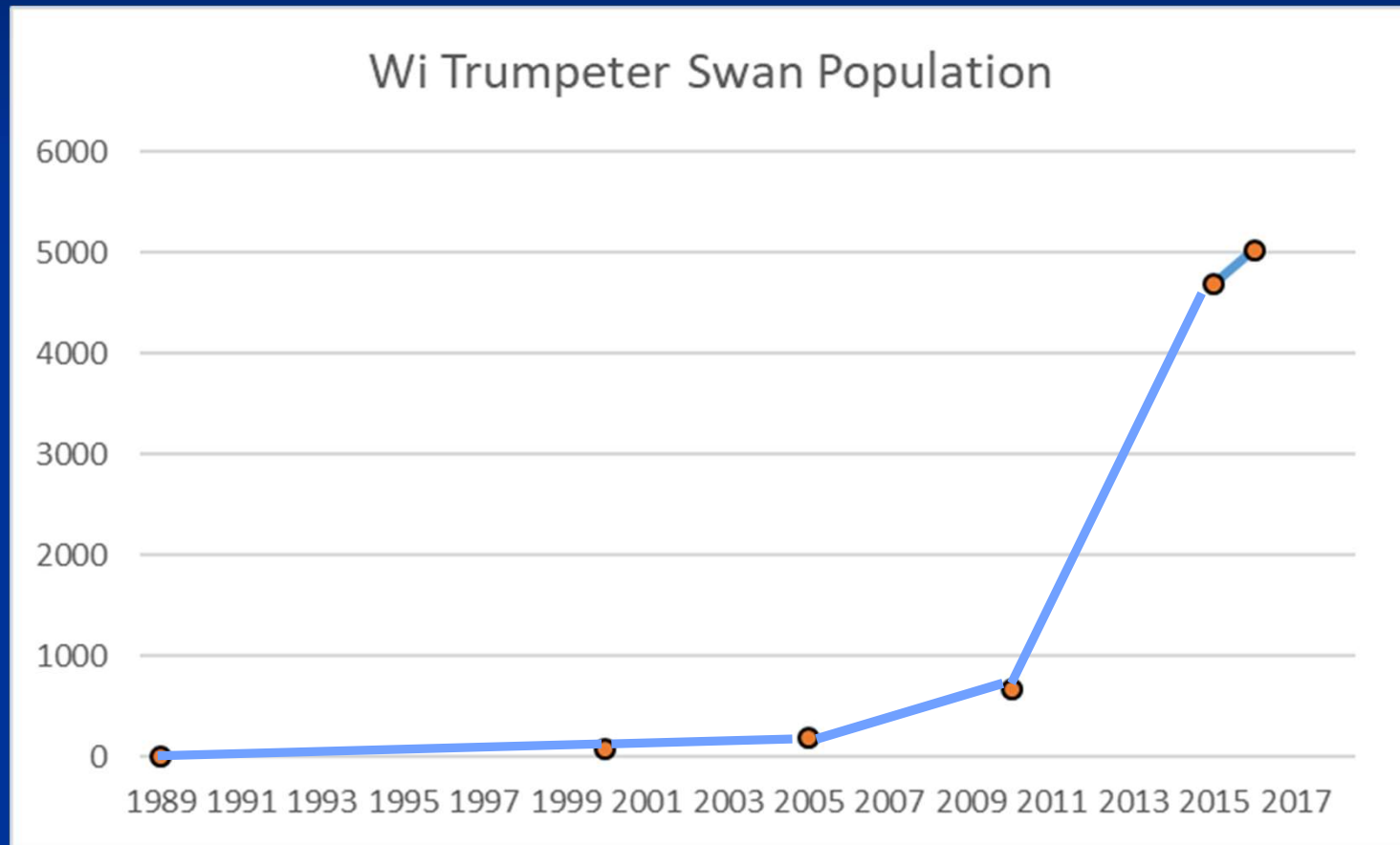


# Trumpeter Reintroduction



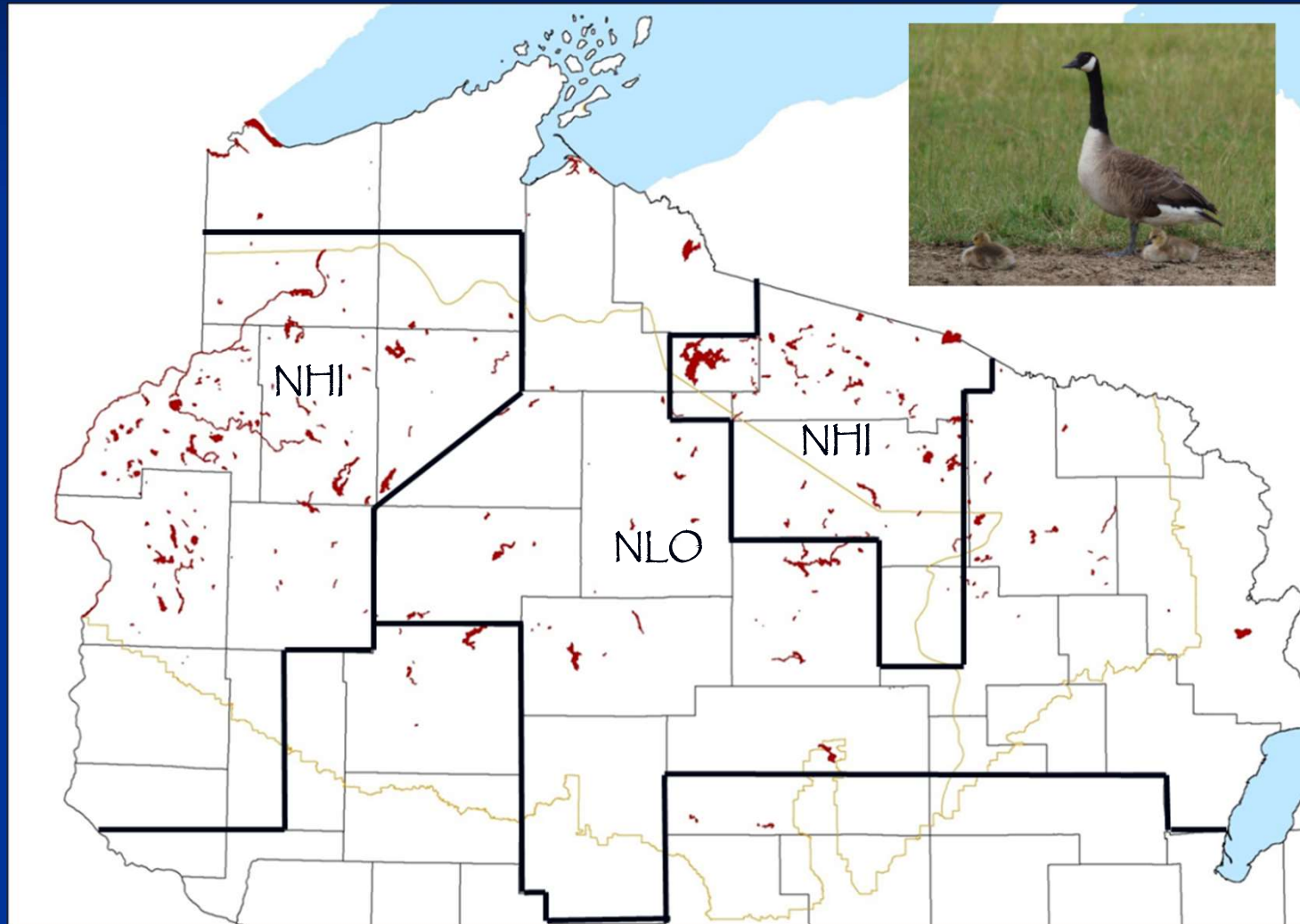
Photos courtesy of WDNR

# Estimated Trumpeter Swan Population in Wisconsin

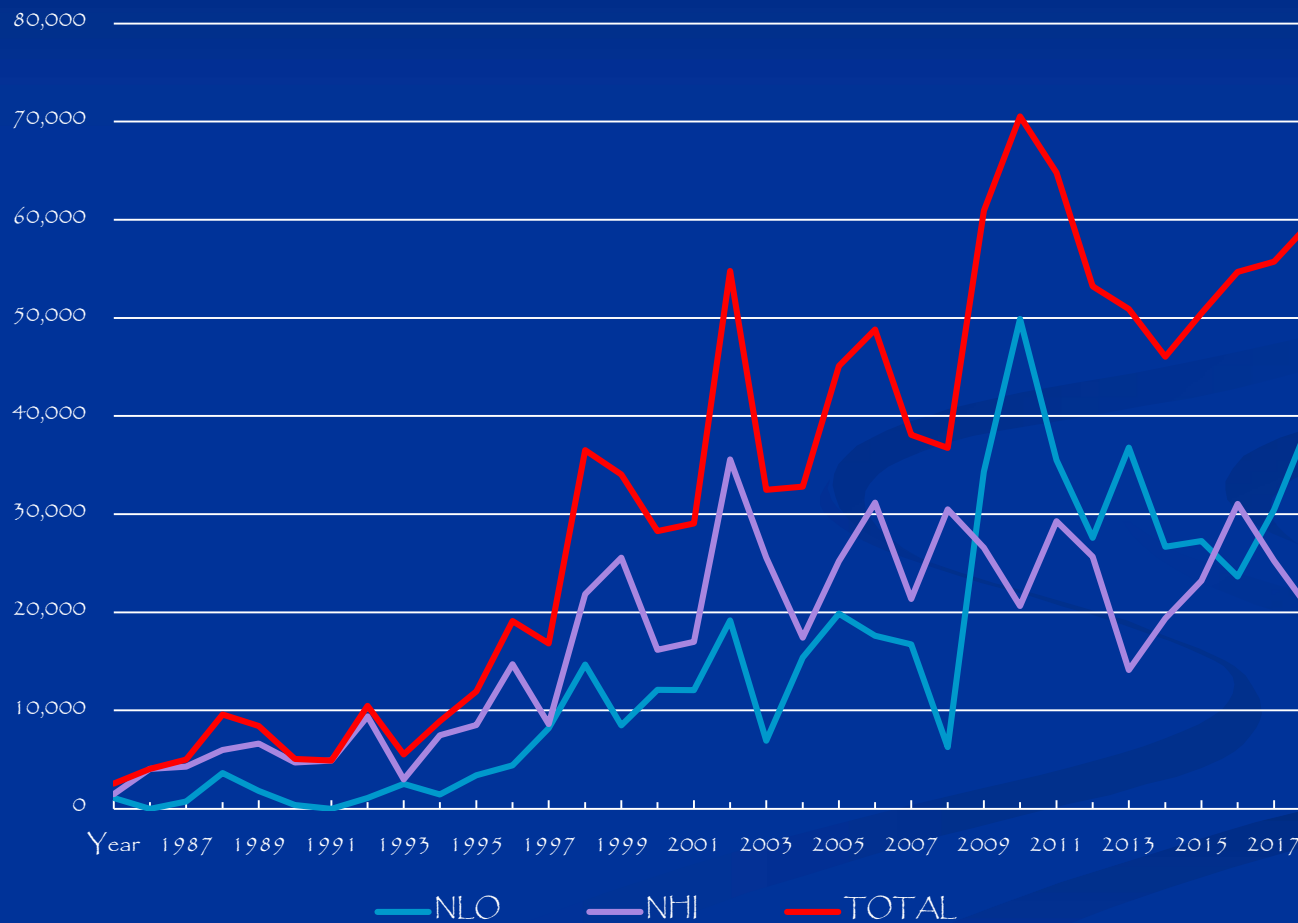




# WDNR Breeding Waterfowl Survey Zones



# Estimated Canada Goose Breeding Population





Locally breeding swans and geese  
feed on manoomin all summer.



# Climate Change

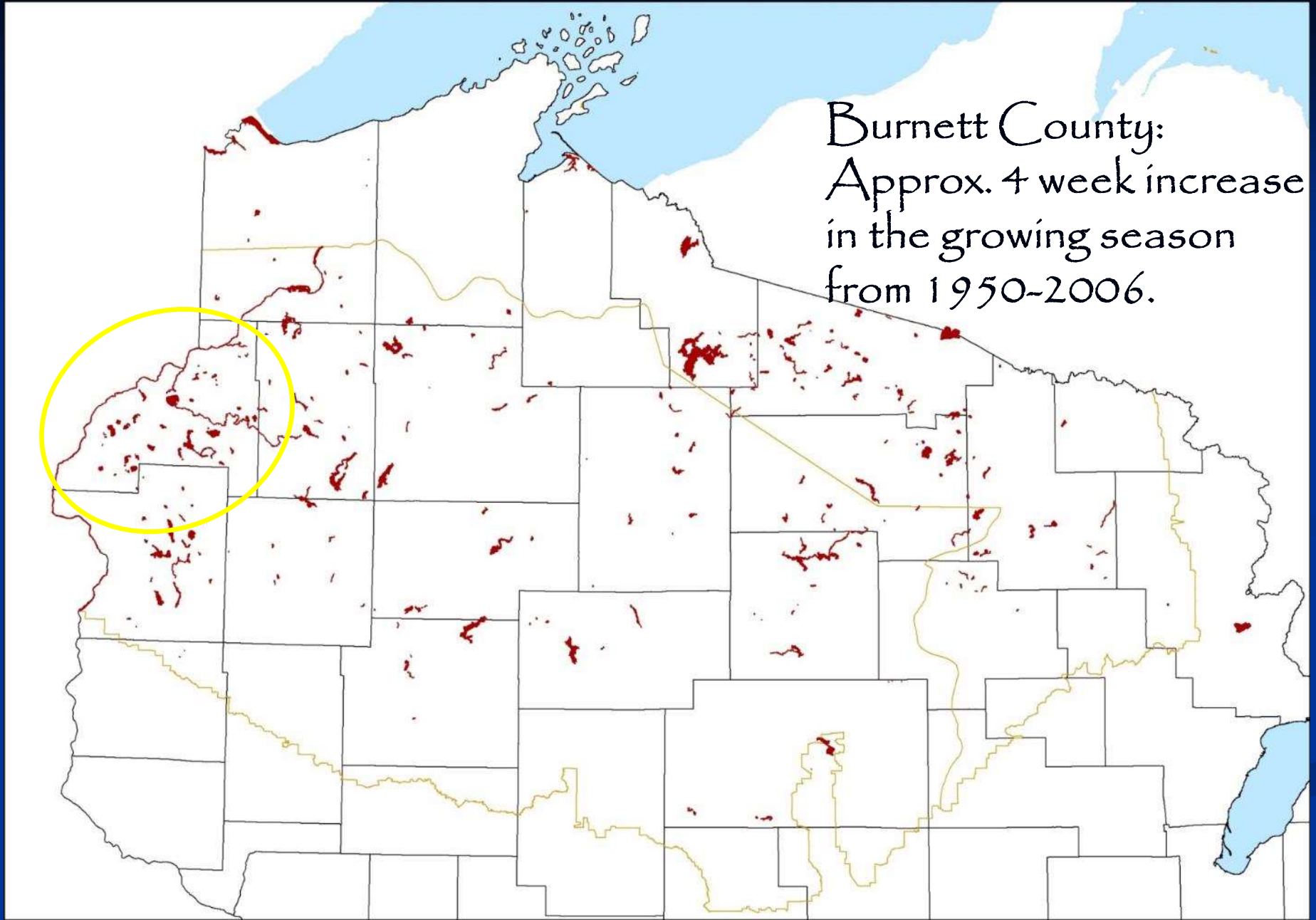




# Some Climate Change Concerns

- Longer Growing Season Favoring other Vegetation

Burnett County:  
Approx. 4 week increase  
in the growing season  
from 1950-2006.



Source: Kucharik et al., 2006



# Some Climate Change Concerns

- Longer Growing Season Favoring other Vegetation
- Potential Impacts from Pest Species







# Some Climate Change Concerns

- Longer Growing Season Favoring other Vegetation
- Potential Impacts from Pest Species
- Relational Impacts with Invasive Species



Direct Competition;  
Unintended Side-Effects  
of Control

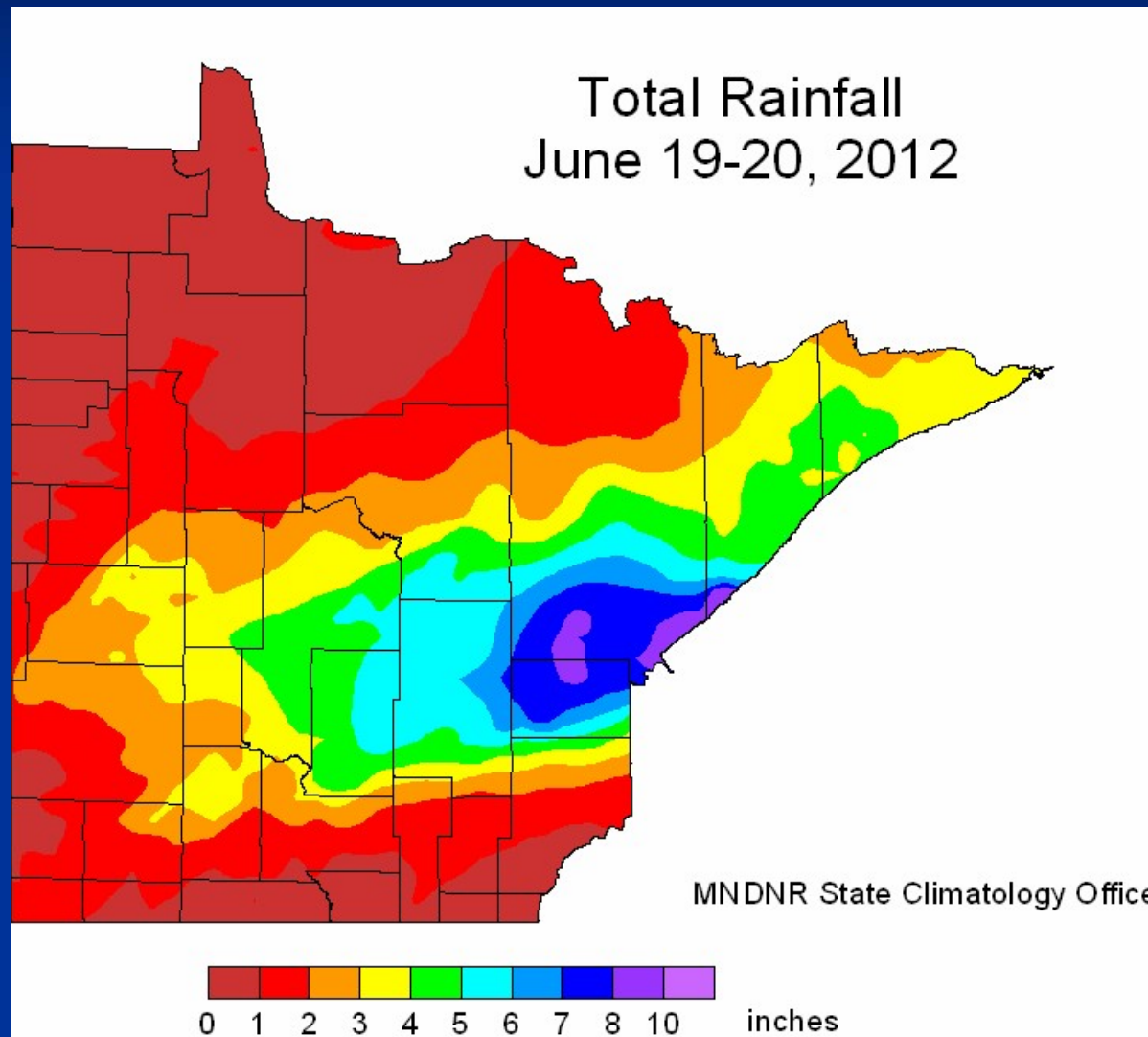


# Some Climate Change Concerns

- Longer Growing Season Favoring other Vegetation
- Potential Impacts from Pest Species
- Relational Impacts with Invasive Species
- More Frequent Heavy Rain Events



# 2012: "The most damaging flood in Duluth's history"







The Great Duluth Flood of 2012, June 17-20.



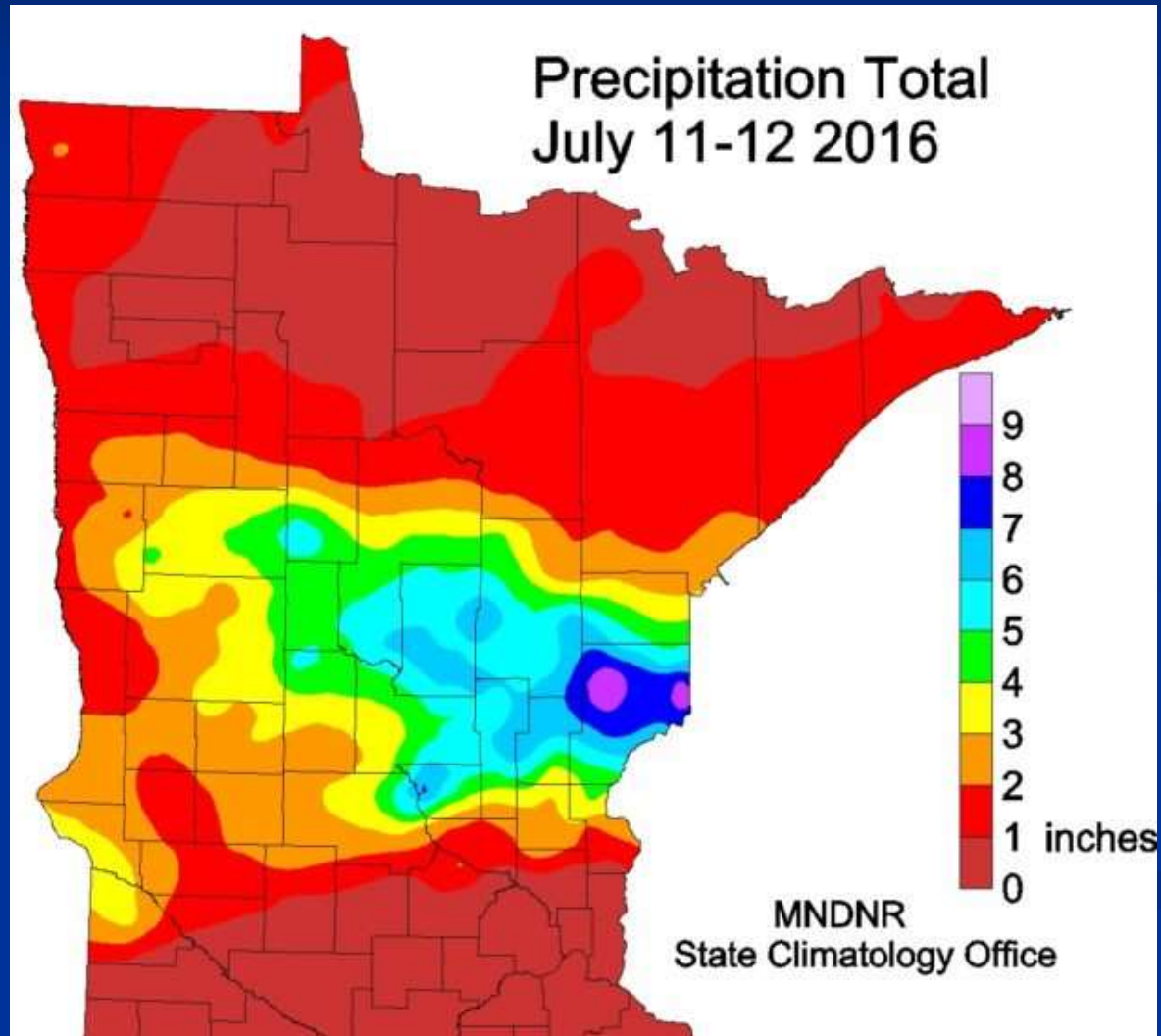


Flowage Lake



Mallard Lake

2016: (4 years and 3 weeks later)







The Great Flood of 2016, July 12-15.

# 2018: The Fathers Day Storm



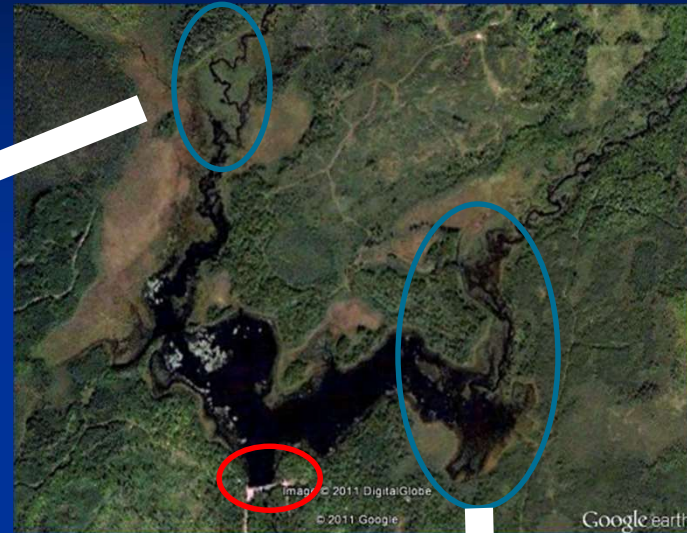
National Weather Service Image



# 2018: The Fathers Day Storm



The Radigan Flowage,  
Douglas County, WI





# Radigan Flowage: 6/18/18



Photo tweeted by  
Russ Weseman, KMSP

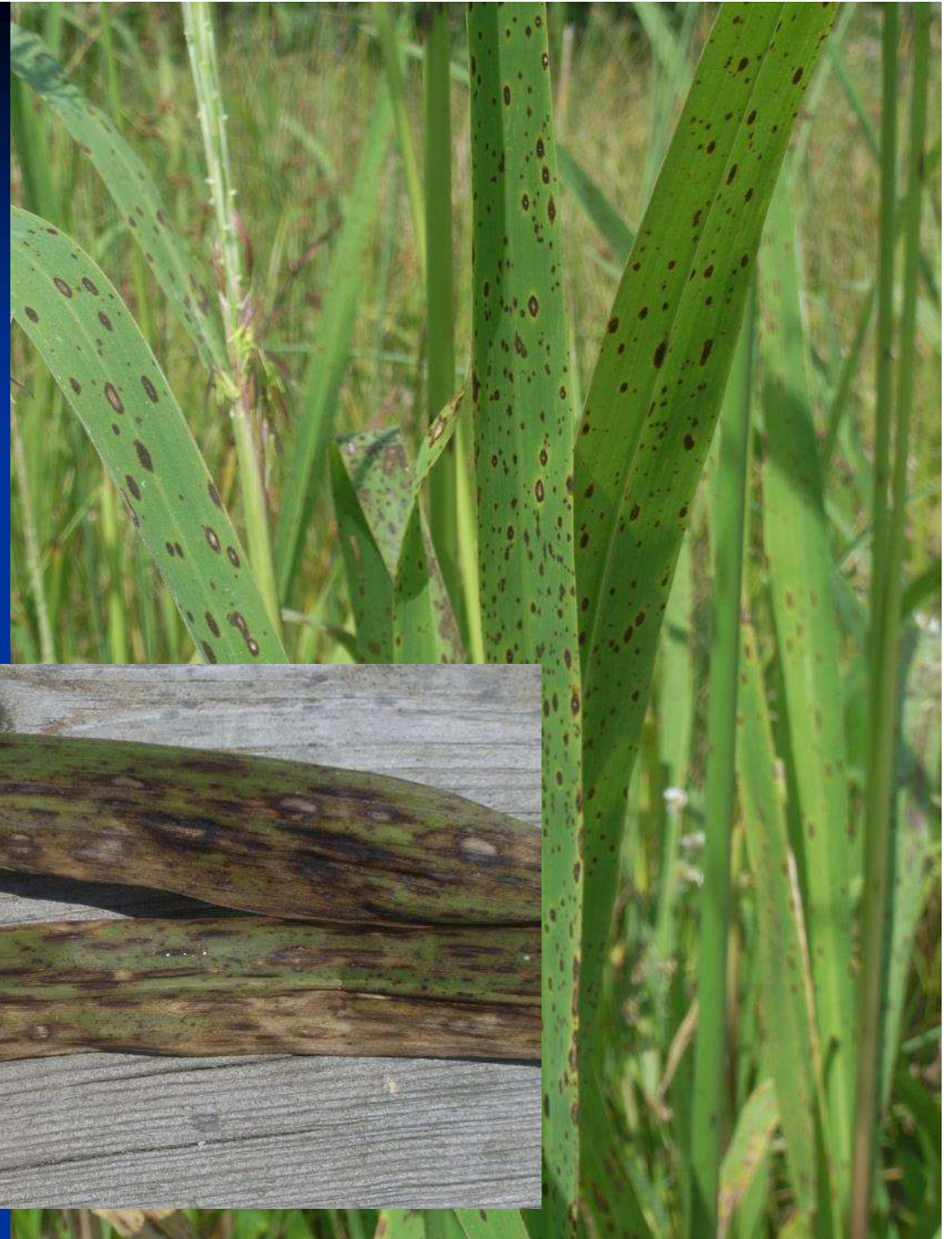




# Some Climate Change Concerns

- Longer Growing Season Favoring other Vegetation
- Potential Impacts from Pest Species
- Relational Impacts with Invasive Species
- More Frequent Heavy Rain Events
- Increased Disease Outbreaks

# Brown Spot Disease







The Big Lake Thoroughfare (Oneida County, WI)  
in healthy and diseased years.

# Some Concerns about Climate Change

- Longer Growing Season Favoring other Vegetation
- Potential Impacts from Pest Species
- Relational Impacts with Invasive Species
- More Frequent Heavy Rain Events
- Increased Disease Outbreaks
- Cumulative Impacts





2009



2010



2011



2012



2013



2014



2015



2016



2017



2018



2019

11 years  
on  
Dean Lake

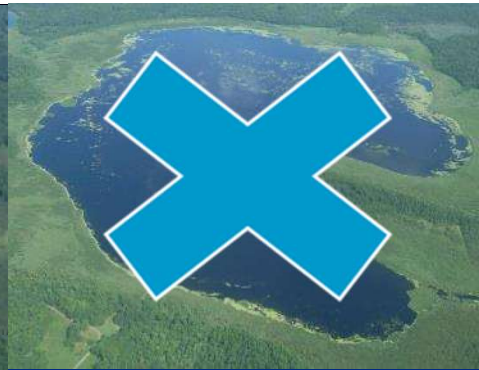




2009



2010



2011



2012



2013



2014



2015



2016



2017



2018



2019

11 years  
on  
Dean Lake



# And one more thing...

- Recent studies indicate that crops such as rice, wheat, barley and soy produce less nutritious seed when grown in the higher CO<sub>2</sub> levels that are expected to occur by the end of century.
- For rice, protein levels declined about 10%; iron by 8%; zinc by 5%. Certain B vitamins also declined significantly, some by up to 30%.

# Possible responses?

- More intensive monitoring and management
  - I.E.: automated water level monitors with remote reporting and water level control
- Modeling the sensitivity to damage
  - Location in the watershed, for example
- Seek strains with genetic resistance
- Consider thinning beds
- ??????: What is culturally appropriate and biologically beneficial.





*Photo courtesy of Annette Drewes*



Miigwech!



- 715-682-6619
- [www.glifwc.org](http://www.glifwc.org)