# Connecting with Climate AIS, Fish and Wildlife Impacts and what we can do

Cathy Techtmann- Environmental Outreach State Specialist
Professor, Community Resource Development
University of Wisconsin-Extension

President-Friends of the Gile Flowage Lake Association

Extension
UNIVERSITY OF WISCONSIN-MADISON
IRON COUNTY

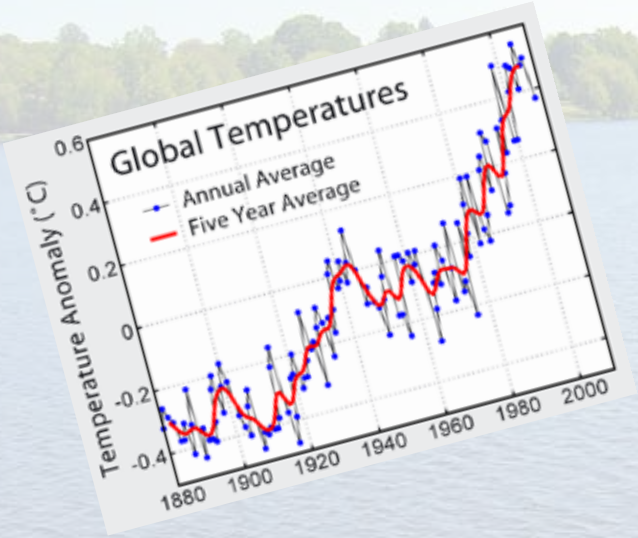
Gile Flowage, Iron County WI

# CLIMATE CHANGE…..
## A Wicked Issue Affecting Our Lakes

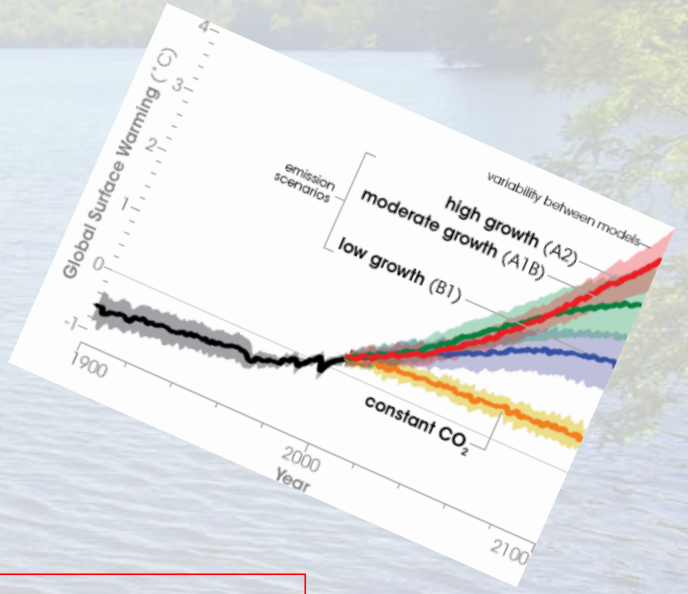
# DISCLAIMER

**This is a polar bear free program**

# Making the Connection to Climate Change








**"…local, place-based evidence of climate change gained through experiential learning is as, or more effective than, simply studying analytical climate change data to increasing climate change literacy."**

*"The Psychology of Climate Change Communication", Columbia University 2009*

# How is Wisconsin's CLIMATE CHANGING?

## Place-based Evidence: change we can observe in our communities and cultures

Increased frequency of extreme storm events:
2012, 2014, 2015, 2016, 2018

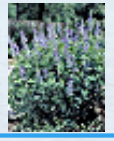
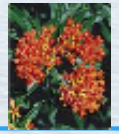
Decreasing ice cover on Lake Superior at Bayfield, Wisconsin: approximately 3 less days/decade or 45 days over the past 150 years

Unprecedented cancellation/disruption of tribal wild rice harvests for the Lake Superior Ojibwe: 2010-2018

Unprecedented blue-green algae outbreaks on Lake Superior:
2012, 2018


# Phenological Evidence

## The Leopold's Observations over 60 Years…

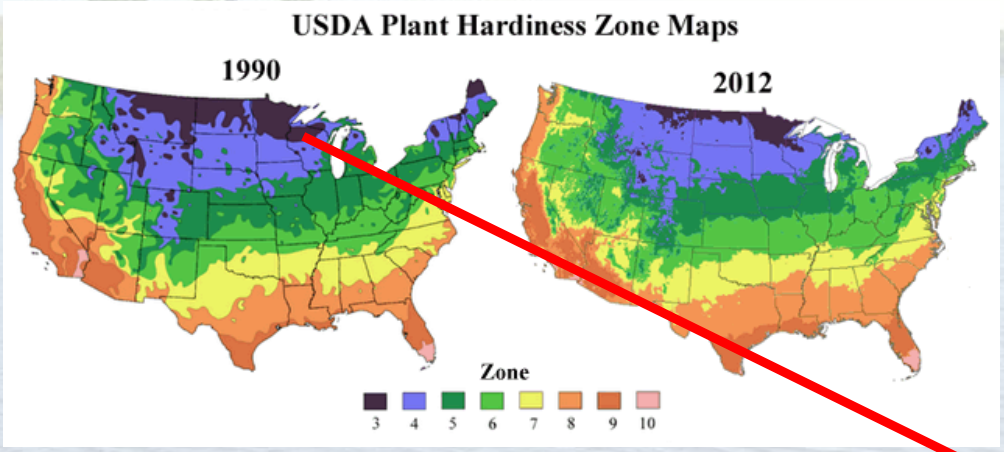
| Bird migration | Vegetation |
|---|---|
|  Geese Arrival *29 days earlier* |  *Baptista* (Wild Indigo) first bloom *18 days earlier* |
|  Cardinal first song *22 days earlier* |  *Butterfly weed* first bloom *18 days earlier* |
|  Robin arrival *9 days earlier* |  *Marsh milkweed* first bloom *13 days earlier* |

**From 1950-2014 on average spring has occurred 12 days sooner than expected, fall has started 12 days later**

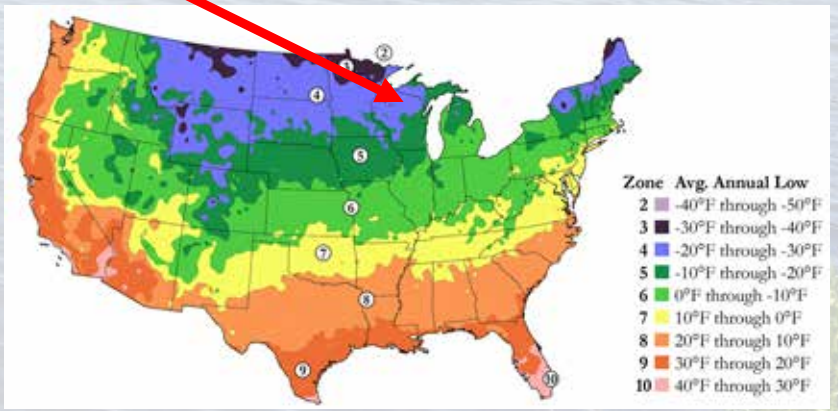
**Growing season lengthened by 5-20 days across the state,**

**Greatest change in NW Wisconsin**

# Changing USDA plant hardiness zones




2018



# CAUTION… When using Place-Based Evidence

**"Survey results confirm that residents perceive regional climate change, it is not clear whether (they) can distinguish (weather) variability from climate change"**

Finnis, J., Sarkar, A., Stoddart, M. 2015. Bridging science and community knowledge? The complicating role of natural variability in perceptions of climate change. Global Environmental Change 32: 1-10.


*"Think Newfoundland is getting windier? Think again- CBC, 2019"*

# Traditional Ecological Knowledge (TEK) can help us evaluate place-based evidence of a changing climate

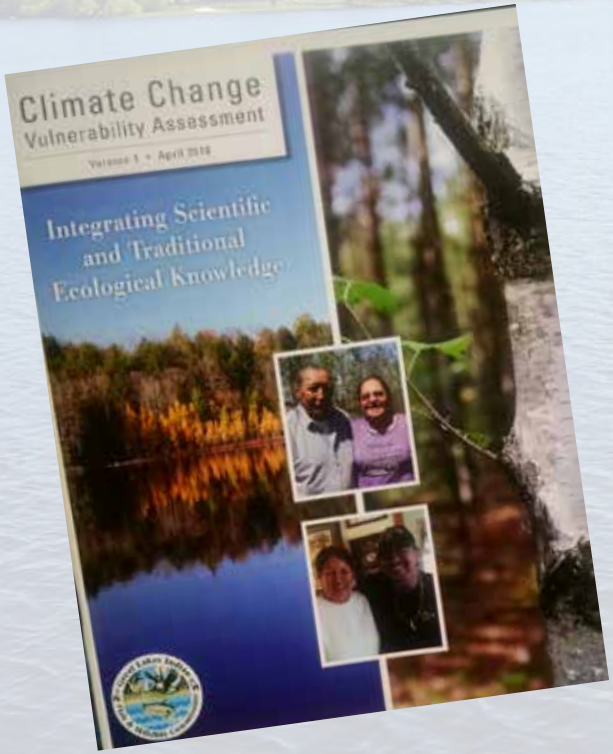
**WHY?**

**Indigenous cultures have traditional ecological knowledge (TEK) of natural systems, and language that provides long term place-based indicators of climate change beyond weather variability.**

**TEK can provide a "baseline" for evaluating place-based evidence we are observing in our cultures**

# Sources of Traditional Ecological Knowledge

**Great Lakes Indian Fish and Wildlife Commission's**
**"Climate Change Vulnerability Assessment"**



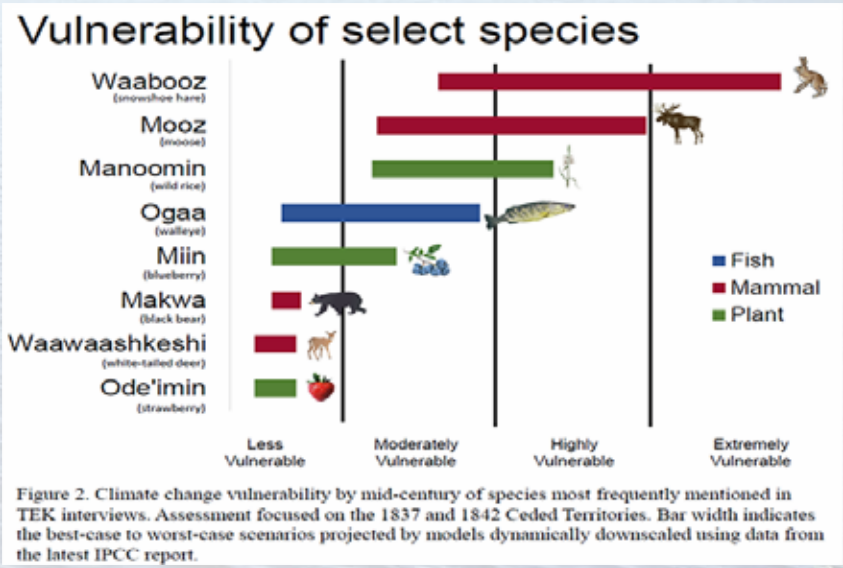
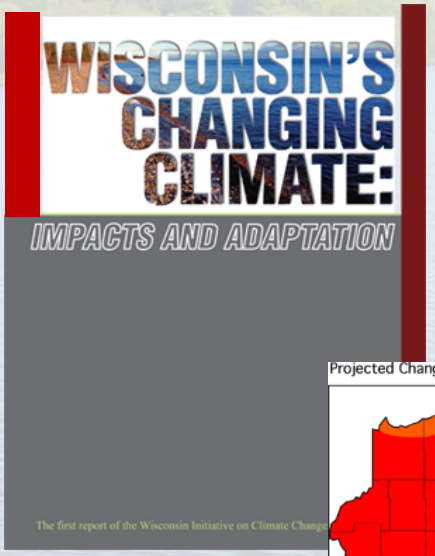
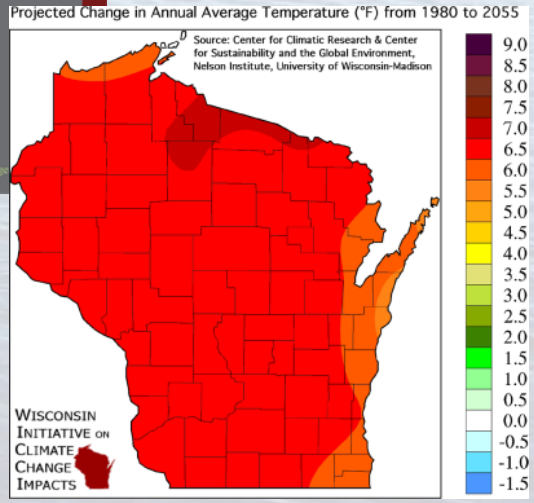




Figure 2. Climate change vulnerability by mid-century of species most frequently mentioned in TEK interviews. Assessment focused on the 1837 and 1842 Ceded Territories. Bar width indicates the best-case to worst-case scenarios projected by models dynamically downscaled using data from the latest IPCC report.

**Language** **Knowledge Keepers** **Elders**

# Scientific evidence- from peer reviewed sources




- **Historic climate data**
- **Projections of change in climatic variables based on modelling**

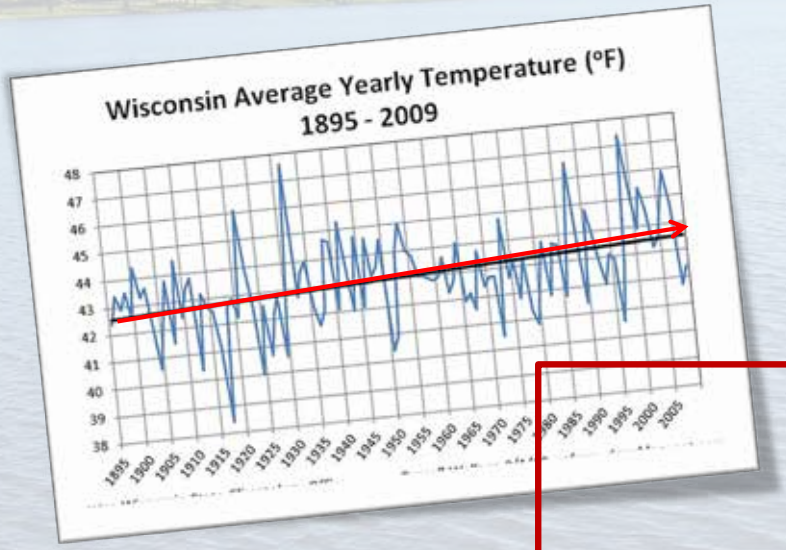
NOAA

WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

NASA

# How is Wisconsin's CLIMATE CHANGING?

## Historic Scientific Evidence– already in the "books"




**1950-2006**

**+1ºF over all temperature increase**

**+2 - 2.5ºF increase in NW Wisconsin**

# Projected Change in Climate Variables

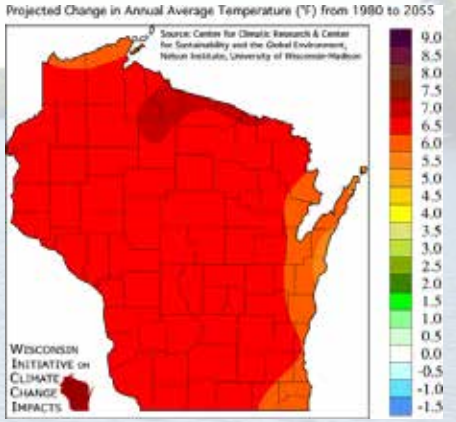
**(1980-2055)** A1B Scenario

## TEMPERATURE

### Overall Warming

**Change in average annual temps +4-9ºF**

**Average +12 days growing season**

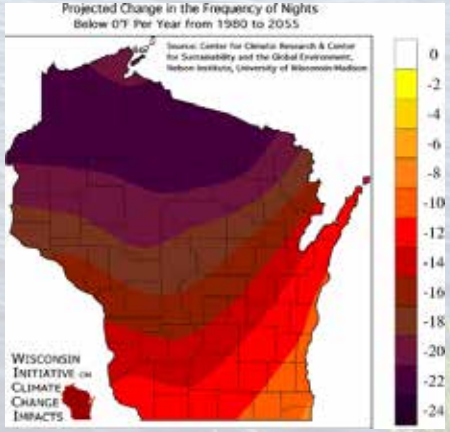



### Warmer Winters

**Decrease in frequency of cold nights (70% decrease in northern WI)**

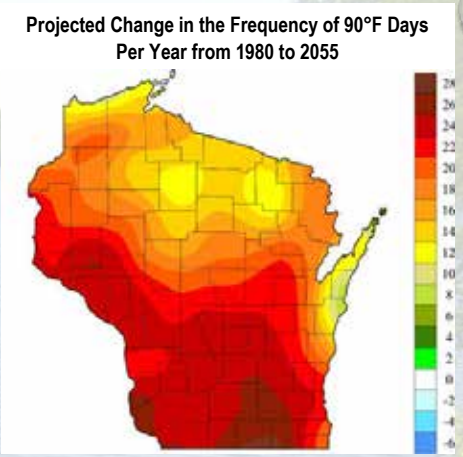
**Less ice cover on lakes, more evaporation**

**More precip <u>as rain</u>, not snow**



## EXTREME HEAT

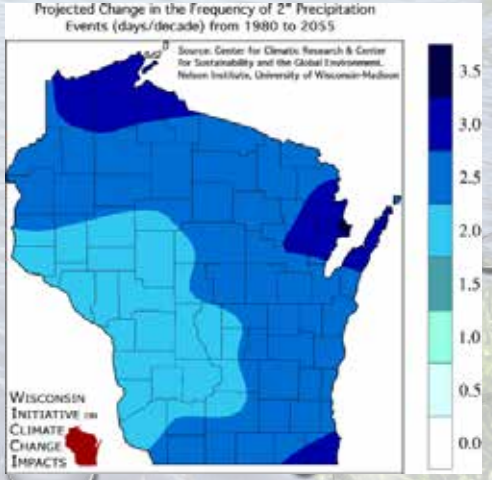
**Up to 2-5 more weeks/year with 90-degree + temps**




## PRECIPITATION & INTENSE STORMS

**Up to 4.5 inch annual mean increase in precip, but a projected:**

**25% increase in the frequency of 2-inch or greater rainfall events**



# But What About those Polar Vortex(es)?

## 2014, 2015, 2016, and 2018??


| 2014 | 2015 | 2016 | 2018 | 2019 |
|---|---|---|---|---|
| Midwest near-record cold for the Midwest | Record cold & snowfall for eastern cities | Record cold and snow in Midwest | Record cold and snowfall in Midwest | No Polar Vortex |
| Alaska warmest since records began in 1918 | Alaska: record high temps for February | Alaska: warmest year on record | Alaska: 2nd warmest year | Alaska: hottest year ever! |
| Globally: Hottest year on record | Hottest year on record | Hottest year on record | 4th warmest year on record | 2nd hottest year on record |
| Highest CO2 Level = 398.6 ppm | Highest CO2 level = 400 ppm | Highest CO2 levels = 409 ppm | Highest CO2 Levels = 411 ppm (2/19) | Highest CO2 Level = 413 ppm |

# CLIMATE WINNERS & LOSERS

**Changing climatic variables will affect the habitat conditions that plants and animals depend on to thrive and survive**

**We depend on the sustainability of these species & habitats for supporting our cultures, activities, economies and the Lakes we Love!**

# Be Prepared….
## To Think About & Respond to Climate Change Differently

**By considering how climate change in affecting the sustainability of species and habitats**

**that support cultural, recreational, and economic activities we value**

**by applying**

**place-based evidence we can observe**

**with science**

**to promote ACTION!**

**Activity**

A cultural, recreation, or economic practice you value in your lake

**Species/Habitat**

What species or habitat conditions are needed to support this activity?

*If a species, what habitat does it need to survive and thrive?*

**Place-based, TEK, and Scientific Evidence**

What changes are being observed in this activity or the species and habitat?

How are climatic variables needed by this species or habitat projected to change?

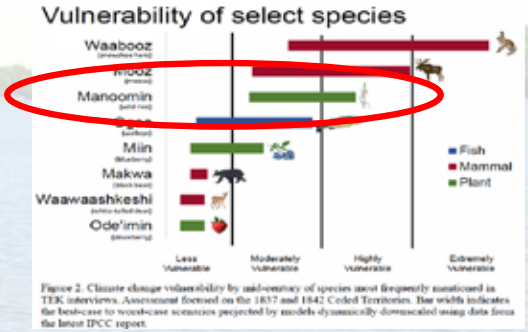
*Variables may include: temperature, precipitation, drought, intense rain/ storms, humidity, etc.*

## Activity

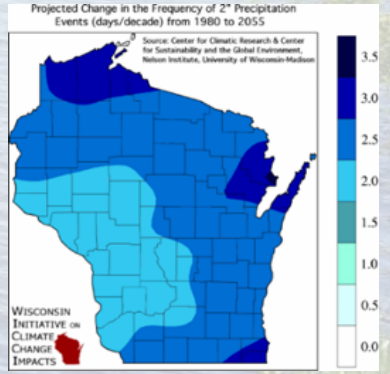
## Species

*Habitat: needs shallow water, moderate water level changes, cool growing season*

## TEK, Place-based & Scientific Evidence








*Projected frequency of 2"+ rain events, 1980-2055*

**How will climate change affect the sustainability of wild rice?**

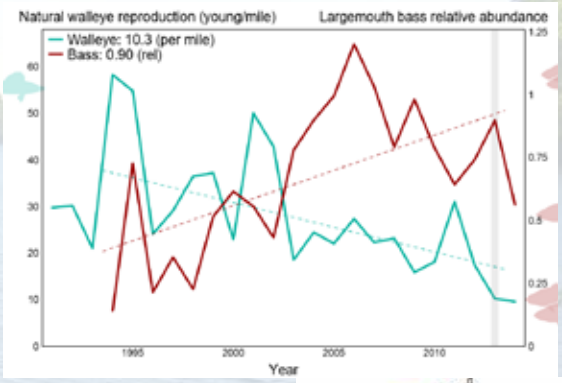
## Activity

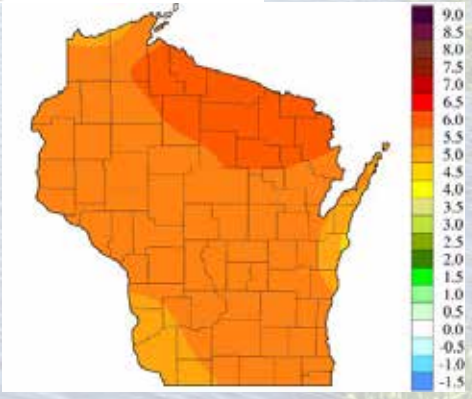
## Species

Can thrive in warmer waters

Requires cooler waters habitats

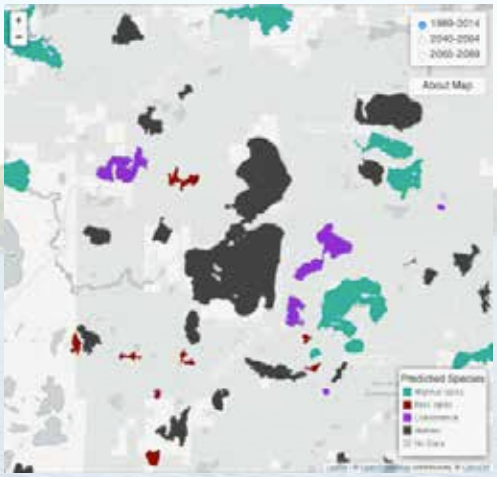
## Place-based and Scientific Evidence




*Projected change in Wisconsin's annual average summer temperatures in ºF, 1980-2055*

**"As water temperatures get warmer, many lakes that currently can support natural walleye reproduction are unlikely to continue to have the thermal habitat conditions to do so"- USGS**




## What's projected for your Lake?

"***Lakes that are resilient to climate change should be protected from other stressors such as habitat loss, invasive species, or overfishing to maximize the potential for continued walleye production***"**- USGS**

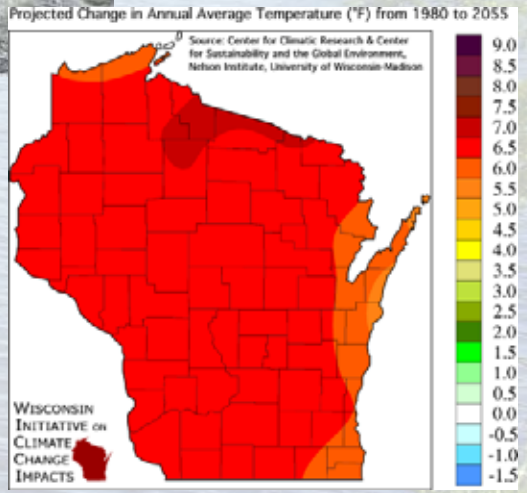
https://owi.usgs.gov/vizlab/climate-change-walleye-bass/

## Activity

## Species

*Temperate to warm water*
*Tolerates lower oxygen habitats*

## Place-based and Scientific Evidence




*Projected change in Wisconsin's annual average temperatures in ºF, 1980-2055*

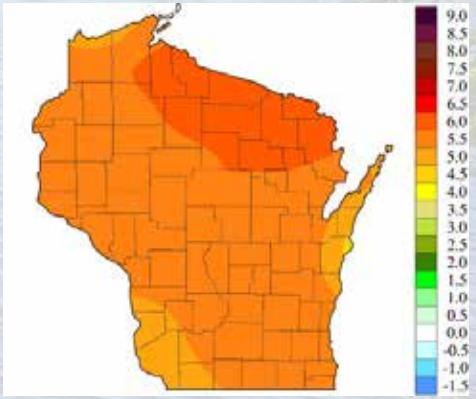
**How will climate change affect the sustainability of invasive fish species?**

## Activity

## Key Species/Habitat

*Habitat: needs cold water with high oxygen levels*

## Place-based and Scientific Evidence




*Projected change in Wisconsin's annual average summer temperatures in ºF, 1980-2055*

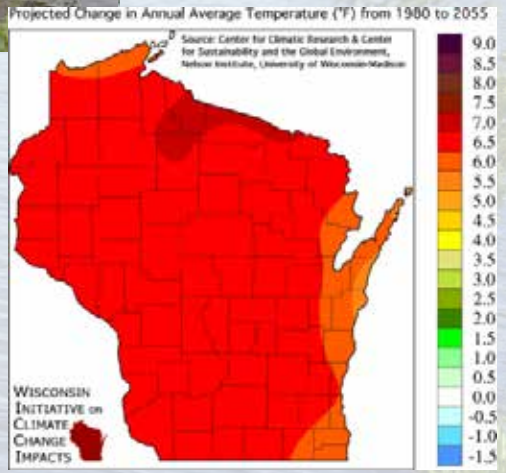
**Climate models predict up to 95% of brook trout habitat across Wisconsin could be lost if the average annual summer air temperature increased just over 5 º F.**

## Activity

## Species

*Eurasian water milfoil tolerates a wide range of temperature conditions, including warm temperatures and low oxygen*

## Place-based and Scientific Evidence




*Projected change in Wisconsin's annual average temperatures in ºF, 1980-2055*

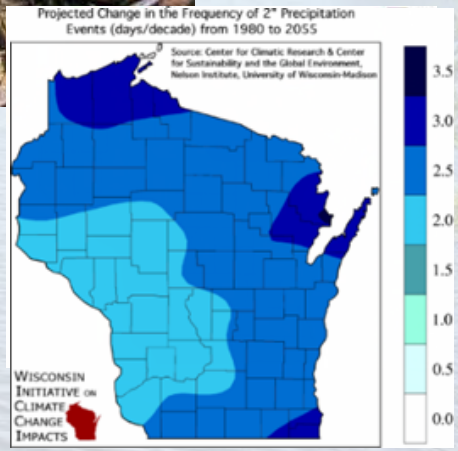
**How will climate change affect AIS plant species and your lake's water quality and recreational use?**

## Activity

## Species

*Habitat: needs shoreline nesting sites with stable to moderate water level fluctuations. Warm temps increase black fly predation on chicks.*

## Place-based and Scientific Evidence




*Projected Change in Summer Average Temperature (°F) 1980 to 2055*

*Projected frequency of 2"+ rain events, 1980-2055*

**What is the future for the sustainability of this iconic symbol of Wisconsin's northwoods lakes?**

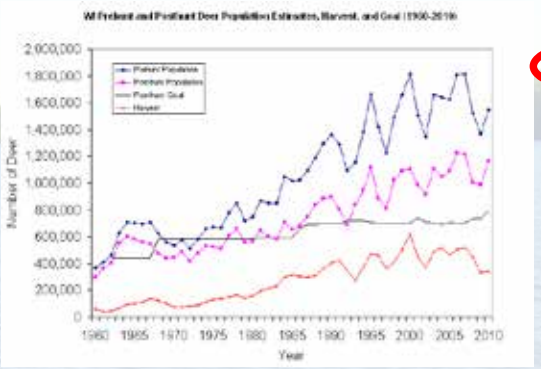
*"By 2080, the loon is forecasted to lose 56 percent of its current summer range and 75 percent of its current winter range….it looks all but certain that Minnesota will lose its iconic loons in summer by the end of the century."*- Audubon's climate model.

## Activity

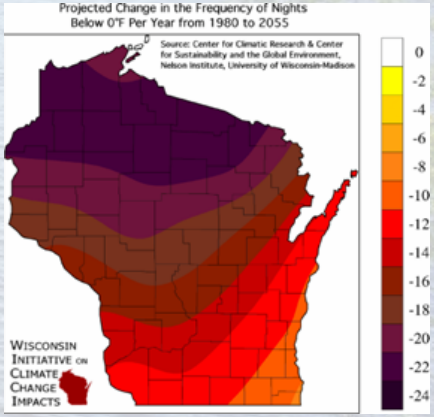
## Species

*Highly adaptable to a variety of habitats, needs winter shelter to reduce energy loss*

## TEK, Place-based, and Scientific Evidence








*Projected change in frequency of nights below 0 ºF, 1980-2055*

**What limiting factors influenced by climate change could affect Wisconsin's white tail deer population?**

## Species

*Requires snowy habitats for winter camouflage*

## TEK, Place-based, and Scientific Evidence

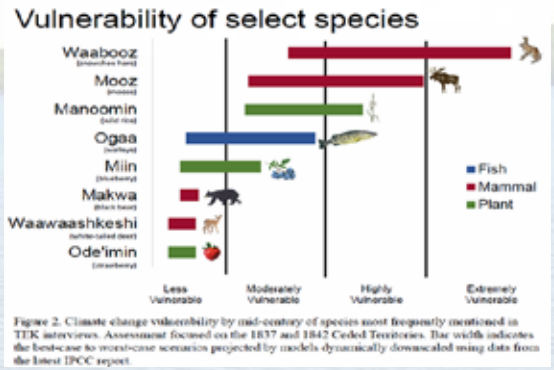
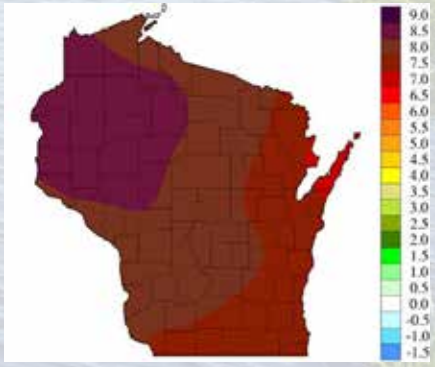



Figure 2. Climate change vulnerability by mid-century of species most frequently mentioned in TEK interviews. Assessment focused on the 1837 and 1842 Ceded Territories. Bar width indicates the best-case to worst-case scenarios projected by models dynamically downscaled using data from the latest IPCC report.



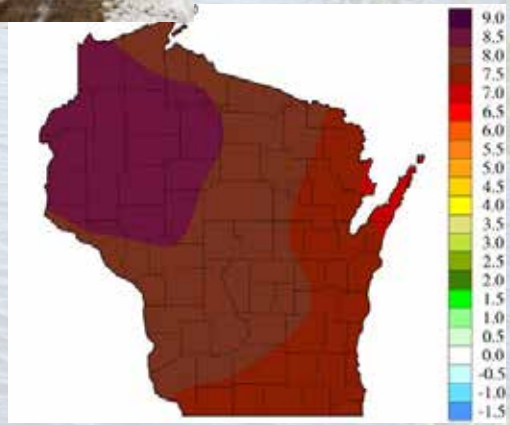

*Projected change in Wisconsin's winter average temperatures in ºF, 1980-2055*

**How will climate change affect the sustainability of Waabooz (Snowshoe Hare) in Wisconsin?**

**Activity**

**Habitat**

**Place-based and Scientific Evidence**




*Projected change in Wisconsin's winter average temperatures in ºF, 1980-2055*

**What do these changes mean for species, businesses, and activities that depend on cold and snow?**

Unfrozen lakes lose more water to evaporation during the winter and warm faster during the spring, which can decrease levels of water and oxygen in the lake. These, in turn, can increase the potential for harmful algal blooms and harm fish and lake wildlife.

# FISH & WILDLIFE- Who May be Moving On?

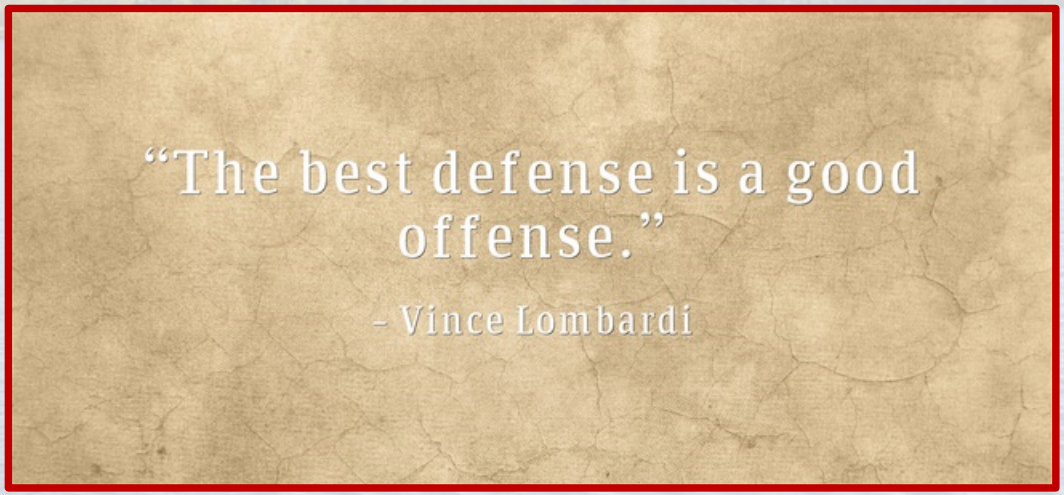
## "Winner" species:

- Shorter generation times
- Wide distribution
- Move easily across the landscape
- Habitat generalists
- Not sensitive to human activity

## Species that may be moving on

- Long generation times
- Narrow or restricted distribution
- Poor dispersal ability
- Habitat specialists
- Sensitive to human activity

# So What Do We Do?




## Good Lake Stewardship Builds Resiliency to Climate Change

# Be Prepared: Extreme Weather Events

## Minimize threats to public health and safety

**What Can We Do?**

**Make lake community infrastructure more "climate ready"**

**Re-Size Replacement Culverts**

- Accommodate increased water flow do to storm events
- Protect stream habitat
- Improve fish passage

**Plan riparian development to accommodate changing lake levels**

**Have a lake-wide plan for weather emergencies**

## Be Prepared: SLOW THE FLOW!

**Extreme precip events increase erosion, flooding, and sedimentation in lakes**

**What Can We Do?**
**Reduce impervious surfaces, "capture" and divert the flow**

Stewardship Benefits:

Creates and diversifies habitat

Reduced shoreline erosion, preserves property value

Reduced sedimentation flow of nutrients + pollutants into your lake

Increases natural aesthetics vs. "urban" lake landscapes

*Lakeshore rain gardens: capture water, create habitat*

## Be Prepared: STOP the SPREAD!

**Warming temperatures will favor many invasive species**

**What Can We Do?**

**Maintain a diverse, healthy aquatic ecosystem**

Stewardship Benefits

Encourage native plantings versus exotic landscape plants

Use invasive species awareness programs to engage boaters, anglers, and lake users

Monitor your lake…Develop a rapid response plan for new invaders– they are coming!

Limit potential pathways for AIS to enter your lake

## Be Prepared: BUFFER YOURSELF!

**Increased storm events impact lake infrastructure, shorelines, property**

**What Can We Do?**

**Use native shoreline buffers to reduce erosion and sedimentation into your lake**

**"Edit" your shoreline!**

**Less "lawn" = less fossil fuels use = less CO2 =**

**more time to enjoy your Lake!**

Stewardship Benefits

Food, breeding areas, shelter for fish, amphibians, birds, wildlife

Reduces runoff into your lake = higher water quality!

Maintains natural aesthetics versus "urban" lake landscape

Little to no fertilizer needed….
Warming temps + nutrients promotes growth of invasive plants and blue-green algae

## Be Prepared: Warmer Waters Ahead!

**"Wisconsin lakes are getting warmer…we can expect different warming rates in big vs. small lakes, deep vs. shallow lakes, clear vs. turbid lakes." *–USGS, 2018***

### What Can We Do?

### Increase Coarse Woody Debris (CWD) Shoreline and Nearshore

*Fish Sticks Create Habitat*

Stewardship Benefits

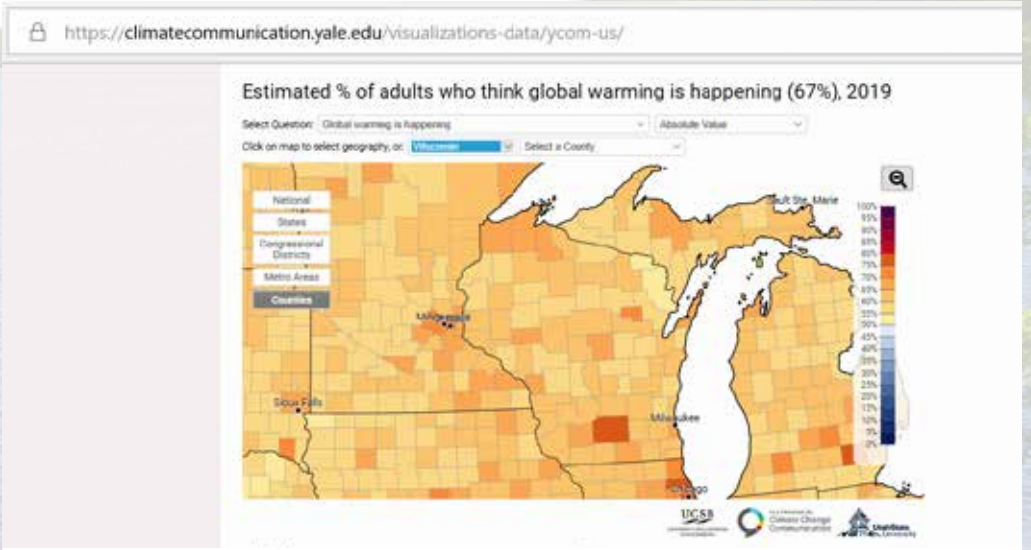
Provides habitat for fish, amphibians, birds wildlife

Provides shade and cooling of habitat areas (water and shoreland) for fish and wildlife

Buffers shorelines against extreme weather events & erosion

*CWD promotes cooler habitats and slows erosion*

# Be Prepared: To Communicate


67% of Wisconsin residents think climate change is happening,
**yet only 33% discuss it occasionally with others**

Yale Climate Communications, 2019
http://climatecommunication.yale.edu/

# Something We Can All Do

Use these strategies to speak to what people personally value and how it may be affected by climate change

Listen to their observations…. Tell your climate story

Stress opportunities for increasing resiliency to climae impacts through good stewardship lake stewardship!

## Need Ideas?

The new "Wisconsin Healthy Lakes and Rivers" Action Plan
for practical ideas that increase resiliency
and promote good lake stewardship

# *Thank you!*


Gile Flowage from Wedding Island

**For more information, please contact**
**Cathy Techtmann-Environmental Outreach State Specialist**
**University of Wisconsin-Extension**

**cathy.techtmann@wisc.edu**
**715.562.0050**

Extension
UNIVERSITY OF WISCONSIN-MADISON
IRON COUNTY