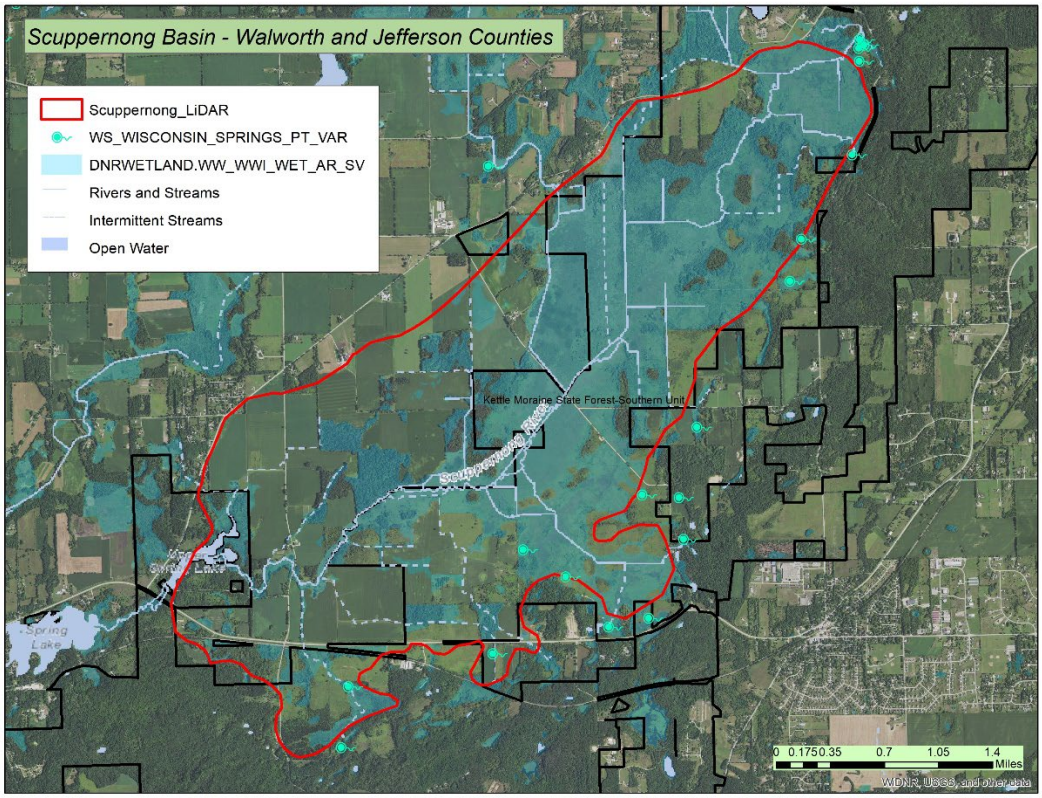
Addressing Climate Change in Scuppernong Basin Wetlands and Waterways

Wetlands figure prominently in the Scuppernong Basin, comprising approximately 66% of DNR-owned lands (~2,500 acres). These include Emergent Marsh, Southern Sedge Meadow, Shrub-carr, Calcareous Fen and Wet-mesic Prairie. The Scuppernong River flows through the middle of the Scuppernong Basin, with its headwaters just to the northeast of the project area. The river is channelized in places and is impaired at Upper Spring Lake and northeastward due to high phosphorus loads. Conditions improve downstream of Mile 12, and the river achieves Class III trout stream status after Mile 15. Numerous springs lie along the southeast boundary of the project area, aligning with the interlobate moraine.



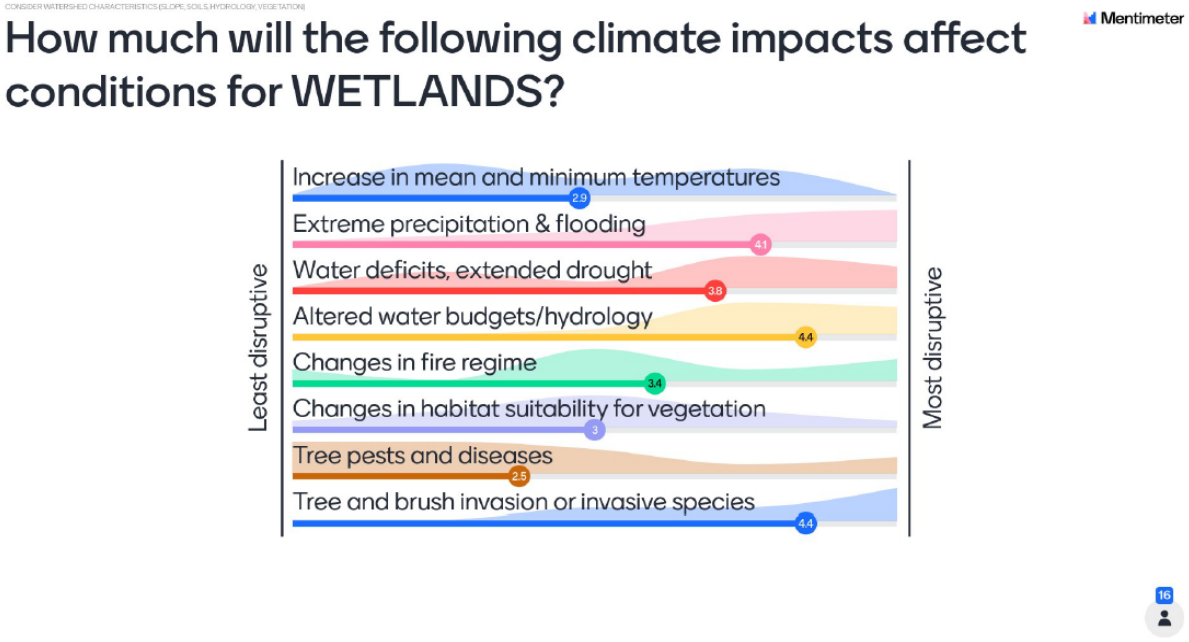
CLIMATE IMPACTS: CHANGING HYDROLOGY, INCREASING STORMWATER RUNOFF, INCREASING NON-NATIVE INVASIVES, AND CHANGES IN THE APPLICATION OF PRESCRIBED FIRE

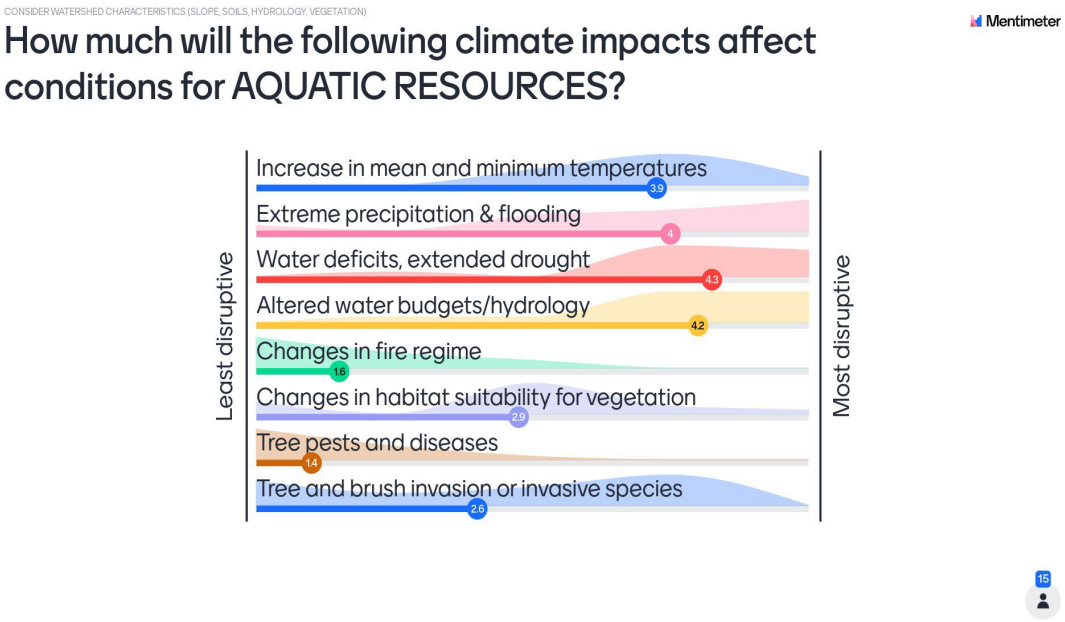
Climate projections for the Upper Midwest indicate that wetlands and waterways will be influenced both by extreme precipitation and longer drought periods between rain events. Increased frequency of large storm events results in greater runoff, increasing nutrient loading,

and sedimentation. This is a particular concern given the large area of agricultural lands and paved roads in the Basin and larger watershed. Altered hydrology is the greatest anticipated impact to non-forested wetlands from climate change. The interplay of warming temperatures, longer growing seasons (and increased plant evapotranspiration), drought, and more frequent and intense storm events suggest a variable forecast for groundwater resources, with likely fluctuations in groundwater levels from year to year and decade to decade. Non-native invasives largely benefit from climate change for a variety of reasons: 1) Floodwaters provide opportunities for dispersal; 2) Increased sediment and nutrient runoff enhances conditions for germination and growth; and 3) Longer growing seasons benefit invasives like reed canary grass, which can grow longer in the fall than native grasses and sedges. Doing prescribed burns in spring is getting harder due to more unusually wet springs and early green-up. Managers may do fewer burns, or may be forced to burn in non-traditional seasons such as fall or winter.

Wetlands will fare best when they are large and/or well situated within a larger wetland matrix, when both ground and surface water influences are secure, and when they have diverse species. Wetlands that occur higher in the watershed (as is the case in the Scuppernong Basin) are also less vulnerable to the cumulative impacts of stormwater runoff.

During the Scuppernong Basin Adaptation Workshop, participants ranked relative disruptiveness of the following impacts (faint colored graphics show distribution of responses, circled numbers show the means, number in lower right indicates total number of responses):





POSSIBLE ADAPTATION ACTIONS

Project participants used the Non-forested Wetland Adaptation Menu to develop adaptation actions for this project. Some examples follow (Non-forested Wetland Adaptation Menu references in parentheses at end of each action). This does not include benefits and drawbacks identified during the workshop, and represents early discussions and ideas that may be explored as part of a larger master planning process for Kettle Moraine State Forest-Southern Unit in the future.

Protect watershed and groundwater resources

The wetlands of Scuppernong Basin are heavily influenced by both groundwater and surface water resources, making it essential to protect those resources at the watershed level.

- Construct small catchments along problematic drainageways to collect sediments and nutrient runoff from adjacent private ag, especially from the west where both row crops and cat-tails (*Typha* spp.) are most prevalent. *(2.3: Reduce loading and export of nutrients and other pollutants.)*
- Explore opportunities to work with private landowners, local municipalities, and existing conservation groups in the watershed to serve mutual needs in reducing flooding and runoff and increasing groundwater infiltration. *(1.1: Maintain and facilitate infiltration and water storage. Possibly 5.1 too: Manage systems to cope with decreased water levels and limited water availability.)*

- Convert DNR-owned farmland to permanent vegetative cover to secure soils and limit runoff. *(1.1: Maintain and facilitate infiltration and water storage.)*
- Develop a plan for beaver management after conducting assessment on their impacts (both positive and negative) to wetlands and waterways, especially rare/sensitive elements such as Calcareous Fen and Wet-mesic Prairie. *(1.2: Maintain and restore a natural hydrologic regime; 2.1: Moderate surface water temperature increases.)*

Restore and maintain healthy ecosystems

Climate change exacerbates impacts of non-climate stressors on native plant communities. Healthy and diverse wetlands can better absorb the stresses of a rapidly changing climate.

- Employ existing WDNR Coarse Level Metrics for Southern Sedge Meadow and Wet-mesic Prairie to assess measures of ecosystem integrity and resilience. Metrics can be used by practitioners to evaluate initial site conditions, determine next management steps, and measure restoration progress over time. *(Approaches 1-3)*
- Plug ditches, disable drain tiles, and continue process of remeandering Scuppernong River. Can use decades of past experience in this system to inform future initiatives: Which methods worked best? What changes in adjoining high quality wetland communities occurred as a result of remeandering? If some impacts are negative, are there ways to mitigate those in future initiatives? *(1.2: Maintain and restore a natural hydrologic regime; 1.3: Restore stream channel processes and restore hydrologic function of waterways connected to wetlands.)*

Adjust priorities

Part of the Adaptation Workbook process is to assess how climate change affects current goals and objectives. In some cases, priorities are adjusted in light of the climate change analysis.

- Prioritize management of Southern Sedge Meadow, and put less focus on monotypic stands of Emergent Marsh Vegetation (focus on containment of aggressive/invasive species). This acknowledges that Emergent Marsh at this site has a poor outlook based on current condition and ongoing/increasing issues with nutrient runoff, sedimentation, and invasives. *(4.4: Adjust wetland and composition to meet functional values.)*
- Prioritize brush clearing along Scuppernong River riparian corridor, with main focus on non-native invasives like glossy bucktorn that outcompete desirable natives and create bare soil that is vulnerable to erosion with more frequent and intense storms. Promptly revegetate bare soils to prevent establishment of invasives. Immediately secure bare soils after seeding/planting by using erosion control fabric or weed-free mulch certified by Wisconsin

Crop Improvement Association. *(3.1: Maintain and restore wetland structure; 3.4: Prevent invasive species establishment and limit their impacts where they already occur.)*

- Prioritize control of leading edge/outlier populations of cat-tails, common reed (*Phragmites australis*), and reed canary grass (*Phalaris arundinacea*). *(3.4: Prevent invasive species establishment and limit their impacts where they already occur.)*
- Identify management zones (zero tolerance, limit dominance, containment) for non-native invasives such as cat-tails based on invasion fronts, and topographic, geographic, and hydrologic boundaries*. (4.4: Adjust wetland and composition to meet functional values.)*

Adjust management methods

Climate change introduces emerging constraints to business as usual for natural area managers, forcing them to seek out new methods to meet their goals. Sometimes, new opportunities arise with climate change, allowing for new approaches that historically could not have been executed.

- Consider applying prescribed fire outside of traditional burn seasons to respond to changing weather, site, and fuel characteristics [e.g., burn Wet-mesic Prairie in spring as usual, but burn Emergent Marsh and Sedge Meadow in summer or fall (often too wet in spring)]. Addressing Incidental Take of rare/declining species is an essential part of this action. *(3.3: Promote prescribed fire in fire-adapted wetlands)*
- Consider biomass harvests of cat-tails during dry periods. Also remove legacy phosphorus from sediments, if soils will support it. *(2.3: Reduce loading and export of nutrients and other pollutants.)*
- Use drones to conduct monitoring of wetlands for hybrid cat-tail, common reed, hairy willow-herb (*Epilobium hirsutum*), and other highly-visible Early Detection-Rapid Response species. *(3.4: Prevent invasive species establishment and limit their impacts where they already occur.)*

ADAPTATION MONITORING

The workshop participants identified important information gaps that need to be filled before decisions about wetland monitoring variables and protocols can be made. Variables might include groundwater levels, water temperature, and water quality. Workshop participants did, however, identify several specific monitoring items that could help inform future management, including:

- Converting farmland owned by DNR to permanent cover: Acres planted.
- Employ WDNR Coarse Level Metrics for Wetlands: Completed monitoring forms.