

## Threats/Issues and Conservation Actions

### Miscellaneous Community Group

This is a summary of threats/issues and conservation actions that are common to all or most of the community types<sup>1</sup> in the wetland community group. As much as possible, the source of the threat is described as well as the stresses or effects that occur directly or indirectly as a result of the threat. Stresses are generally thought of as loss, conversion and/or degradation of the natural community. Distinguishing the **source** of the impact from the **effects** that occur to or in the community is important because the two typically need a different approach and set of conservation actions. Multiple sources of impact may have the same or similar effects on a community. Similar effects may be addressed collectively by a single action or suite of actions.

The wetland group includes the following community types:

#### Bedrock Communities

- Algific Talus Slope
- Alvar
- Bedrock Glade
- Caves and Subterranean Openings
- Dry Cliff
- Glaciere Talus (Felsenmeer)
- Moist Cliff

#### Great Lakes Shoreline

- Bedrock Shore
- Great Lakes Alkaline Rockshore
- Great Lakes Beach
- Great Lakes Dune
- Great Lakes Ridge and Swale

#### Wetlands

- Inland Beach
- Lacustrine Mud Flat
- Clay Seepage Bluff

#### Other Community Types

- Transportation and Utility Corridors

Descriptions for these community types can be found online.<sup>2</sup>

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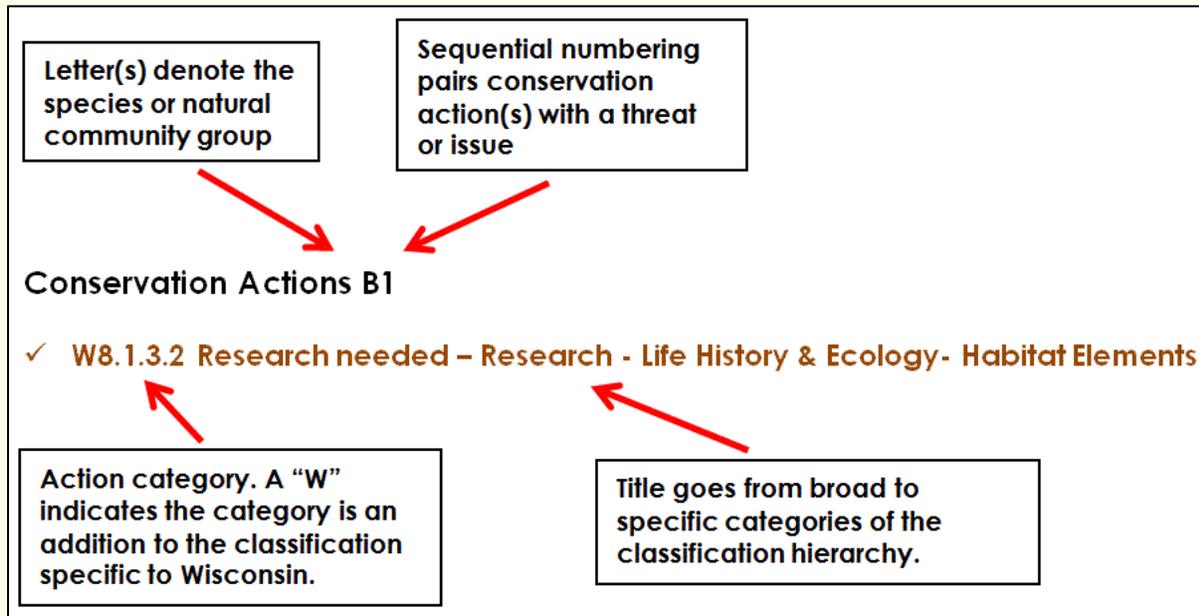
<sup>1</sup> Community or natural community is used in the WWAP as a proxy for habitat.

<sup>2</sup>

[http://dnr.wi.gov/topic/EndangeredResources/Communities.asp?mode=group&Type=Miscellaneous\(Search Terms: Miscellaneous Communities Wisconsin DNR\)](http://dnr.wi.gov/topic/EndangeredResources/Communities.asp?mode=group&Type=Miscellaneous(Search Terms: Miscellaneous Communities Wisconsin DNR))



Conservation actions for most or all miscellaneous community types are organized according to categories in the [Conservation Actions Classification](#) based on the Open Standards threats and actions classification<sup>3</sup>. If the threat/issue and its associated conservation action(s) apply to one or a few species they are identified as such. Conservation actions overlapping in content or scope may be grouped under a single code. Coding and identification for each action category are explained further below.



More about how threats and issues or conservation actions were developed, opportunities to provide input on this topic, and how this information can be used to make conservation decisions can be found on the [Conservation Actions and Effectiveness Monitoring](#) page or in [Sections 2 and 4.4.8](#) of the Wisconsin Wildlife Action Plan.

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## Threat/Issue Mi1

Three bedrock community types, Moist Cliff, Algific Talus Slope, and Felsenmeer, require cool and moist microclimates to maintain their community structure and function. Intrinsic factors such as topography, slope and aspect play an important role in this microclimate. A forested matrix surrounding these communities is also important for maintaining a cool microclimate. Outliers of northern plant species occur in southern Wisconsin due to unusually cool, moist microclimates created by cold air vents (Algific Talus Slope, Felsenmeer) and by steep topography, north-facing aspects, and/or regular provision of a water source. With climate change, temperatures may increase to the point of exceeding a physiological threshold for these northern species, e.g.,

<sup>3</sup> See the following website for the classifications. <http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/> (Search Terms: open standards conservation threats actions). The conservation actions classification is provided in Appendix 2.1.

eastern hemlock and yellow birch, causing a reduction in their extent or extirpation from existing sites. Lichens, an important substrate stabilizer in many of these communities (especially Dry Cliff and Bedrock Glade), are sensitive to warming and drying, and could also be compromised by a changing climate.

## Conservation Actions Mi1

Depending on your overall objectives, the following voluntary conservation actions can address changes in microclimate to some bedrock communities:

### ✓1.2 Land/water protection-Resource & habitat protection

#### ✓8.2.2 Research needed- Conservation Planning- Area-based Management Plan

Consider a landscape-scale approach to reserve design and management, where complementary natural communities and habitat types are interwoven in a mosaic, and occupy different positions along soil, topography, and moisture gradients. In the Western Coulees and Ridges Ecological Landscape, restore and manage sandstone-influenced sites with a mosaic of dry oak savanna, oak woodland and sand prairie communities, along with smaller patches containing oak forest, pine relicts, dry prairie, open shrubby barrens, and rock outcrops.

#### ✓2.1 Land/water management-Site/area management

Maintain sufficient canopy cover surrounding Moist Cliffs to confer resistance to extreme heat and drought. Let shading be the guide as to the amount and extent of canopy trees.

Maintain a landscape matrix of mid-successional to mature upland forest around Algific Talus Slope. The intent is to buffer this exceptionally rare and sensitive resource from external threats, as well as confer resistance to changing environmental conditions by maintaining cool soil temperatures and by providing a buffer for northern outlier species. The extent of this buffer is currently at the land manager's judgment; the need for research on buffer extent is expressed in a separate action.

#### ✓W8.3.4.2 Research needed-Habitat trends-Composition, Quality & Function

Conduct research on extent of mature upland forest buffer needed to protect Algific Talus Slope sites from external threats and changing environmental conditions.

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## Threat/Issue Mi2

Non-native invasive plants are prolific reproducers in the absence of their homeland's natural checks and balances, and outcompete native plants by monopolizing light, water and nutrient resources. The most common non-native invasive plants of bedrock communities include herbs such as garlic mustard (*Alliaria petiolata*) and shrubs such as common buckthorn (*Rhamnus cathartica*) and Eurasian bush honeysuckles (*Lonicera* spp.). White-tailed deer are a problematic native species that can be devastating to



forests in terms of limiting regeneration and growth of trees and ground layer plants, especially as their populations are allowed/encouraged to reach extremely high levels. Climate change scientists suggest that non-native invasive species may increase in productivity with increasing CO<sub>2</sub>, warmer temperatures, earlier springs, and reduced snowpack, and may invade new areas during extreme flood events; white-tailed deer may also benefit from milder winters, with increased access to vegetation and reduced winter mortality. Lastly, as trees become stressed with extreme climatic conditions, they may become more vulnerable to pests and diseases.

## Conservation Actions Mi2

Depending on your overall objectives, the following conservation actions can address non-native invasives and other problematic species as well as the effects that they have on bedrock communities:

### ✓W2.4 Land/water management – Comprehensive management

#### ✓8.2.2 Research needed – Conservation planning – Area-based management plan

At the site level, employ an eight-part approach to non-native invasive species: 1) careful planning; 2) prevention; 3) early detection and rapid response; 4) control; 5) slowing the spread; 6) reducing impacts; 7) monitoring; 8) restoration.

Develop a plan by conducting surveys for invasives and creating maps showing their locations and densities. Set reasonable management objectives based on this information. Consider designating management zones based on degree of infestation and available resources (zero tolerance, acceptable threshold, slow the spread).

#### ✓W2.2.1.3 Land/water management – Prevention – Terrestrial (upland)

Prevent invasions of non-native plants by limiting human vectors (e.g., install boot brushes at trail heads, clean out seeds from maintenance equipment), minimizing soil disturbance, maintaining healthy and diverse natural communities, conducting periodic inspections of high-risk areas (e.g., trails), and revegetating disturbed sites with native plants.

#### ✓W2.2.3 Land/water management – Invasive/problematic species control – Inventory and early detection

Implement an Early Detection-Rapid Response approach by finding new populations of non-native invasives as early as possible when eradication and control are still feasible and less costly.

#### ✓W2.2.2.3 Land/water management – Invasive/problematic species control – Control – Terrestrial (upland)

Control non-native invasive species and problematic woody species by manual, mechanical, and/or chemical means.

In areas where eradication and control are not feasible, slow the spread of non-native invasives into adjoining areas by restricting activities during certain seasons, minimizing travel through areas, and inspecting clothing and equipment.

If eradication, control, and containment methods fail to manage an infestation of non-native invasives, reduce their impact on elements of the natural community by focusing control efforts to allow for specific functions to occur (e.g., tree regeneration), translocating sensitive species, or accommodating unavoidable changes (e.g., underplanting swamp white oaks to replace ash trees that will die due to emerald ash borer or installing deer exclosures to protect tree seedlings and saplings).

**✓W2.2.3 Land/water management – Invasive/problematic species control – Inventory and early detection**

**✓W8.3.5 Research needed – Monitoring – Effectiveness monitoring**

Conduct regular monitoring of sites to detect new invasions and to evaluate the success of pest management plans and control measures.

**✓W2.3.3 Land/water management – Habitat and natural process restoration – Terrestrial**

Restore sites to confer resistance to infestation by non-native invasives, pests and diseases. This may involve restoring system functions (e.g., fire), restoring natural community structure (canopy, mid-story, shrub layer), and ameliorating ground layer species.

**✓5.2 Law & policy- Policies and regulations**

**✓5.4.4 Law & policy- Compliance and enforcement- Scale unspecified**

At a landscape or statewide level, enforce and strengthen regulatory mechanisms and voluntary BMPs that address the introduction and spread of non-native invasives. For more details, see “Wisconsin’s Forestry BMPs for Invasive Species” ([dnr.wi.gov](http://dnr.wi.gov), search words “Wisconsin DNR invasive bmp”).

## Threat/Issue Mi3

Development, mining and quarrying can pose a direct threat to most bedrock communities, especially Dry and Moist Cliff, Algific Talus Slope, and Felsenmeer. Livestock are known to plug cold air vents, the climatic lifeline for Algific Talus Slope, and they can trample vegetation and compact soils in other bedrock settings that are accessible to them. Vandalism (mostly pertains to Dry Cliff), hiking, and rock climbing can also cause damage to fragile vegetation and substrates.

## Conservation Actions Mi3

Depending on your overall objectives, the following conservation actions can address direct damage to substrates and ground layer vegetation and the effects that they have on bedrock communities:

**✓W7.2.3 – External capacity development-Alliance and partnership development-Management and Protection**

In the Niagara Escarpment and Driftless Area COAs, encourage public and private landowners to maintain natural forest cover, protect areas where surface waters drain



into natural fissures, minimize pesticide use, and maintain partially open sinkholes that serve as bat hibernacula and host SGCN snails.

**✓W4.3.1 Education & awareness- Awareness & communications- General ecology, biology, habitat related to conservation needs**

Create and provide written materials to landowners in the areas where Algific Talus Slopes are confirmed or probable, with information on these unique and important habitats that encourages protection of this critical resource for Wisconsin.

Limit or avoid rock climbing and other disruptive recreational activities on Dry Cliff sites with high conservation value by: 1) conducting educational outreach with rock climbing clubs to inform members of important sites and help them know how to recognize SGCN/quality habitat; 2) blocking access to high value sites; and 3) identifying lower value sites where rock climbing will have little to no impact.

**✓8.2.2 Research needed-Conservation Planning- Area-based Management Plan**

**✓W8.3.4.2 Research needed-Monitoring-Habitat trends-Composition, Quality & Function**

Avoid routing recreational trails through sensitive resource areas when possible. When that can't be avoided, monitor periodically for evidence of erosion, browse damage, and infestation by invasive plants.

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## Threat/Issue Mi4

Water is vital for three of our bedrock communities: Moist Cliff, Algific Talus Slope, and Bedrock Glade. Water enters cracks or pools at the base of rocky slopes, creating permanent ice blocks that maintain a cool microclimate for our two 'climate relicts,' Algific Talus Slope and Felsenmeer. Moist Cliff is kept moist by a variety of factors that can include an internal water source, permeable or fractured bedrock substrate (sandstone or limestone), or wave splash/spray. Road building and quarrying can interrupt internal water flow as well as movement of water through sandstone or limestone, diminishing the vital source of moisture. Furthermore, extreme heat and drought associated with climate change (along with milder winters) may compromise ice formation in the two climate relict communities.

## Conservation Actions Mi4

Depending on your overall objectives, the following conservation actions can address soil disturbance and hydrologic alteration and the effects that they can have on bedrock communities:

**✓W8.1.7 Research needed- Research- Natural Community Inventory and Ecology**

Conduct research on mechanics behind cold air sources for Algific Talus Slope and Felsenmeer, and identify warming thresholds that may cause loss of community identity.

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## Threat/Issue Mi5

Projections for vulnerability of bedrock communities to climate change range from low to high (Climate Change Vulnerability Assessment Workshops 2014). Negative impacts relate to milder winters, drought, extreme summer heat, and changes in winter precipitation. Milder winters and drought may compromise ice formation in the two climate relict communities (Algific Talus Slope, Felsenmeer), which is the lifeblood of these community types where northern outlier species rely on a microclimate that is exceptionally cooler than the surrounding landscape. These northern species may be further stressed, or even pushed beyond a physiological threshold, by extreme summer heat and drought. Lichens, an important substrate stabilizer in many of these communities (especially Dry Cliff and Bedrock Glade), are sensitive to warming and drying, and could also be compromised by a changing climate. In Alvar, community composition may shift to favor prairie species over boreal species. Less snowpack in winter may render tree roots vulnerable to frost damage, while ice storms may severely damage trees, especially conifers. Climate change scientists suggest that non-native invasive species may increase in productivity with increasing CO<sub>2</sub>, warmer temperatures, earlier springs, and reduced snowpack, and may invade new areas during extreme flood events; white-tailed deer may also benefit from milder winters, with increased access to vegetation and reduced winter mortality. Lastly, as trees become stressed with extreme climatic conditions, they may become more vulnerable to pests and diseases. Resistance to climate change is projected for species that are already adapted to hot and dry climates and thin, nutrient-poor substrates. Species that have high dispersal capabilities and ample alternate habitat available in the vicinity also show resilience to climate change (e.g., lichens).

Moist Cliff, Felsenmeer, Algific Talus Slope and Alvar are considered to have the highest vulnerability to climate change due to the amplified threats of non-native invasive species, milder winters, modification of water sources, and extreme summer heat/drought. The extreme rarity of Algific Talus Slope, Felsenmeer, and Alvar, in addition to the small size and isolation of remnants, further contribute to the vulnerability of these community types. Dry Cliff may fare the best due to the fact that associated species are already adapted to a hot, dry, harsh environment.

## Conservation Actions Mi5

Depending on your overall objectives, the following conservation actions can address climate change and the effects that it can have on bedrock communities:

### ✓1.2 Land/water protection-Resource & habitat protection

#### ✓8.2.2 Research needed- Conservation Planning- Area-based Management Plan

Consider a landscape-scale approach to reserve design and management, where complementary natural communities and habitat types are interwoven in a mosaic, and occupy different positions along soil, topography, and moisture gradients.

### ✓2.1 Land/water management-Site/area management



Maintain sufficient canopy cover surrounding Moist Cliff, Algific Talus Slope, and Felsenmeer sites to confer resistance to changing environmental conditions. Let shading be the guide as to the amount and extent of canopy trees.

#### ✓W2.4 Land/water management – Comprehensive management

At the site level, employ an eight-part approach to non-native invasive species: 1) careful planning; 2) prevention; 3) early detection and rapid response; 4) control; 5) slowing the spread; 6) reducing impacts; 7) monitoring; 8) restoration.

- See other conservation actions under the following issue sections above:
  - Changes in microclimate
  - Non-native invasive plants and aggressive native plants
  - Hydrologic alteration

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## Threat/Issue Mi6

Beaches and dunes are built in part by longshore currents which run parallel to the shoreline, which, depending on shoreline features and local currents both bring in and erode the sand that forms the foundation of these communities. The construction of artificial structures such as jetties, breakwalls, riprap, and sea walls can disrupt the longshore current and alter sand transport, leading to the deposition of sand behind these structures and erosion of beaches elsewhere. Loss of a sand source is among the major functional threats to beach and dune ecosystems along the Great Lakes, especially near large urban centers and ports. Minimizing the construction of the new structures will help preserve beaches and dunes.

## Conservation Actions Mi6

Depending on your overall objectives, the following voluntary conservation actions can address disruption of natural shoreline processes and the effects that it has on Great Lakes shoreline natural communities:

#### ✓2.1 Land/water management-Site/area management

#### ✓5.2 Law & policy-Policies and regulations

Implement practices to reduce shoreland and bluff erosion on Great Lake shorelines that maintain natural long-shore sand movement and minimize new artificial shoreline structures (permanent piers, breakwalls, seawalls, rip-rap, jetties, etc.).

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## Threat/Issue Mi7

Heavy recreational use, residential and occasional commercial development have adversely impacted many dune and beach complexes. Some municipalities and parks

groom the beaches and the adjacent dunes, removing all plant life and introducing high levels of frequent physical disturbance to these communities. Recreational uses such as off-road vehicles and horseback riding are incompatible with dune protection and maintenance, as they destroy the fragile dune vegetation, damage or eliminate rare plant and animal populations, create and enlarge blowouts, and facilitate the spread of invasive plants. For bedrock-based communities, excessive trampling can damage already sparse vegetation, including exceptionally rare plants adapted to unique lakeshore bedrock exposures.

## Conservation Actions Mi7

Depending on your overall objectives, the following conservation actions can be considered to address erosion and the effects that it has on Great Lakes shoreline natural communities:

✓**W4.3.1 Education & awareness- Awareness & communications- General ecology, biology, habitat related to conservation needs**

✓**W4.3.2 Education & awareness- Awareness & communications- Harvest, roadkill, or other sources of illegal, incidental mortality, nonlethal threats**

Educate landowners on the uniqueness of the dune and shoreline plant community to minimize trails, erosion, and beach grooming.

✓**8.2.2 Research needed-Conservation Planning- Area-based Management Plan**

✓**W8.3.4.2 Research needed-Monitoring-Habitat trends-Composition, Quality & Function**

Avoid routing recreational trails through sensitive resource areas when possible. When that can't be avoided, monitor periodically for evidence of erosion, browse damage, and infestation by invasive plants.

✓**2.3 Land/water management-Habitat & natural process restoration**

Promote dune vegetation re-establishment by protecting sensitive or eroded areas from recreation.

## Threat/Issue Mi8

Great Lakes shorelines are dynamic and soil disturbance is common. Native and non-native weed species are able to take advantage of this disturbance, and are sometimes common along shorelines. Some of these weeds are highly invasive, including such problematic species as spotted knapweed (*Centaurea biebersteinii*), Lyme grass (*Leymus arenarius*), sweetclovers (*Melilotus* spp.), Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*P. pratensis*), black locust (*Robinia pseudoacacia*), and poison ivy (*Toxicodendron radicans*). Non-native Phragmites (*P. australis* var. *australis*) is also extremely problematic along shorelines, particularly in the Green Bay area. In forested areas, such as Great Lakes Ridge and Swale systems, glossy buckthorn (*Rhamnus frangula*) can gain a foothold and alter habitat used by dozens of rare species. Invasive species tend to increase where management and recreation causes



soil disturbance. Non-native invasive species may increase under climate change as well due to their productivity with increasing CO<sub>2</sub>, warmer temperatures, earlier springs, and reduced snowpack, and may invade new areas following extreme storms that cause erosion and transport seeds and vegetative propagules.

## Conservation Actions Mi8

Depending on your overall objectives, the following voluntary conservation actions can address invasive species and the effects that it has on Great Lakes shoreline natural communities:

### ✓W2.4 Land/water management – Comprehensive management

#### ✓8.2.2 Research needed – Conservation planning – Area-based management plan

At the site level, employ an eight-part approach to non-native invasive species: 1) careful planning; 2) prevention; 3) early detection and rapid response; 4) control; 5) slowing the spread; 6) reducing impacts; 7) monitoring; 8) restoration.

Develop a plan by conducting surveys for invasives and creating maps showing their locations and densities. Set reasonable management objectives based on this information. Consider designating management zones based on degree of infestation and available resources.

#### ✓W2.2.1.3 Land/water management – Prevention – Terrestrial (upland)

Prevent invasions of non-native plants by limiting human vectors (e.g., install boot brushes at trail heads, clean out seeds from maintenance equipment), minimizing soil disturbance, maintaining healthy and diverse natural communities, conducting periodic inspections of high-risk areas (e.g., trails), and revegetating disturbed sites with native plants.

#### ✓W2.2.3 Land/water management – Invasive/problematic species control – Inventory and early detection

Implement an Early Detection-Rapid Response approach by finding new populations of non-native invasives as early as possible when eradication and control are still feasible and less costly.

#### ✓W2.2.2.3 Invasive/problematic species control- Control-Terrestrial (upland)

Control non-native invasive species and problematic woody species by manual, mechanical, and/or chemical means.

#### ✓W2.2.2.3 Land/water management – Invasive/problematic species control – Control – Terrestrial (upland)

In areas where eradication and control are not feasible, slow the spread of non-native invasives into adjoining areas by restricting activities during certain seasons, minimizing travel through areas, and inspecting clothing and equipment.

If eradication, control, and containment methods fail to manage an infestation of non-native invasives, reduce their impact by limiting their dominance.

**✓W2.2.3 Land/water management- Invasive/problematic species control-Inventory & early detection**

Conduct regular monitoring of sites to detect new invasions and to evaluate the success of pest management plans and control measures.

**✓W2.2.1.3 Land/water management – Prevention – Terrestrial (upland)**

Restore sites to confer resistance to infestation by non-native invasives.

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## Threat/Issue Mi9

Great Lakes shoreline communities are projected to have moderate to high vulnerability to climate change (Climate Change Vulnerability Assessment Workshops 2014). The greatest impacts are expected to be from extreme storms and less ice cover in winter, both of which can increase shoreline erosion through wave action (especially due to winter storms). In addition, high winds may exacerbate dune blowouts and sand loss in general. Less winter ice cover will likely result in less scouring of bedrock shorelines, an important process that maintains an open condition. Wetlands associated with the Great Lakes, including Great Lakes Ridge and Swales are anticipated to be highly vulnerable to small changes in hydrology, as well as direct impacts from higher temperatures on trees that require cool, moist conditions like eastern white-cedar. However, Great Lakes shorelines may be buffered from extreme temperatures by proximity to the large, generally cool waters of the Great Lakes. Invasive species may increase under climate change as well due to increased productivity with increasing CO<sub>2</sub>, warmer temperatures, earlier springs, and reduced snowpack, and ability to invade new areas following extreme storms that cause erosion and transport seeds and vegetative propagules.

Finally, changes to Great Lakes water levels driven by climate will also have a major impact on all shoreline communities. Projections on future water levels are still uncertain, however, and average water levels may be slightly higher or somewhat lower compared to contemporary levels. In either case, year to year variability and cyclical fluctuations will likely still occur, and management that plans for variability will help increase resiliency of communities.

## Conservation Actions Mi9

Depending on your overall objectives, the following conservation actions can be considered to encourage climate change adaptation for Great Lakes shoreline natural communities:

**✓2.3 Land/water management-Habitat & natural process restoration****✓8.2.2 Research needed – Conservation planning – Area-based management plan**

Implement practices to reduce shoreland and bluff erosion on Great Lake shorelines that maintain natural long-shore sand movement and minimize new artificial shoreline structures (permanent piers, breakwalls, seawalls, rip-rap, jetties, etc.).



**✓2.3 Land/water management-Habitat & natural process restoration**

Revegetate disturbed or eroded areas by installing boardwalks, manually reseeding or replanting, or allowing sensitive areas to naturally revegetate.

**✓5.2 Law & policy- Policies and regulations**

Minimize land use conflicts and improve wetland conservation at the local level by implementing recommendations in Wisconsin Wetlands Association's "Land Use and Wetlands: Zoning Opportunities to Improve Wetland Protection."

**✓W4.3.1 Education & awareness- Awareness & communications- General ecology, biology, habitat related to conservation needs**

**✓W7.2.3 – External capacity development-Alliance and partnership development- Management and Protection**

Educate shoreline landowners and restore natural shoreline habitat.

**✓W2.4 Land/water management – Comprehensive management**

**✓8.2.2 Research needed – Conservation planning – Area-based management plan**

Employ an eight-part approach to non-native invasive species: 1) careful planning; 2) prevention; 3) early detection and rapid response; 4) control; 5) slowing the spread; 6) reducing impacts; 7) monitoring; 8) restoration.

**Estimated Vulnerability of miscellaneous bedrock communities to climate change under low and high change scenarios.**

<b>Community type</b>	<b>Vulnerability under Low degree of climate change</b>	<b>Vulnerability under High degree of climate change</b>
Algific Talus Slope	Moderate	High
Alvar	Moderately Low	Moderately High
Bedrock Glade	Moderate	Moderate
Caves and Subterranean Openings*	NA	NA
Dry Cliff	Low	Moderately Low
Glaciere Talus (Felsenmeer)	Moderate	Moderately High
Moist Cliff	Moderately High	High

Source: WDNR Climate Change Vulnerability Assessment Workshops 2014.

\*Caves were not evaluated during the 2014 workshops.