Adapt

Collaborative Tribal Climate Adaptation Planning





Inter-Tribal Council of Michigan, Inc.

Climate Change

At a glance 2016



GREAT LAKES: PAST AND FUTURE



Surface water temperatures have risen by about 3F° since 1995, with the largest change in Lake Superior (+3.2F°).



Ice cover has decreased by 62-79% between 1973-2010. Lake effect snowfall may decline after mid-century (2050).

Data source: Great Lakes Sciences and Assessments, 2016 Image source: NASA Earth Observatory 2013

PAST: TEMPERATURE



The annual average temperature has increased by about 2 F° over the past century, with a 9-day decrease in frost days (cold season) between 1958-2012.

PAST: PRECIPITATION



The annual average amount of precipitation has increased by about 11% over the past century, with a 37% increase in the number of heavy storms during the last 50 years.

FUTURE: TEMPERATURE



The annual average temperature may increase by about 4-6 F° by 2050, with an increase in the growing season of about 1 month.

FUTURE: PRECIPITATION



Heavy storms may continue to increase in number and intensity. Winter precipitation may fall more often as rain, while snow depth may decrease.

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Inter-Tribal Adaptation Plannin

Overview

Whereas, the Tribal leaders...recognize the vital importance of the health and quality of the Great Lakes, inland waters, air, geography, ecosystems, plants, and wildlife to the physical, cultural, and economic welfare and future of all of our citizens;

Whereas, climate change poses a grave and immediate threat to the environment, quality of life, and economy for all of our citizens... Tribal-State Climate Accord 2009

Tribes in Michigan are currently experiencing the impacts of climate change: warmer average annual air and surface water temperatures, more volatile weather with extreme precipitation events, decreases in duration and extremity of winter temperatures, and increases in duration of summer temperatures.

Changes in climate and weather patterns are accelerating, with an expected increase in mean annual temperature of 5.5 to 6 degrees Fahrenheit by mid century (2041 – 2070; GLISA 2016). These changes impact Tribes in Michigan both directly and indirectly, with potential and undefined impacts on natural features, public health, built-infrastructure, energy, and the ability of tribal communities to maintain cultural ways of life. Now is the time to evaluate and plan for climate change with adaptation strategies that mitigate degradation or losses in tribal resources. This document offers a snapshot of the results of a cooperative effort among the Inter-Tribal Council of Michigan, Inc., and nine federallyrecognized Tribes in Michigan:

- Bay Mills Indian Community (BMIC)
- Lac Vieux Desert Band of Lake Superior Chippewa (LVD)
- Grand Traverse Band of Ottawa and Chippewa Indians (GTB)
- Little River Band of Ottawa Indians (LRB)
- Little Traverse Bay Bands of Odawa Indians (LTBB)
- Match-E-Be-Nash-She-Wish Band of Potawatomi - Gun Lake Tribe (GLT)
- Pokegenek Bodewadmik Pokagon Band of Potawatomi (PBP)
- Saginaw Chippewa Indian Tribe (SCIT)
- Sault Ste. Marie Tribe of Chippewa Indians (SSMT)

The Inter-Tribal Council of Michigan (ITCMI) is a consortium of federally recognized tribes in Michigan and works across reservation

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Overview

boundaries and treaty ceded territories to provide technical assistance with human health and resource protection efforts to member Tribes. Through this project, ITCMI facilitated a tribal-led process of analyzing climate projections at midcentury, assessing the vulnerability of key tribal resources, developing planning resources, and identifying adaptation strategies across jurisdictional boundaries to benefit Tribes in Michigan as they face a changing climate.



For the purposes of this project, the State of Michigan was subdivided into four climatic and ecologic regions: Western Upper Peninsula (WUP), Eastern Upper Peninsula (EUP), Northern Lower Peninsula (NLP), and Southern Lower Peninsula (SLP); see Figure 1. Tribes located within each region may experience similar climate changes and related challenges based on regional climates and geographies. Natural Resource and Environmental staff from participating Tribes in Michigan worked together with ITCMI to conduct vulnerability assessments for identified resources in a true learning collaborative, contributing to and learning from each others' expertise and perspectives.

This project has served to connect tribally-driven climate change vulnerability assessments, identification of climate sensitive tribal assets, and the development of adaptation strategies to support tribal decision-making and prevent or minimize climate change impacts on important tribal resources. This work would not have been possible without the dedication of participating Tribe staff, who contributed their time and expertise in service of the Tribes.

Community and Traditional Knowledges

Anishinaabek Ways

Anishinaabek cultures and ways are inter-woven with the lands, waters, plants, fish, and wildlife of this region. Where would our communities be without manoomin – the food that grows on the water? How would our societies have survived without subsistence hunting, fishing, and gathering of traditional foods and medicines? What would our communities look like without our relationships with local animals, fish, and plants?

Tribal communities maintain important traditional and community knowledge regarding local plants and animals, lands and waters, seasons and cycles – including recent changes in climate and impacts on natural resources. Traditional Knowledge (TK) refers to the bodies of knowledge, practices, and beliefs that have been developed and shared across generations. TK is sustained today by Anishinaabek communities, with ongoing relationships with the lands, waters, and other beings of this region.

Tribal communities can use TK to guide tribal adaptation efforts. Community and traditional knowledge is vital in identifying local climate impacts, important resources, and ways to protect important tribal resources for current and future generations.

TK may be included in tribal climate adaptation planning by the inclusion of community members in the planning process: one-on-one conversations, formal interviews, community workshops, community feasts, and working with tribal elder, cultural, natural resource, youth, and other advisory committees. It is important to consider the rights, risks, and means of protections involved in working with community members and TK, as discussed in *Guidelines for Considering Traditional Knowledges in Climate Change Initiatives* (Climate and Traditional Knowledges Workgroup 2014).







Figure 2. Vulnerability assessment graphic (adapted from Glick et. al. 2011)

Assessing Vulnerability

Vulnerability to climate change is the likelihood that climate-driven changes will have an adverse impact on a species, habitat, or system (part Glick et al. 2011). Vulnerability is a function of a species' or system's:

- **Sensitivity**: how a species or system is likely to be affected by a given change in climate
- **Exposure**: how much of a change in climate and related impacts a species or system is likely to experience
- Adaptive capacity: a species or system's ability to minimize or manage its sensitivity, exposure, or potential impact to climate changes

From: Williams et al. 2008, Glick et al. 2011, Schneider et al. 2007

Results

Assessment Findings

Vulnerability assessments were conducted for 124 individual species across the four geographic regions, using Nature Serve's Climate Change Vulnerability Index and geospatial analysis. These assessments addressed mid-century impacts (to the year 2050) using Nature Serve's Climate Wizard data and Dr. David Notaro's climate projections (University of Wisconsin – Madison).

Uncertainty is an important aspect of vulnerability assessment, especially in this broad-scale vulnerability assessment project. The process was characterized by uncertainty, with ITCMI and tribal staff drawing from a wide variety of scientific and technical literature sources, community and traditional knowledge, and local natural resource management experience. The results are meant to be updated as new information and perspectives are included in tribal adaptation efforts.

Vulnerability was ranked on a scale of: extremely vulnerable (EV), highly vulnerable (HV), moderately vulnerable (MV), and less vulnerable (LV). Uncertainty was captured in a confidence rating on a scale of Low to Very High. Assessment findings are summarized on the following page, according to the scale below. Many species were categorized under different levels of vulnerability and uncertainty across the four geographic regions assessed. The following page presents the most vulnerable ranking received by each species in any geographic region. Detailed information with confidence ratings can be found in the final project report.



Results

EV
Snowshoe hare, Moose

Lake sturgeon

Black ash, Black spruce, Bulrush sedge, Fringed polyster



Black ash, Black spruce, Bulrush sedge, Fringed polygala, Labrador tea, Large cranberry, Northern white cedar, Paper birch, Partridge berry, Pipsissewa, Small cranberry, Yellow lady's slipper

Walleye



Elm, Beech, Balsam fir, Broadleaf arrowhead, Trillium, Goldthread, Hemlock, Ladyfern, Lowbush blueberry, Pin cherry, Pin lady's slipper, Sugar maple, Sweetgale, Sweetgrass, Tamarack, White pine, Yellow birch, etc.

American beaver, American marten, Fisher, Common loon, Ruffed grouse, Spruce grouse, Sharp-tailed grouse

Brook trout, Burbot, Lake trout, Lake herring, Whitefish



Basswood, Bearberry, Bigtooth aspen, Blue cohosh, Boneset, Jack in the pulpit... White water lily, Winterberry

Badger, Black bear, Mink, Bobcat, Coyote, Cottontail rabbit, Elk, Gray wolf, Porcupine, Bald eagle, Loon, Blue heron, Mallard, Sandhill crane, Snapping turtle, etc.

Northern pike, Perch, Smelt, Muskellunge, Black crappie, Bluegill, Longnose/White sucker, Large/Smallmouth bass

For detailed information with confidence ratings by geographic area, see the final project report. Icons: Gan Khoon Lay and Jens Tarning from Noun Project





Goals & Strategies

With these vulnerability assessments, tribal resource managers, leaders, and community members may identify and prioritize adaptation goals and strategies.

Adaptation goals may focus on resilience and/or transition. The goal of **resilience** is to improve the ability of a species, resource, or system to remain the same (for the most part) despite changes in climate. The goal of **transition** is to assist the species, resource, or system's ability to track, or to move with, climate changes.

Adaptation strategies are identified and then implemented to accomplish adaptation goals. Adaptation strategies have been developed for specific species, ecosystems, water resources, roads and buildings. These strategies include standard Best Management Practices (BMPs) that Tribes in Michigan may already be using, small changes to current BMPs or current practices, and entirely new efforts.

Adaptation

Adaptation Strategies

A selection of adaptation strategies identified through this process are listed below. Establishing a tribal climate adaptation committee composed of tribal members to guide adaptation strategies may contribute to the adaptation process overall. A complete listing of adaptation strategies can be found in the final project report.



- Monitor species populations, phenology, and habitat
- Improve and protect habitat, biodiversity, and ecosystem services
- Improve and protect habitat connectivity to increase resilience and allow species to track climate changes and move to more suitable habitat
- Identify and protect climatic refugia: places where species may persist despite loss of habitat
- Adjust harvesting techniques or times to accommodate changes in growth, flowering, or rearing-young
- Share harvesting and other traditional knowledge across communities
- Conduct built infrastructure vulnerability assessments to identify sensitivities and thresholds for failure, e.g. freeze-thaw impacts on roadways
- Monitor built infrastructure to decrease probability of emergency actions due to failure, e.g. road wash-outs due to heavy precipitation event runoff
- Implement best land use planning strategies in constructing or upgrading infrastructure, including use of green infrastructure
- Upgrade built infrastructure to accommodate new climate characteristics, e.g. increased runoff from heavy precipitation events
- Implement alternative energy to reduce long term costs, reliance on fossil fuel energy, and decrease greenhouse gas emissions

These strategies may be tailored to the unique needs of each Tribe's lands, waters, ecosystems, infrastructure, and priorities. Selected adaptation strategies may be integrated into existing resource management efforts, plans (e.g. housing, transportation, natural resources), and protocols, and/or compiled in tribal climate adaptation plans.

Moving Forward

Adaptation Planning

Preparing for climate change is a process, not an outcome. Climate adaptation and other management plans are often called "living documents" with good reason – the resources and systems that they deal with are complex, changing, and characterized by (at least some) uncertainty. Planning documents require review and revision as situations change and as more information becomes available. This is especially true with climate change, where new information arises often and where species and resources are actively responding to changes happening now.

Consistent with traditional Anishinaabek ways of working in circles, paying attention to responses, and adjusting actions accordingly, **adaptive management** offers a framework for climate adaptation planning and management in the face of uncertainty. The process of adaptive management is shown in Figure 3.



Figure 3. Adaptive Management Adapted from Walters 1986 and Holling 1978

Whether the Tribe is creating a new Climate Adaptation Plan or integrating adaptation strategies into existing management plans or protocols, the success of tribal climate adaptation depends on:

- Support and involvement of tribal leadership, staff, and community
- Full implementation and integration of adaptation strategies in tribal operations
- Use of an iterative process (e.g. adaptive management) to monitor, evaluate, and revise the adaptation objectives and strategies on a regular basis

Climate adaptation offers a way for Tribes in Michigan to reinforce cultural, political, and economic sustainability and protect natural features for current and future generations.

Michigan Tribal Climate Change Adaptation Project Partners:

Bay Mills Indian Community Grand Traverse Bay Band of Ottawa and Chippewa Indians Lac Vieux Desert Band of Lake Superior Chippewa Indians Little River Band of Ottawa Indians Little Traverse Bay Bands of Odawa Indians Match-E-Be-Nash-She-Wish Band of Potawatomi - Gun Lake Tribe Pokegenek Bodewadmik - Pokagon Band of Potawatomi Saginaw Chippewa Indian Tribe Sault Ste. Marie Tribe of Chippewa Indians



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