



# Guidance Document on Incorporating Climate Change into Community Planning

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## Abbreviations and Acronyms

CEAA	Canadian Environmental Assessment Agency
EA	Environmental Assessment
GCM	Global Circulation Model
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
SEA	Strategic Environmental Assessment
TEK	Traditional Ecological Knowledge
UNFCCC	United Nations Framework Convention on Climate Change
WIFN	Walpole Island First Nation

## 1.0 Introduction

International concern over the future of the world's climate has been building steadily, particularly in the last 20 years. In 1988 the Intergovernmental Panel on Climate Change (IPCC) was established to assess the science of climate change, its environmental and socio-economic impacts and possible response strategies.

International recognition of the climate change issue was reinforced in 1992 when, at the United Nations Conference on Environment and Development held in Rio de Janeiro, the *United Nations Framework Convention on Climate Change* (UNFCCC) was signed. The Convention objective is “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system”. The Intergovernmental Panel, in its 1995 report, projected an increase in global surface temperature of 1 to 3.5 degrees Celsius over the next century, which compares with the observed increase of 0.3 to 0.6 degrees Celsius over the past 100 years. The Panel's most recent report in 2001 included an upward revision estimating that globally averaged surface temperatures for the period from 1990 to 2100 will increase by 1.4 to 5.8 degrees Celsius. The Panel also concluded that it is very likely that the 1990s was the warmest decade, and 1998 the warmest year, on record.

One of the most challenging aspects of climate change is uncertainty as to whether or not changes in the atmosphere are influencing the frequency and intensity of “natural disasters” associated with extreme weather-related events. Typically it is the extreme events such as heat waves, severe thunderstorms, snow and ice storms, drought, floods, tornadoes and hurricanes that are the focus of concern and which are the immediate cause of harm. On a global scale the losses associated with natural disasters have increased dramatically since 1950 and weather related natural disasters have increased at a much faster rate than non-weather related natural disasters such as earthquakes and volcanoes. This reinforces the view that the frequency and severity of weather-related natural disasters are increasing and that these increases are likely to continue in the future.

A number of long-term data sets indicate that an ever-larger proportion of annual precipitation is associated with major precipitation events. Some authorities caution that major surprises are likely to be in store and that at some point some ecosystems and indeed the global climate system could change very rapidly with unanticipated outcomes.

There are considerable uncertainties with future climate predictions, and climate affects many aspects of economic and social endeavor. Thus, adaptation to climate change, irrespective of actions to control emissions of greenhouse gases (GHGs), is an important consideration of decision makers at all levels. *Adaptation is about recognizing the expected risks and making decisions that will allow likely impacts to be reduced or managed, while exploiting opportunities that may arise.* Incorporating climate risks into planning and decision-making requires not only scientific and technical information, but also knowledge from those who make decisions at the local level.

The overall objective of this document, *Incorporating Climate Change Adaptation in First Nations' Planning and Decision Making: A Guidance Document*, is to provide guidance on incorporating climate change adaptation considerations in planning and decision making of the Walpole Island First Nation (WIFN). The document is expected to assist WIFN planners and decision makers in understanding climate change adaptation and accounting for adaptation considerations in policy development and program and project design. It is expected that the

guidance document, while developed for and directed at WIFN decision makers and planners, will have broader applicability to other First Nations.

Section 2 discusses the local dimensions of climate change in Walpole Island. Section 3 introduces the general concept of adaptation and discusses methods of engaging the First Nation community in assessing climate change risk and vulnerability, and adapting to climate change. Section 4 provides an overview of the ways that a First Nation community can identify and prepare for the anticipated changes in climate and climate variability. Section 5 sets out recommended actions over the short- and long-term for the WIFN to begin to address the issues of climate change adaptation.



## **2.0 The Changing Climate and Walpole Island**

This section provides an overview of the potential implications of climate change and climate variability for Walpole Island. It draws largely on the information presented in *Climate Change in the Great Lakes Region: An initial assessment of climate change and climate variability with respect to potential implications for the Walpole Island First Nation*, an RFI report developed earlier in the project.

### **2.1 Walpole Island First Nation**

The Walpole Island First Nation is referred to in the Ojibwe language as “Bkejwanong” (where the waters divide) and forms part of a large delta island complex situated in the mouth of the St. Clair River along the northern portion of Lake St. Clair. These delta islands cover approximately 24,000 hectares and are part of the traditional homeland of the Ojibwe, Odawa and Pottawatomi people who together comprise a political compact known as the Three Fires Confederacy.

Walpole Island contains a rich mosaic of natural areas including some of the most biologically diverse remaining in Canada. These areas include rare tall-grass prairie and oak savanna remnants, Carolinian forests, and one of the largest wetland systems in the Great Lakes basin. These habitats are home to many rare plants and animals including some that are not recorded elsewhere in Canada. The WIFN makes up only 0.002 percent of Canada’s landmass yet contains 12 percent of Canada’s species at risk. Many of those species considered rare or at risk in Canada are locally abundant on Walpole Island.

The Walpole Island community is the southernmost First Nation “Reserve” in Canada.<sup>1</sup> The land supports traditional harvesting and practices such as hunting, fishing and trapping. The largest industry is recreation and tourism-based, and syndicates of sportspersons rent Walpole Island marshes and have built hunting and fishing lodges. The wetlands bring in millions of dollars of revenue annually by supporting hunting, fishing, trapping and guiding activities. Agriculture is the second largest industry, with over 4,850 hectares under cultivation. A cooperative – Tahgahoning Enterprises – farms 1,950 hectares and is the largest cash crop farm operation in Ontario.

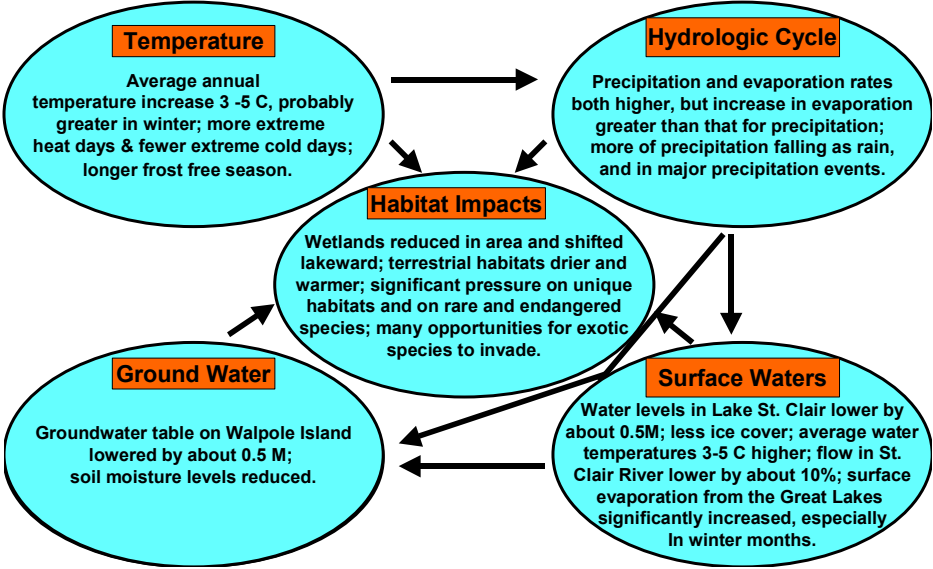
### **2.2 Climate Change: Walpole Island and the Great Lakes Region**

Figure 1 provides a synoptic overview of some of the likely and very likely changes in climate and hydrology in the Walpole Island ecosystem together with likely implications with respect to the unique ecosystems and biodiversity in the area. Figure 2 is a simple summary of some of the components of the Walpole Island ecosystem, including its human components that are likely to be influenced as a result of changes in climate and hydrology in the area.

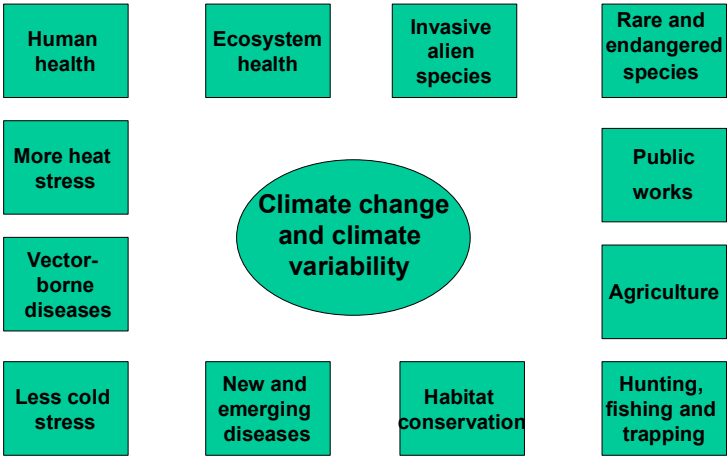
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<sup>1</sup> Walpole Island is unceded territory and its boundaries have never been defined. In 1989, Canada, Ontario and Walpole Island began negotiations to settle the boundaries of the reserve, with negotiations simultaneously covering the ownership and management of sub-surface resources, wildlife harvesting rights, wildlife management, water quality and environmental protection, navigation and shoreline erosion and other issues.

**Figure 1: Summary of anticipated changes in climate and hydrology in the vicinity of Walpole Island over the next century**



**Figure 2: Components and features of the Walpole Island ecosystem that are likely to be sensitive to climate change**



While we do not have estimates of the extent of climate change in the immediate vicinity of Walpole Island, the Canada Country Study's results for Ontario, research of the Great Lakes Region, and studies related to flows in the Niagara River do provide a basis for plausible extrapolations. There is reason to believe that the projections for the larger basin are likely to be generally valid in terms of both the direction of temperature change and the magnitude of that change. At the same time it is not likely that the changes will be uniform, and while the long-term-trend is almost certainly to warmer average temperatures it is also likely that short-term fluctuations will make verification and interpretation difficult. It is, however, likely that the short-term fluctuations and extreme weather-related events will be of more immediate concern

There is reasonable consensus, though not unanimity, as to the direction and magnitude of temperature and precipitation changes in the Great Lakes region. A study by Bruce, et al. (2003) predicts an increase of about 3 degrees Celsius between 1970 and 2050 in the average annual temperature in the Great Lakes Basin above the Niagara River. The measured increase in average annual temperature between 1970 and 2000 for this region has been 1.5 degrees Celsius. Most of this increase is due to higher winter temperatures, which, over the same period, have risen by 3 degrees Celsius. Annual precipitation is projected to increase by about 5 percent over the same period with most of that increase resulting from increases in winter and spring precipitation.

Considerable variability in climate is to be expected. While past trends and future projections indicate warmer average temperatures, it is also likely that short-term fluctuations will make verification and interpretation difficult. A study by Adamowski, et al. (2004) of precipitation records from 15 meteorological stations in Ontario found that severe storms, determined from intensity-duration-frequency relationships, are tending to occur more and more frequently. It is quite probable that short and mid-term fluctuations in climate and in the frequency of extreme weather-related events will be of more immediate concern to the Walpole Island community than the long term trends in temperature and precipitation.

The increase (3 to 8 degrees Celsius) in average annual temperature in the 21<sup>st</sup> century that is predicted for Ontario in the Canada Country Study provides a general picture of the long-term trends in temperature. The more recent predictions for the Niagara River Basin are for an average increase of about 3 degrees Celsius by 2070 while recent projections for Lake Erie using two different Global Circulation Models (GCMs) suggest an increase in average annual air temperature of about 3 to 6 degrees Celsius by 2090. The projections made with the Canadian Model (CGCM1) suggest significantly greater increases in air temperature than the Hadley model (HadCM2). The Canadian model projects a global increase of around 4.5 Celsius while the Hadley model projects an increase of nearly 3 Celsius during this period. For the Great Lakes Region the Canadian model projects an increase of about 3 Celsius by 2050 and about 5.5 Celsius by 2090. The comparable increases projected by the Hadley model are about 1.5 Celsius and 2.8 Celsius respectively. The Hadley model is the first of the nine model runs done of the Great Lakes region that has not indicated a reduction in water supplies and a significant lowering of Great Lakes levels. Both models indicate that there will be many more ice free winters and that the duration of ice cover will be much less. Both also project that a greater proportion of the precipitation will occur in major events and that the frequency of lake-effect snowstorms will decrease in the vicinity of Lake Erie. As a result of higher temperatures, the lake-effect precipitation will more frequently fall as rain.

The average predicted increase in surface temperature for Lake Huron and Lake Erie was about 3 degrees Celsius with a range from 0.9 degrees Celsius to over 5 degree Celsius (Lake Erie) and 6.0 degrees Celsius (Lake Huron). These estimates are considered to be applicable to Lake St. Clair, which lies downstream from Lake Huron and upstream from Lake Erie.

Higher temperatures on land and of surface waters will result in increased evaporation rates, and the modest increases in precipitation that could occur are unlikely to be sufficient to counterbalance evaporation losses. If the trend to more annual precipitation falling in short term storm events continues, this will result in a greater proportion of the precipitation falling on land to become surface runoff. This will often lead to reduced soil moisture and perhaps to reduced levels and flows in the Great Lakes Ecosystem. The fluctuations in lake levels and flows will undoubtedly continue, but over the long term most projections are that mean levels of the lakes and mean flows in the connecting channels will decrease. Increases in consumptive uses of Great Lakes waters, while unlikely to be as large as the increased evaporation losses, can be expected to put additional pressure on flows and levels in the Great Lakes Basin Ecosystem. The duration of ice cover on Lake St. Clair will generally be reduced and ice in the navigation and connecting channels will likely be less.

Lower levels in Lake St. Clair would have ramifications for the coastline and for Walpole Island. A one-metre reduction in the level of lake St. Clair would add significantly to the land base of the WIFN and make additional acreage suitable for agriculture. The wetlands and marshes would be required to adapt and the location and character of these extensive and unique ecosystems would undoubtedly shift. Significant disruptions would tend to favour certain species, including invasive alien (exotic) species, that are suited to the new regime and many of the locally adapted native species would likely suffer. The existing wetlands evolved in conjunction with past fluctuations in levels and flows and, while some of these wetlands are now managed to moderate these fluctuations, they are still important in maintaining the diversity and productivity of these ecosystems. It is probable that the suitability of the habitat for many species of fish, especially for spawning and the rearing of juveniles, would be lessened although some species might find it to their advantage.

The groundwater table on Walpole Island is very close to the surface and lower lake levels in Lake St. Clair can be expected to eventually result in a slightly lower water table throughout much of Walpole Island. While the extent of this shift will vary it would likely be important in some parts of the Island where it would contribute to lower soil moisture and influence land drainage.

While it is difficult to predict, it can be assumed that significant changes in local habitats are almost certain to have a negative impact on the very diverse and unique fauna found on Walpole Island. Direct affects due to changes in the temperature and hydrologic features of the Island as well as urban development, agriculture and other human activities will all be at play. While some of the negative aspects can be mitigated, others are very difficult to address.

The ecosystems of Walpole Island have had to cope with a significant degree of water and air pollution and while current conditions are considerably improved over those that once existed it seems inevitable that the pollution of air and water will remain as issues of concern. The extent to which climate change could directly impinge on these issues is unclear. Biological pollution in terms of microbial pollution will likely continue to be a concern, especially given recent attention over the quality of drinking water in Ontario.

Changes in climate and climate variability are expected to have a modest impact on human health. Increased incidence of high temperature episodes is likely and higher ground level ozone concentrations are a distinct possibility. Heat stress and respiratory difficulties could increase, especially with sensitive individuals and vulnerable age groups. Another concern is that diseases associated with warmer climates, such as malaria, could eventually extend into the region. On the other hand, warmer winter temperatures are likely to result in fewer cold-related illnesses.

Perhaps one of the most difficult and important negative aspects of climate change in the region is the potential for invasive alien species, including diseases associated with warmer climates, to successfully “invade” the region. Many factors are contributing to the invasive species phenomenon and climate warming would be one more important factor increasing the probability of successful biological invasions. It is impossible to predict where and when the next successful invader will appear, but we know that new invaders will appear.

Some of the impacts that assessment global warming foresees are a gradual northward shifting of plants and animals. Forests are expected to become less diverse as species, such as aspen, jack pine, white pine and red pine will be under stress in much of the Great Lakes Region. Deciduous trees such as red oak and sugar maple are not seen as being threatened as a result of climate warming although new and introduced plant diseases could pose a problem. Agriculture may benefit from longer growing seasons, although insect pests are likely to increase and more pesticide applications may be required. Orchards are a special case and while they could benefit from the longer growing season the increasingly variable temperatures, especially when plants are budding, could make fruit production less economic. An increasing requirement for the application of pesticides is expected.

Climate change and climate variability can be expected to have a number of possible implications for the economy and human health. Some of the more likely changes for the economy include:

- Potential of a moderately negative impact on waterfowl hunting and guiding operations;
- Potential of a moderately negative impact on recreational fishing and guiding operations;
- Potential of a moderately negative impact on trapping operations, especially for muskrats;
- Potential for both negative and positive impacts on agriculture;
- Potential for both negative and positive impacts on tourism;
- Potential for community learning and leadership; and
- Moderate impact on cooling and heating industries and on building and land use practices.

Some of the more likely implications for human health include:

- Increased incidence of heat-related health events including respiratory and heat related hospital admissions;
- Decreased incidence of cold-related health events such as colds, flu, and pneumonia; and
- Potential for tropical and subtropical disease vectors to be established in the area.

Table 1 provides a synopsis of some of the envisaged impacts of climate change on the Walpole Island Ecosystem along with some considerations with respect to the health and economy of the Walpole Island First Nation.

**Table 1: Potential impact of climate change during the 21st century on the Walpole Island Ecosystem and some potential implications for the people and economy of Walpole Island First Nation**

<b>Aspect</b>	<b>Biophysical Impact</b>	<b>Potential Implications for Community</b>
Temperature	<ul style="list-style-type: none"> <li>- Mean annual air temperature 3 – 5C higher, differences greater during winter and during the night</li> <li>- More extremely hot days, fewer extremely cold days</li> <li>- Longer frost-free season</li> </ul>	<ul style="list-style-type: none"> <li>- More heat related and fewer cold related illnesses</li> <li>- More frequent “ozone” events</li> <li>- Navigation season extended</li> <li>- Change in agricultural crops and practices</li> </ul>
Precipitation and evaporation	<ul style="list-style-type: none"> <li>- Precipitation and evaporation both higher, net precipitation probably lower</li> <li>- Greater proportion of precipitation falling as rain, and in major precipitation events</li> <li>- Incidence of extreme weather-related events likely to increase, more thunderstorm activity, greater likelihood of hail, freezing rain and very high winds</li> </ul>	<ul style="list-style-type: none"> <li>- Weather-related extreme events are likely to occur more frequently</li> </ul>
Surface waters	<ul style="list-style-type: none"> <li>- Water levels in Lake St. Clair expected, on average, to be 0.5 to 1.0 metres lower by 2100</li> <li>- Flow in the St. Clair River expected to be about 10% less than at present</li> <li>- Average surface temperature in lake St. Clair expected to be 3 – 5C higher</li> <li>- Significantly less ice cover on Lake St. Clair</li> <li>- Surface evaporation from the Great Lakes to be significantly increased, especially during winter months</li> </ul>	<ul style="list-style-type: none"> <li>- More dredging in navigation channels</li> <li>- Ferry operations extended in spring and autumn</li> <li>- Ice fishing reduced</li> <li>- Patterns of migration of migratory waterfowl changed</li> </ul>
Groundwater	<ul style="list-style-type: none"> <li>- Groundwater eventually lower, perhaps by up to 0.5 metres on some parts of the island</li> <li>- Reduced soil moisture in most terrestrial habitats</li> </ul>	<ul style="list-style-type: none"> <li>- Possible overall advantage for agriculture, favours more drought tolerant vegetation</li> </ul>
Habitat	<ul style="list-style-type: none"> <li>- Wetlands reduced in area and shifted lake ward</li> <li>- Terrestrial habitats generally drier and warmer</li> <li>- Significant change in local habitats favouring species adapted to warmer conditions</li> <li>- Some rare and endangered species at greater risk, invasive alien species likely to be a major issue for both aquatic and terrestrial habitats</li> </ul>	<ul style="list-style-type: none"> <li>- Waterfowl and waterfowl management will evolve</li> <li>- Fur harvest likely to decline</li> <li>- Unique habitats and endangered species at greater risk</li> <li>- Opportunities for more invasive alien species, including vectors of human disease</li> <li>- Sport fishing to adapt to more warm water species</li> </ul>

### **3.0 Responding to Climate Change – Engaging the First Nation Community**

Responding to climate change involves mitigation against the causes of climate change (e.g. reducing greenhouse gas emissions) and adaptation to the impacts of climate change. While the WIFN can probably reduce its own emissions of GHG, such action will in itself have no measurable impact on the rate of climate change. The First Nation does, however, have reason to collect information as to what is happening with respect to climate change to be sufficiently resilient to adapt to both anticipated and unanticipated changes.

This section will introduce the concept of adaptation and examine methods of engaging the community in assessing climate change risk and vulnerability and adapting to climate change. The culture, traditions, beliefs and community values of the WIFN will have a major influence on the ways in which the community prepares for and responds to the opportunities and challenges associated with climate change. It is important that the interests and knowledge of community members be taken into account in tailoring an appropriate approach for addressing climate change issues.

#### **3.1 Adaptation**

The concept of adaptation is relatively new to the climate change research community but it has a longer history of use in such related fields as ecology, natural hazards and risk management. “Adapt” means to make suitable (or to fit some purpose) by altering (or modifying). “Adaptation” refers to both the process of adapting and the condition of being adapted. “Adaptive capacity” indicates the extent to which a physical, biological, socioeconomic or human system may accept or undertake adaptation. A detailed description of the theory and science of adaptation is provided by Smit et al., 1999.

The climate change literature contains numerous different expressions of adaptation, varying according to specific circumstances or applications. These definitions include:

- “The process through which people reduce the adverse effects of climate on their health and well-being, and take advantage of the opportunities that their climatic environment provides” (Burton, 1992);
- “Adaptation to climate change includes all adjustments in behaviour or economic structure that reduce the vulnerability of society to changes in the climate system” (Smith et al., 1996);
- “Human adaptation involves adjustments to enhance the viability of social and economic activities and reduce their vulnerability to climate, including its current variability and extreme events as well as longer term climate change” (Smit, 1993);
- “Any adjustment, whether passive, reactive or anticipatory, that is proposed as a means of ameliorating the anticipated adverse consequences associated with climate change” (Stakhiv, 1993); and
- “Adaptability is the degree to which adjustments are possible in practices, processes, or structures of systems to projected or actual changes of climate” and that “adaptation can be spontaneous or planned, and can be carried out in response to or in anticipation of change in conditions” (Watson et al., 1996).



The last of these examples is the definition that is of most common usage in the IPCC literature. However, all of these examples are useful and correct in their own fashion. They all reflect differences in scope, application and interpretation of adaptation, and differences in response to two fundamental questions:

- **Adapt to what?** Adaptation can be to climate change, to climate variability, to climatic extremes, or simply to climate. Adaptation can be a response to adverse effects, to vulnerabilities, or to opportunities. Adaptation can be in response to current, actual or projected conditions, changes or consequences.
- **Who or what adapts?** The entity that does the adapting can be people, social and economic sectors and activities, managed or unmanaged natural (physical and biological) or ecological systems, or practices, processes or structures of systems.

Adaptation to climate change or climate variability can be natural or directed. Natural (or autonomous) adaptation occurs without the deliberate intervention of an informed decision maker. Directed (or planned) adaptation requires strategic actions based on an understanding or awareness or acceptance that climate is changing and that action is needed to respond to such changes.

Adaptation can be either reactive or proactive depending on timing, goals and motives. Reactive adaptation takes place after the impacts of climate change or variability have occurred, while proactive adaptation takes place before the anticipated impacts or effects are apparent. Natural adaptation, in physical, biological and human systems is clearly reactive; directed adaptation in human systems can be both reactive and proactive.

Adaptation is an important consideration in both impact assessment and response strategies. Impact assessment is an attempt at understanding the potential effects of climate change and, therefore, includes consideration of what adaptations are likely in the natural or other systems under stress. Response strategies include measures and actions to confront the effects of climate change and include (or should include) consideration of what adaptations are recommended to support the systems under stress. Research, analysis and implementation of adaptation options and adjustment processes are necessary if governmental, institutional and private sector entities are to make climate sensitive sectors more resilient to climate variability, and to limit the damage from or take advantage of potential long term changes in climate.

### **3.2 Adaptation and the WIFN**

The culture, traditions, beliefs and community values of the WIFN will have a major influence on the ways in which the community prepares for and responds to the opportunities and challenges associated with climate change. It is important that the interests and knowledge of community members be taken into account in tailoring an appropriate approach for addressing climate change issues. The observations and knowledge of community members, including traditional ecological knowledge (TEK) is an important asset in developing a community stance and response to the climate change issue. Thus, activities to engage the community are needed to inform and create awareness in the early stages of the development of an adaptation strategy, as well as to identify ways of collecting and documenting knowledge residing in the community. Decision making regarding climate change and adaptation options requires a combination of scientific and technical, and traditional knowledge, not just from the climate sciences, but from those who understand the community and the consequence of decisions for society, institutions and individuals, for business and the economy, and for the environment. Decision-making requires



knowledge of the community's tolerance and acceptance of risk, which is impacted on by First Nation beliefs, cultures and values.

Understanding and responding to the climate change issue will involve extensive community consultation to ensure community support for decisions and actions taken, and, at least in part, to enhance the ability for the community to anticipate and adapt to challenges and opportunities associated with climate change. The adoption of a long-term community-centered approach is reflective of the perspective currently used in the community to take decisions and actions.

The people of WIFN have lived off the land and have successfully managed these lands for thousands of years. Traditional Native philosophies, values and practices of interacting respectfully with the natural world and not separating themselves from it, have directly contributed to the continued existence of natural areas and many wildlife species, both common and rare, found on the Walpole Island First Nation. The various nationally and globally threatened ecosystems on Walpole Island remain a vital part of the community's past, present and future. The following statement, taken from the Walpole Island Heritage Centre's (2002) *Species at Risk* publication, provides a perspective on the importance of Native philosophies, values and practices in sustaining a way of life.

***“Walpole Island Philosophy and Principle...***

*We the First nations of Walpole Island Indian Territory have inherited these lands since the beginning of time.*

*With this occupation we have developed our language, heritage and values ... in accordance with the Creator, mankind and nature.*

*Through this relationship we possess the rights and freedom to determine our own path. We shall carry on these responsibilities as handed down to us by our Creator, our elders, and ensure that future generations shall be entrusted by these sacred obligations.*

***and environmental philosophy***

*To preserve, enhance and maintain a mutual respect and to continue our beneficial dependency upon the environment, we shall endeavour to co-exist with Mother Nature and protect this relationship.*

*We, the Walpole Island First Nation people, pledge to use these resources to the mutual benefit of all people.*

*We shall therefore, ensure proper respect for all resources. As our elders have done we shall maintain laws that preserve our wildlife, lands and resources.”*

The WIFN has consistently acted in a manner that demonstrates a close relationship with their environment. For example, the sustainable development strategy developed in 1990 set out a community commitment to the ideal of sustainable development that demonstrated the merits of addressing human needs and community aspirations through sustainable, holistic development in the context of finely-balanced ecosystems. Reviews of external proposals consider a time span of at least seven generations in anticipating potential effects, and an environmental audit examining the relationship between the WIFN and its environment and resource base emphasizes preserving the natural heritage for future generations.

A community's understanding of the climate change issue will inevitably be influenced by the culture, shared values and philosophy of its inhabitants. The close and enduring relationship that the inhabitants of Walpole Island have with the land, waters and natural resources of their territory will be important in shaping their understanding of, and adaptation to, climate change. The actions and activities of the community suggest that planning for and adapting to climate

change is a logical extension of WIFN environmental and sustainable development beliefs and philosophies.

### **3.3 Engaging the Community**

Climate change introduces both challenges and opportunities for the WIFN. The inhabitants of this First Nation have adapted to a variety of major changes throughout their history, and climate change, while important, is only one of many changes taking place in the community. The community has adapted to the climate fluctuations that have occurred and has learned to live with seasonal and multi-year fluctuations in lake levels.

A number of activities have been undertaken to engage the community in regard to climate change. For example, the Heritage Centre has carried out awareness raising activities (e.g. consultations with community, surveys, publication and distribution of a pamphlet on climate change and publishing articles in local publications) and stakeholder consultations (e.g. focus groups). Such activities are important to increase understanding and to communicate the potential implications of climate change for the community. These activities are also important in that they highlight the significance of community input and consultation in moving forward to adapt to climate change, and recognize the knowledge inherent in the community that will direct and determine necessary future actions.

Table 2 includes observations on climate change that were assembled during a focus group session. These observations reflect the knowledge of a First Nation that lives with and is dependent on its natural environment, and are indicative of the traditional ecological knowledge that resides in the community. Such knowledge, which reflects the relationship between humans and the land and resources, should be gathered and used to help develop an adaptation plan. It is also important to note that consensus is a fundamental part of First Nation traditions – all community members should be encouraged to participate in the process of reaching agreement on matters of common interest. These considerations are paramount in developing an adaptation strategy for the WIFN, where community knowledge must combine with scientific and technical knowledge to develop a forward looking community-centered perspective in adaptation planning.

The ongoing negotiations with respect to land treaties and self government will undoubtedly have a significant influence on the community's capacity to design a future that takes both the risks and the opportunities associated with climate change into account. The probability of having greater local control over environmental protection and land use development provides an additional reason to anticipate and, where appropriate, to prepare in advance for future events, or at least to be watchful and monitor changes so that timely responses are possible. It also might enable the WIFN to be even more effective in advocating local, regional and national measures that are likely to enhance the health and sustainability of the Walpole Island ecosystem.

**Table 2: WIFN Band Members' Personal Observations on Climate Change (June 2004)**

Personal observations on climate change (June 2004)

- Many agricultural fields had to be re-planted in 2004 due to the high moisture levels in the soil, preventing germination of the seeds.
- The amounts of ice and snow have changed over the years. The ice on the St. Clair River used to be thick enough to drive cars over, now there is barely any ice and the ferry service does not stop in the winter. Snow accumulation was greater in the past.
- It was so dry during the 1930's drought that cars could drive where there now is water, and baseball was played in the bay.
- Gulls, cormorants and ducks were feeding in open water during a hunting trip in January. These waters are normally frozen over. Some waterfowl have shifted their food source to the lake from the marshes as decreasing water levels have opened up a new food source.
- Wetland plants are being replaced by prairie species as water levels and moisture content decrease. In some locations, the prairie habitat is being replaced by forest habitat. Some invasive plant and animal species are appearing as well.
- The composition of fish species in Lake St. Clair has been changing as a result of changes to the water temperature.
- Quotas for professional fishermen in Lake Erie are half of what they used to be.
- Decreased water levels have led to an increased number of boating accidents; and more fishermen go through the ice in the winter.
- There was an increased incidence of grass fires last year due to dry conditions. Children with asthma had to remain indoors due to poor air quality.
- Changing weather and warmer winters may contribute to health problems through an increased mosquito population. Several cases of West Nile Virus were found in crows in the neighboring town of Wallaceburg last year, although no cases have appeared in Walpole Island.

## 4.0 Community Initiatives to Adapt to Climate Change

A long-term, community-centered perspective is reflected in many of the decisions and actions taken by the WIFN and this perspective is likely to continue. Understanding and responding to the climate change issue will involve extensive community consultation to ensure support for decisions and actions taken and, at least in part, to enhance the ability of the community to anticipate and adapt to challenges and opportunities associated with climate change.

From the perspective of the WIFN it is probably desirable to have a broad “encompassing” view of climate change and keep a close watch on important community and ecosystem components that could be impacted by changes in climate. Long-term changes in climate, as well as potential changes in the frequency and severity of extreme weather-related events and their implications, are to be taken into account. Long-term gradual changes in temperature, precipitation and evaporation patterns are clearly to be considered, as are subsequent changes in water levels and flows, groundwater levels and soil moisture levels. Changes in habitats, and in the distribution and abundance of plants and animals can be expected although many specific changes will undoubtedly come as a surprise.

In dealing with an uncertain future, communities are obligated to make decisions as to the risks, benefits and costs when allocating resources to prepare for things that might or might not happen in a particular time period. This section, which draws largely on *Climate Change and Climate Variability: Adaptation Opportunities for the Walpole Island First Nation*, outlines actions the WIFN community could undertake to identify and prepare for the range of conditions expected to occur as a result of climate change. The information, which is summarized in Table 3, will inform and provide input to the more formal decision tools outlined in Section 5.

### 4.1 Develop and Maintain General Awareness

General awareness of the global and regional developments with respect to the climate change issue is a starting point for developing practical policies and measures that are applicable at a community level. Maintaining a general awareness of the climate change issue is a low cost and flexible approach that can provide context for understanding local changes that are observed or expected. Learning how other communities are preparing for and adapting to climate-influenced impacts can also provide ideas and insights that may be useful to the Walpole Island First Nation.

Potential actions include:

- Develop and maintain general awareness through public meetings, newsletters, the local radio station and school activities.
- Educate children and students; offer bursaries and scholarships in areas that are needed in the community to deal with anticipated changes.
- Appoint a community member to be responsible for keeping informed of the climate change issue, to prepare or arrange for the preparation of periodic reviews, and to arrange for information sessions and generally be a community resource with respect to understanding the issue and its potential implications for the community.
- Explore other First Nation initiatives that could serve as models for WIFN.

## **4.2 Utilize Traditional Ecological Knowledge**

One area where WIFN might take the lead in this “alerting” function could be in the development of TEK with respect to Walpole Island habitats, flora and fauna especially as it relates to long-term changes that have been observed. The value of current and future observations is much enhanced if information on past conditions is available to provide context.

Potential actions include:

- Compile, organize and disseminate TEK on the status and trends of important habitats, plants and animals of Walpole Island.
- Develop a photo archive of important habitats on Walpole Island, including new photographs that would be periodically taken at particular sites, to document and convey important changes in the Walpole Island ecosystem.
- Utilize Geographic Information Systems to convey long-term trends in land use and in land cover.
- Establish an interpretive centre to help collect and research historical changes and TEK in the WIFN. Engage the community in compiling research and traditional lore with respect to the Walpole Island ecosystem. A primary objective would be to capitalize on the wisdom and experience of elders and others persons with a long-term perspective on the changes that are taking place on Walpole Island. Input of persons directly dependent on agriculture, hunting, fishing and trapping could be an important input and perhaps an annual community consultation on the state of the Walpole Island ecosystem and its natural resources would be an appropriate means of documenting and recording this “traditional ecological knowledge” together with the science-based monitoring, research and surveys carried out on the Island.

## **4.3 Identify Opportunities for Partnerships and Cooperative Programs**

The WIFN has been very successful in developing partnerships with university and government research and monitoring agencies to develop greater understanding of the Walpole Island ecosystems and the stresses that are being placed on these systems. There are many other opportunities to develop cooperative programs to enhance the understanding of the climate change issue as it relates to Walpole Island.

Potential actions include:

- Develop a compendium of completed studies that have applicability to the development of climate change responses.
- Develop a list of climate related “projects” that could be considered as the basis for masters or doctoral theses on Walpole Island and/or in the vicinity. Those that would attempt to relate current conditions to previous and potential conditions could be particularly relevant to the climate change issue. Potential candidates might include:
  - Distribution, abundance and ecological significance of invasive alien flora in selected Walpole Island ecosystems;
  - Distribution, abundance and ecological significance of invasive alien fauna in selected WIFN ecosystems;
  - Distribution, abundance and habitat requirements of one or more of the species at risk; and

- Distribution and abundance of particular groups of organisms on the Island or in particular habitats. Perhaps reptiles and amphibians, fish or mollusks would be reasonable candidates.

#### **4.4 Future Scenarios and Detailed Projections for Walpole Island**

The community may wish to have more detailed projections made as to future climate change and climate variability on Walpole Island. It may be that this possibility will become more feasible in conjunction with the accumulation of more and better information on local variables and local conditions. The community will need to periodically assess whether the reliability of projections for local conditions as well as the costs involved are likely to be worth the additional understanding that might result.

Potential actions include:

- Arrange to have a periodic (perhaps every 10 years) review of documented and projected regional and global changes in climate and climate variability and to compare this with local information that becomes available. These sources of information would then provide the basis for an updated assessment of potential implications for Walpole Island.
- Arrange, periodically, to have one or more detailed computer simulations of the Walpole Island region done using global circulation models that are then in use.
- Develop a simulation game for the WIFN to simulate interactions between, climate change, climate variability, and implications for the Walpole Island ecosystem with and without selected adaptation measures. The purpose of such a simulation game would to facilitate a better understanding of the possible environmental, economic, and human welfare outcomes of adopting different adaptation options in response to concerns over future changes in climate and climate variability.
- A computer simulation model available on the Internet predicted that the climate at WIFN would be similar to that in an area of Tennessee near Memphis. A group from WIFN could visit this area to observe first-hand how Walpole Island could look in the future (e.g. agriculture, wetlands, housing, building standards for infrastructure and roads, health concerns, etc.).

#### **4.5 Community-based Monitoring**

An effective way of developing and maintaining community interest in the climate change issue could be to identify a number of climate-sensitive indicators of change that would form the core of a community-based monitoring program. Ideally these indicators will be seen as important and valued components or characteristics of the Walpole Island ecosystem, and could be observed and documented without special technical measurements. For example, agreement on “seasonal signals” (e.g. freeze-up and break-up of ice at particular locations; arrival date for selected species of migratory birds) that community members would agree to note and document would allow information to be accumulated over time.

A community-based monitoring system would provide the WIFN with an on-going source of information on important changes in the local ecosystem. Such an information base would greatly strengthen the community’s capacity to document important changes that are occurring to the Walpole Island ecosystem and would make it easier to demonstrate the relevance of the climate change issue to the community. The community has demonstrated a high level of environmental

awareness and concern. It also has an enviable record of developing partnerships with others to help document, understand and protect the Walpole Island ecosystem.

A range of activities can be considered with respect to developing a community-based monitoring system. The examples outlined below range from relatively simple to others that would require considerable planning and commitment of significant resources.

Potential actions include:

- Consult with the community to agree on a number of simple “*seasonal signals*” that individuals, WIFN officials, or community groups would agree to note and document so that a record of seasonal signals for the Island would, over time, be accumulated. Examples of such signals could include: freeze-up and break-up of ice at particular locations, dates for the flowering of selected wild plants, the hearing of spring mating calls of amphibians, arrival dates for selected species of migratory birds, and spawning dates for particular fish species. The development of a photo archive of particular habitats and locations could also provide a good basis for assessing changes in local habitats.
- Carry out retroactive analysis of climate related information that has been collected in the region to see if significant trends have occurred. Examples of such data sets could include: records of the numbers and timing of the annual harvest of waterfowl species, dates of opening and closing of ferry service to the United States on Walpole Island and upstream on the St. Clair River, trends in temperature, precipitation and the frequency of extreme events such as heat waves, air pollution alerts, extreme cold and severe storm events that may be detectable in meteorological data from nearby meteorological stations.
- Choose a number of important ecosystem variables to monitor/survey on a regular basis to assess the status and trends of these variables. These variables would normally include species and habitats that are of particular interest to the community. These variables might include: the extent and state of wetlands, the oak savannah, the tall grass prairie and the presence or abundance of selected sentinel species including existing and new invasive alien species. Water levels in Lake St. Clair, connecting channels, and drainage channels might also be candidates for monitoring.
- Coordinate, probably through the Heritage Centre, selected research and survey projects to assist in understanding the status of, and trends in, important valued components of the WIFN Ecosystem. Partners in these initiatives could include the Royal Ontario Museum, the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources, Environment Canada, Natural Resources Canada, universities, non-government organizations, foundations and consulting firms. It may also be feasible to establish a meteorological site on the Island to record temperature, precipitation, humidity, wind direction and speed, and perhaps even selected air quality and atmospheric deposition measurements.
- Establish WIFN as an important element in a national network established to monitor the status and trends of a variety of important environmental indicators. This would require consultation with other responsible agencies to explore the possible advantages and disadvantages for the WIFN to have its community-based monitoring program formally designated as a component of a national monitoring network. If this were to be the case, a formal agreement would be required, as would protocols with respect to the collection, quality control and quality assurance, analyses, reporting, storage, and access to monitoring information.
- Develop a comprehensive community-based monitoring strategy that incorporates some or all the above elements in order to guide future monitoring, research and survey efforts



and to provide information for decisions affecting land use and development on Walpole Island.

#### **4.6 Environmental Assessment**

Another option for the WIFN is to include the incorporation of climate change considerations in Environmental Assessments (EA), which are required when a federal authority is involved in a project. Information collected during the EA process relating to the impacts of climate change on a project can:

- Help proponents manage or reduce the potential risk posed by the impacts of climate change to their project;
- Assure community members that climate change implications are being considered in project planning;
- Provide the broader planning community with information that will broaden their adaptation planning framework; and
- Help decision makers address climate change implications in a risk management context.

EA can be an effective means to incorporate adaptation considerations into project planning. Scenarios based on climate model projections, existing climate data, local experiences and traditional ecological knowledge can contribute to the identification of climate change considerations and assist in decision-making. The consideration of climate change in EA can assist in the identification of best practices to adapt to the more frequent or intense extreme weather events, increases in mean temperature or altered precipitation patterns and amounts.

Strategic Environmental Assessment (SEA), a systematic, on-going process for evaluating the environmental effects and consequences of policy, planning or program proposals, can also be considered in undertaking adaptation assessments. SEA can be used to assist decision makers in promoting more sustainable forms of development by ensuring that the environmental implications of decisions are fully integrated and taken into consideration at the earliest possible stage in program and policy development.

Potential actions include:

- Ensure that the guidance provided by the Canadian Environmental Assessment Agency (CEAA) regarding climate change is taken into consideration in EAs.<sup>2</sup> The CEAA also has developed interim principles to account for Aboriginal Traditional Knowledge.
- Consider the use of SEA to encourage community planners to examine the sensitivity of local systems to weather-related and other natural disasters, assess the adaptive capacity of the regions and promote a range of adaptive or preventative measures to reduce the negative impacts of climate events. This approach will also capture events that are not directly correlative with climate change or that cannot be attributed to climate change, but may cause severe damage to natural or human systems. An example of an adaptation assessment is included in Appendix 3 and includes a series of specific questions to assist community planners in examining the impact of extreme weather events on programs and policies.

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<sup>2</sup> The CEAA's document, *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*, can be found at [http://www.ceaa-acee.gc.ca/012/014/a\\_e.htm](http://www.ceaa-acee.gc.ca/012/014/a_e.htm).



**Table 3: Community Initiatives to Adapt to Climate Change**

**Develop and Maintain General Awareness**

- Use public meetings, newsletters, local radio station and school activities to raise awareness.
- Offer scholarships in areas where research is required.
- Appoint a community member to keep informed on climate change.
- Explore other First Nation climate change initiatives.

**Utilize Traditional Ecological Knowledge (TEK)**

- Compile, organize and disseminate TEK.
- Develop a photo archive of important habitats.
- Utilize GIS to convey long-term trends.
- Establish an interpretive centre to help collect and research historical changes and TEK.

**Identify Opportunities for Partnerships and Cooperative Programs**

- Develop a compendium of completed studies that have applicability to climate change adaptation.
- Develop a list of adaptation “projects” that could be considered as the basis for masters or doctoral thesis.
- Identify opportunities with federal funding agencies to undertake community awareness raising, research, community-based monitoring.

**Future Scenarios and Detailed Projections for Walpole Island**

- Undertake a periodic review of documented and projected climate changes and compare to local information.
- Undertake computer simulations of the Walpole Island region.
- Develop a simulation game for WIFN to simulate interactions between climate and implications with and without adaptation measures.
- Visit areas where the climate is similar to that predicted for Walpole Island.

**Community-based Monitoring**

- Identify a number of simple “*seasonal signals*” (e.g. freeze-up and break-up of ice at particular locations, dates for the flowering of selected wild plants, the hearing of spring mating calls of amphibians, arrival dates for selected species of migratory birds) that community members would note and document so that a record would, over time, be accumulated.
- Carry out retroactive analysis of climate related information to see if significant trends have occurred.
- Choose a number of important ecosystem variables to monitor/survey on a regular basis; e.g. wetlands, the oak savannah, the tall grass prairie and alien species.
- Establish WIFN as an important element in a national network monitoring the status and trends of a variety of important environmental indicators.

**Environmental Assessment (EA)**

- Use guidance regarding climate change provided by the CEAA when undertaking EAs.
- Consider the use of Strategic Environmental Assessment to encourage community planners to consider the sensitivity of local systems to the impacts of climate change.

## 5.0 Incorporating Climate Change into Decision Making

Climate change is expected to impact on many aspects of social and economic endeavors in the WIFN, and adaptation decisions must account for individuals, institutions, the environment, business endeavors and economic development. This section of the guidance document sets out recommended actions, which build on the community-based activities outlined in Section 4. The recommended actions aim to educate and involve the broader community, and all actions are inter-dependent in ensuring that a path forward builds on the knowledge accumulated in the community and has broad acceptance. An overview of the recommended actions is included in Table 4 and explained in greater detail in this section.

**Table 4: Recommended Actions – Climate Change Adaptation**

<p><b>Short-term Actions (2 to 5 years)</b></p> <ol style="list-style-type: none"><li><b>1. Develop a Climate Change Adaptation Charter</b> (within 2 years)</li><li><b>2. Departmental Reporting on Actions to Meet Aims of Charter</b> (within 1 year of signing of Charter)</li><li><b>3. Develop a Community-based Monitoring Program</b> (fully instituted by year 4)</li><li><b>4. Strengthen Ties to Other Communities</b> (on-going)</li></ol>
<p><b>Long-term Actions (5-10 years)</b></p> <ol style="list-style-type: none"><li><b>1. Develop Adaptation Plan</b></li><li><b>2. Develop a 10 year snapshot of the status of climate change</b></li></ol>

### 5.1 *Climate Change Adaptation Charter*

The development of an overall climate change charter can raise awareness and guide the WIFN's development of further actions to address climate change adaptation. For example, an environmental or climate change charter affirming a commitment to work toward adapting to climate change may influence the community, leaders and planners to consider climate change in day-to-day activities and when making decisions that will have impacts over the short, medium and long-term. It is expected that this charter will be the first action for the community, and thus will provide an umbrella for other actions and decisions in the WIFN. As a short-term action, it is desirable that the Charter be formally adopted within two years.

A sample climate change charter has been developed and is included in Table 5. Note that this is an example and is included to assist WIFN community members in considering the development of a climate change charter. The Whitehorse Declaration on Northern Climate Change is included in Appendix 3 as an example.

**Table 5: Example of a Community Charter on Climate Change**

**The Council of the Walpole Island First Nation:**

Recognizing that a major continuing challenge for the WIFN is to recognize, manage and adapt to changes in the Walpole Island ecosystem;

Conscious of the need for the community to adapt to changing circumstances in a manner that conserves and protects the integrity of the ecosystem and is consistent with ecologically sustainable development;

Recognizing that climate change and climate variability are likely to be key drivers of change in the Walpole Island community;

Acknowledging that climate change will have effects on WIFN's economy, society, environment and ability to pursue traditional ways of life;

Acknowledging that evidence of global and regional climate change has increased dramatically;

Noting that the global circulation models that are being developed and used to explain past climatic conditions and to project future climatic conditions are being refined and improved;

Recognizing that global circulation models are projecting that global mean surface temperatures will be several degrees higher by the end of the 21<sup>st</sup> century;

Noting the evidence that climate variability and the incidence of some weather-related extreme events have increased and expecting that these trends will continue;

Recognizing the importance of being generally aware of global and regional trends and projections with respect to climate change and climate variability;

Recognizing the need for the WIFN to improve the capacity of the community to prepare for, recognize and adapt to changes in climate.

The Council of the WIFN shall:

- a) Endeavor to conduct, at approximately ten year intervals, comprehensive assessments of global and regional changes in climate noting in particular the effects that these changes have had or are likely to have on the WIFN ecosystem;
- b) Promote the development of a community-based monitoring system to provide documented information on the status of, and trends in, the Walpole Island ecosystem;
- c) Convene gatherings of elders, hunters, gatherers and other community members to discuss the status of, and trends in, the WIFN ecosystem with a primary focus being on indicators of climate change;
- d) Promote, within the WIFN community, the development and maintenance of a general awareness of climate change and its relevance to the community;
- e) Ensure that the WIFN is aware of federal and provincial climate change initiatives and that it is able to participate in those initiatives that are in the communities interests;
- f) Proactively seek to ensure that the WIFN is aware of projects and programs in Canada and the United States that have the potential to impact on the WIFN ecosystem and that any concerns of the WIFN are expressed in a responsible and effective manner;
- g) Share and exchange information on climate change initiatives with other First Nation and tribal communities in Canada and the United States so as to better encourage the development of informed and responsible approaches to the challenges and opportunities likely to arise as a result of climate change;
- h) Encourage the development of partnerships agreements with other entities interested in

- documenting and understanding the effects of climate change and climate variability on the WIFN ecosystem or on surrounding regions;
- i) Require WIFN departments to each prepare a report outlining how climate-change considerations are to be taken into account in planning and conducting departmental activities; and
  - j) Complete, by 2010, a climate change adaptation plan to guide community planning and response to changes in climate.

**5.2 Reporting on Actions to Meet the Aims of the Charter**

Departmental reporting to the Chief and Council on actions taken to meet the aims of the Climate Change Adaptation Charter will help to ensure that charter is considered in planning and programs. Reporting on an annual basis will assist community officials and planners in developing formal responses indicating how they expect to incorporate the charter into their decision-making. As a short-term action, the first reporting will take place within a year of formal adoption of the Charter.

**5.3 Develop a Community-Based Monitoring Program**

A community-based monitoring program will be an important component of the WIFN response to adapt to climate change. As discussed in Section 4.5, such a program would provide the community with an on-going source of information on important changes in the local ecosystem. The program could be developed in parallel with the Climate Change Adaptation Charter, as the community-based monitoring is expected to generate useful information regarding potential adaptation actions and encourage partnerships with other levels of government and universities. This area could potentially attract funding to the WIFN. It is expected that the community-based monitoring program will be fully instituted by year four.

**5.4 Strengthen Ties to Other Communities**

An important part of the Climate Change Adaptation Charter will be to encourage strengthened ties with other communities. As a leader in climate change adaptation, the WIFN may chose to participate in other projects in the region that have climate change impacts, or the WIFN may chose to intervene where appropriate in regional and national debates on adaptation issues. Outreach to other First Nations to share experience and actions could be considered by the WIFN, and the WIFN might establish ties with Native American Nations in areas where the climate is similar to what is predicted for the WIFN. Another option to consider is the establishment of a Canada-United States indigenous peoples dialogue, with the intent of encouraging a North American indigenous people’s charter on climate change adaptation. Such an activity would build on the work completed at the community level and could potentially attract funding. This strengthening of ties is expected to occur over the first five years of activities; such ties will assist the WIFN in becoming a leader in climate change adaptation, as well as presenting opportunities for further learning and dialogue.

**5.5 Climate Change Adaptation Planning Framework**

Over the longer term (five to 10 years), after the community has accumulated experience in the area of climate change adaptation, the WIFN might consider the development of an adaptation action plan or strategy, which could draw together various adaptation responses to expected



climate changes. An overall climate change adaptation planning framework could assess responses for a number of departments that offer services to the community that will be impacted by climate change. Or alternatively, the climate change agenda could be integrated into new strategies and frameworks as they are developed, or incorporated in existing strategies, such as the Capital Plan, which presents a community land use/development plan for the WIFN over a 20 and 50 year planning period.

Decision makers and planners will need to recognize those activities and decisions at risk from a changing climate, and to modify decision making accordingly. Many decisions will be driven by the need to reduce or manage anticipated climate risks because of the sensitivity of certain activities to climate variability. A planning framework, developed through extensive community consultation, can identify areas for action and assist with raising awareness. Consultation will be required to:

- Determine the key services provided by departments;
- Discuss the extent to which services are likely to be impacted by climate change and the nature and significance of any impacts;
- Explore what opportunities may be presented by the impacts of climate change (e.g. tourism, agricultural diversification);
- Identify and prioritize the key decisions that will need to be made with respect to impacts and opportunities and when these decisions will need to be made;
- Assess the level of uncertainty and risk; and
- Identify services where a coordinated response between departments will be required.

An example of an adaptation planning framework is included in Appendix 4, which provides an example of how First Nations could begin to analyze the issue of climate change adaptation, looking at expected impacts, possible actions, time frame and key partners.

## **5.6 Development a 10 Year Snapshot of the Status of Climate Change**

The development of a 10-year snapshot of the status of climate change will provide the basis for an updated assessment of climate change implications for Walpole Island as well as provide benchmarks for the community. To act effectively and make informed choices it is important that the WIFN stay current with respect to climate changes that are occurring. This snapshot will assist the community in determining appropriate adaptation options and assessing the benefits of previous actions and decisions.

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## Appendix 1: Useful Websites and Resources

A considerable body of information and published literature on climate change, and specifically adaptation issues, is in existence. Much of this can be accessed on general and specialized sites of the World Wide Web. The reader is therefore referred to the following sites for data and information to supplement the information provided in this document.

Canada's National Climate Change Process. This site is maintained by the National Climate Change Secretariat in Ottawa and contains a very comprehensive set of links to other federal government sites as well as provincial, U.S. and other international government bodies, international organizations, NGOs, academia and the research community.

<http://www.nccp.ca>

Natural Resources Canada hosts the main Government of Canada climate change impacts and adaptation Web site, which includes reports, fact sheets, presentations, papers, and links to other Web sites.

<http://adaptation.nrcan.gc.ca/>

Environment Canada climate change Web site

<http://www.ec.gc.ca/climate/>

Canada Country Study

<http://www.ec.gc.ca/climate/ccs>

Canadian National Assessment - *Climate Change Impacts and Adaptation: a Canadian Perspective*

[http://adaptation.nrcan.gc.ca/home2\\_e.asp?CaID=9&PgID=25](http://adaptation.nrcan.gc.ca/home2_e.asp?CaID=9&PgID=25)

Canadian Environmental Assessment Agency

<http://www.ceaa-acee.gc.ca>

Canadian Climate Impacts and Adaptation Research Network (C-CIARN)

<http://www.c-ciarn.ca/>

Intergovernmental Panel on Climate Change (IPCC)

<http://www.ipcc.ch>

United Nations Framework Convention on Climate Change (UNFCCC)

<http://www.unfccc.de>

United Nations Environment Program (UNEP)

<http://www.unep.ch>

United States Environmental Protection Agency

<http://www.epa.gov/globalwarming>

United States Global Change Research Program – US National Assessment

<http://www.usgcrp.gov/usgcrp/nacc/default.htm>.



## Appendix 2: Whitehorse Declaration on Northern Climate Change<sup>3</sup>

**Whereas** we recognize that residents of the Circumpolar North are witnessing disturbing and severe climatic and ecological changes; and

**Whereas** we recognize that this interdisciplinary issue requires an unprecedented level of collaboration by all nations and all sectors of their societies; and

**Whereas** we recognize that Northern residents need to take stronger measures to reduce their own greenhouse gas emissions, and we also recognize that, regardless of the success of these measures, the Circumpolar North will remain highly reliant upon global actions to reduce greenhouse gas emissions;

**Therefore**, we the undersigned participants at the Circumpolar Climate Change Summit, held in Whitehorse, Yukon, Canada, on March 19th to 21st, 2001, declare that the following actions need to be taken to address climate change and its impacts in the Circumpolar North:

1. We must develop a strong northern message on the effects of climate change and present this message nationally and internationally;
2. We must use local information and improve our scientific capacity to understand climate change impacts on northern ecosystems, economies, cultures, traditions and communities;
3. We must develop tools that will enable communities to better understand climate change, reduce their greenhouse gas emissions, and adapt to changing climatic and environmental conditions;
4. We must ensure that all new and existing policies, standards, regulations, legislation, and management agreements become consistent with the goal of reducing greenhouse gas emissions and our vulnerability to climate change;
5. We must establish effective incentives and remove the many barriers to improved energy efficiency and the widespread use of renewable energy; and
6. We must ensure that all institutions, businesses, governments, families and individuals take far stronger measures to reduce greenhouse gas emissions.

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<sup>3</sup> <http://www.taiga.net/nce/declaration/>

## Appendix 3: The Adaptation Assessment Form

The “Adaptation Assessment Form” presented below is designed to capture the outputs of each of the eight steps described in Section 4. This form will allow for the documentation of the factors considered in an adaptation assessment and the conclusions drawn. Any adjustments made to the initiative as a result of the assessment, prior to implementation or in the course of periodic review and evaluation, should be documented by updating the form.

### A. General Information

<b>Title of Project or Program</b>	
<b>Department</b>	
<b>Name of Officer</b>	
<b>Telephone</b>	
<b>Email</b>	

### B. Results of the Adaptation Assessment

<b>Step 1: Is consideration of adaptation planning appropriate?</b> <input type="checkbox"/>	<b>Yes</b>	<b>No</b>	<b>Unknown</b>
Does the proposed project or activity involve management of natural systems?			
Does the proposed project or activity involve natural resource development or exploitation?			
Does the proposed project or activity involve adjustments to socio-economic systems that could be affected by changes in the natural world?			
Does the proposed project or activity involve major capital construction?			
<b>Step 2: Is the geographic region of interest subject to extreme weather conditions (or other physical or biological extremes)?</b> <input type="checkbox"/>	<b>Yes</b>	<b>No</b>	<b>Unknown</b>
Wide seasonal fluctuations			
Temperature extremes			
Precipitation extremes			
Prolonged dry periods			
Intense wet periods			
Ecosystem sensitivity			
Others			

<b>Step 3: What extreme events may be anticipated in the geographic region as a result of these weather or other conditions?</b> <input type="checkbox"/>	<b>Yes</b>	<b>No</b>	<b>Unknown</b>
Storms and associated events			
Drought			
Flood			
Fire			
Landslides			
Biological plagues			
Mass die-offs or extinctions			
Others			
<b>Step 4: What is the scope of anticipated extreme events?</b> <input type="checkbox"/>	<b>Extreme Event 1</b>	<b>Extreme Event 2</b>	<b>Extreme Event 3</b>
Geographic Range: What is the total area in which the anticipated event likely to occur? Local, regional or widespread?			
Systems: What systems (natural, physical, human, socio-economic, etc.) are likely to be affected by the event?			
Magnitude: In qualitative terms, how large an effect will the event produce?			
Temporal Characteristics: Is the event expected to be long, short, repeated or intermittent in nature?			
Likelihood: What are the probabilities that the event will occur?			
Seasonality: When in the year is the effect likely to occur (rainy season, dry season, winter, ice break-up)? Will this season result in particularly adverse impacts on natural cycles or agricultural production?			
Reversibility: Can the event be reversed and systems returned to their previous state?			
What is the likelihood that the effect will actually occur (high, medium, low)?			
What is the potential for cumulative effects to occur (high, medium or low)? <input type="checkbox"/>			
If they occur how can they be characterized? - Short-term or long-term; permanent or temporary; direct or indirect			

<b>Step 5: What is the anticipated impact of the extreme event?</b> <input type="checkbox"/>	<b>Extreme Event 1</b>	<b>Extreme Event 2</b>	<b>Extreme Event 3</b>
<p>The likely areas of impact may include:</p> <ul style="list-style-type: none"> <li>- Natural ecosystem damage</li> <li>- Physical destruction (urban, rural, industrial infrastructure)</li> <li>- Human health (e.g. loss of life, disease, epidemics, sanitation)</li> <li>- Social system dislocation (e.g. homelessness, medical infrastructure, transportation, energy production and supply)</li> <li>- Disruption of food and waster supply systems</li> <li>- Loss or degradation of land</li> <li>- Other <input type="checkbox"/></li> </ul>			
<b>Step 6: What is the state of preparedness of the country or region for extreme events?</b> <input type="checkbox"/>			
<b>6.1: Preparedness</b>	<b>Yes</b>	<b>No</b>	<b>Unknown</b>
Are processes or protocols in place to allow governments, organizations and institutions to respond effectively to the impacts of anticipated natural disasters in the region?			
If such response structures and procedures are in place, can they be expanded to provide early warning of potential extreme events?			
Can the preparedness procedures be extended or adjusted further to include adaptive measures to prevent or reduce the impacts of natural disasters?			
If preparedness procedures are not in place, does the region have the institutional capacity to develop such tools?			
<b>Step 7: What adaptation measures could help to avoid or mitigate the negative impacts?</b> <input type="checkbox"/>	<b>Extreme Event 1</b>	<b>Extreme Event 2</b>	<b>Extreme Event 3</b>
<p>Initial areas of focus may include:</p> <ul style="list-style-type: none"> <li>- Forest management practices</li> <li>- Sustainable agricultural practices</li> <li>- Coastal zone management</li> <li>- Awareness raising</li> <li>- Land use planning for hazardous areas</li> <li>- Codes, guidelines and incentives</li> <li>- Institutional and policy capacity building <input type="checkbox"/></li> </ul>			

Step 8: What actions should be taken in post-assessment follow-up? <input type="checkbox"/>	Adaptation Measure 1	Adaptation Measure 2	Adaptation Measure 3
Questions			
How valid were the vulnerability and impact predictions?			
Were the proposed adaptive and preventative measures carried out?			
How effective were these measures?			
What was the general effectiveness of these measures?			
What further changes are needed to ensure adequate preparedness?			

## Appendix 4: The Adaptation Planning Framework – An Example<sup>4</sup>

An adaptation planning framework would include guidance for each department in the First Nation community, developed through a process of analysis and consultation. Consideration should be given to expected impacts, actions required to adapt or take advantage of opportunities, the time frame for the actions and key partners. It is important to note that this guidance is from the perspective of climate change adaptation, and in terms of implementation, issues will need to be considered alongside a number of other issues, including sustainability.

Action planning for climate change should use a range of time frames. Work to adapt to climate change can start in the present and should be a long-term process to be tackled in a strategic manner. Decision makers should consider timescales when developing actions:

- “Act immediately” should take place in the present, when decision makers are facing problems or when infrastructure is being taken regardless of climate change. Immediate action can deliver benefits under the present climate as well as future climate scenarios.
- “Plan for the future” should take place when major investments are being planned that have long time frames, particularly as these investments may require additional costs to ensure that future climate scenarios are accounted for. Planning for the future may also include actions to benefit from climate change, such as growing new crops and exploring new markets.
- “Keep a watchful eye on developments” should take place when not enough is known. Adapting to climate change is not always a simple decision and the WIFN should keep up to date about the impacts of climate change. Attending workshops and seminars can help to ensure that WIFN members are able to recognize impacts and adopt appropriate adaptation considerations in the provisions of services.

The development of an adaptation planning framework for the various WIFN departments (e.g. Housing, Lands, Farming, Public Works, Natural Resources, Health and Economic Development) would assist in identifying key actions, promote coordination between the departments, and assist in situating climate change adaptation considerations in the broader planning framework. It is important to note that while the scientific understanding of climate change and likely impacts is improving all the time, there will always be considerable uncertainty, especially in predicting local and regional impacts. The risks of climate change must be balanced against other factors and the costs implications of dealing with climate change impacts. Many actions present “no regrets” options and will lead to significant benefits that are unrelated to climate change. These actions should be priorities.

The following table provides an example of how the WIFN could begin to analyze the issue of climate change adaptation, looking at expected impacts, possible actions, time frame and key partners. This table is provided as a description only, with the actual development to take place through extensive consultation that draws on the knowledge and experience in the community.

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<sup>4</sup> This adaptation planning framework is influenced by the *Living with climate change in the East of England*, a study conducted the UK Climate Impacts Programme ([www.ukcip.org.uk](http://www.ukcip.org.uk)).

<b>AGRICULTURE</b>			
<b>Most Significant Likely Climate Change Impacts</b>	<b>Suggested Actions</b>	<b>Time Frame</b>	<b>Key Partners</b>
Lengthened growing season and need to irrigate in dry summers may result in higher costs for agricultural crops	Plan for and implement a gradual change to more drought resistant crops to cope with the increasing frequency of warmer, drier summers and droughts	Plan for the future	Economic Development
	Undertake close crop monitoring	Watch developments	
Changes in rainfall patterns could affect agricultural strategies	Improve drainage to prevent washouts in the spring	Act immediately	
	Consider whether guidance on fertilizer/pesticide applications is appropriate or will need to be reviewed	Watch developments / Plan for the future	
<b>ECONOMIC DEVELOPMENT</b>			
<b>Most Significant Likely Climate Change Impacts</b>	<b>Suggested Actions</b>	<b>Time Frame</b>	<b>Key Partners</b>
Changes in climate may increase demand for some products and services (e.g. tourism, fishing and hunting)	Examine opportunities for eco-tourism	Plan for the future	Natural Resources
	Consider the establishment of an interpretive centre to collect and record historical climate changes, while attracting tourists.	Plan for the future	
Water levels in Lake St. Clair expected to drop, water flow to be reduced, surface temperature higher and less ice cover	Work with stakeholders to examine impacts of water changes on hunting and fishing activities (including lodges)	Plan for the future	Sportsperson syndicates with lodges
	More dredging of navigation channels, ferry operations extended in spring and autumn	Plan for the future	Natural Resources
<b>HEALTH</b>			
<b>Most Significant Likely Climate Change Impacts</b>	<b>Suggested Actions</b>	<b>Time Frame</b>	<b>Key Partners</b>
In the longer term diseases caused by mosquitoes may become a public risk	Provide advice and preventative health care	Plan for the future	
	There may be an increase in deaths and injury as a result of extreme weather events	Improve maintenance regimes and building standards	Plan for the future
	Introduce better warning systems	Plan for the future	Emergency Services
There may be health impacts on workers resulting from warmer temperatures	Ensure opportunities for natural ventilation are incorporated; adjust time of outdoor work	Watch developments	Agriculture; Natural Resources; Public Works

<b>HOUSING</b>			
<b>Most Significant Likely Climate Change Impacts</b>	<b>Suggested Actions</b>	<b>Time Frame</b>	<b>Key Partners</b>
More frequent extreme weather events will add to costs resulting from damage to buildings	Examine building codes – encourage good design that accounts for climate change impacts	Act immediately	
Milder winters will reduce requirements for heating, but greater attention will need to be given to cooling	Ensure that maintenance and improvement of houses accounts for climate change impacts (e.g. incorporating balconies and other passive cooling, rainwater and greywater recycling; improving insulation  Provide information to homeowners that includes advice on how to make their homes more resilient to climate change impacts	Plan for the future  Plan for the future	Public Works
<b>NATURAL RESOURCES</b>			
<b>Most Significant Likely Climate Change Impacts</b>	<b>Suggested Actions</b>	<b>Time Frame</b>	<b>Key Partners</b>
Changes in water levels and temperature increases will affect habitats and species	Examine fishing species and seasons, patterns of migratory waterfowl  Develop biodiversity action plans and land management strategies to identify potential climate change impacts and ensure they are taken into account	Watch developments  Plan for the future	
Unique habitats and endangered species at greater risk; invasive alien species likely to be a major issue for both aquatic and terrestrial habitats	Monitor growth of invasive species and ensure time and monetary resources are allocated to respond to invasive alien species	Plan for the future/ Watch developments	
<b>PUBLIC WORKS</b>			
<b>Most Significant Likely Climate Change Impacts</b>	<b>Suggested Actions</b>	<b>Time Frame</b>	<b>Key Partners</b>
Increased damage to buildings, roads, etc. because of extreme weather events	Adapt buildings to make more resilient to expected impacts  Develop risk management plan	Plan for the future Act immediately	
There is likely to be an increase in costs and demands for emergency services as a result of extreme weather events.	Ensure the allocation of resources for emergency planning match the changing level of risk associated with climate change  Ensure emergency equipment is updated to meet increased risk  Update the emergency plan	Act Immediately  Act Immediately  Act Immediately	Economic Development