

THE CLIMATE DATA

OCCAR

for the Georgina Island First Nation Climate Change
Adaptation Project

□ Shanty Bay 1973 to 2012

Season	Max Temp (°C)	Min Temp (°C)	Mean Temp (°C)	Total Precipitation (mm)
Winter	2.5	2.7	2.6	38
Spring	1.5	0.3	0.9	14
Summer	1.4	1	1.1	13
Fall	2.1	1	1.6	4
Annual	2	1.1	1.6	32

- Ensemble projection of 24 global climate models
- For the 2050s (2041-2070)
- Based on 1961-1990
- High emissions scenario based on SRES-A1B
- Low emissions scenario based on SRES-B1
- Medium emissions scenario based on the combination of A1B and B1

	Change in Air Temperature (°C)			Change in Precipitation (%)		
	Low	Medium	High	Low	Medium	High
Annual	2.3	2.7	3	5.15	5.45	10.76
Winter	2.5	3	3.4	9.38	10.19	10.76
Spring	2.2	2.5	2.8	8.58	9.1	9.65
Summer	2.2	2.6	2.9	0.92	0.11	-0.62
Fall	2.3	2.6	2.8	3.06	3.79	3.85

- Statistical Downscaling
- Probabilistic climate change projections of three 30 year time periods
 - ▣ 2030s (2020-2049)
 - ▣ 2050s (2040-2069)
 - ▣ 2080s (2070-2099)
- Baseline 1968-1998
- 16 climate variables, 3 temporal averages (month, season, year)
- PRECIS model (Providing Regional Climates for Impact Studies)

- PRECIS is an atmospheric and land surface model of limited area and high resolution
- Probabilistic Projections:
 - ▣ Projections expressed as cumulative probability levels
 - ▣ 10%
 - ▣ 50%
 - ▣ 90%
 - If values of T change at probability 10% is 2.5°C, and at 90% 3.8° - then that means that there is a 10% probability of the temperature changes being less than 2.5; and a 90% probability of the temperature change being less than 3.2

Variable	Unit	Change	Temporal averaging
Mean daily temperature	°C	°C	Month, season, year
Mean daily maximum temperature	°C	°C	Month, season, year
Mean daily minimum temperature	°C	°C	Month, season, year
99th percentile of daily maximum temperature	°C	°C	Season
1st percentile of daily maximum temperature	°C	°C	Season
99th percentile of daily minimum temperature	°C	°C	Season
1st percentile of daily minimum temperature	°C	°C	Season
Precipitation rate	mm/day	%	Month, season, year
99th percentile of daily precipitation rate	mm/day	%	Season
Specific humidity	g/kg	%	Month, season, year
Relative humidity	%	% (of%)	Month, season, year
Total cloud	Fraction	%	Month, season, year
Net surface long wave flux	W/m ⁻²	W/m ⁻²	Month, season, year
Net surface short wave flux	W/m ⁻²	W/m ⁻²	Month, season, year
Total downward short wave flux	W/m ⁻²	W/m ⁻²	Month, season, year
Mean sea level pressure	hPa	hPa	Month, season, year

Variable (change in)	Year	Winter		
		p10	p50	p90
Mean Daily T (°C)	2040-2069	1.6	4.0	5.1
Mean Daily Max T (°C)		1.5	3.6	5.0
Mean Daily Min T (°C)		1.7	4.3	5.3
Precipitation rate (%)		3.7	15.3	32.7

Variable (change in)	Year	Spring		
		p10	p50	p90
Mean Daily T (°C)	2040-2069	1.5	3.3	4.0
Mean Daily Max T (°C)		1.5	3.5	4.0
Mean Daily Min T (°C)		1.5	3.1	3.9
Precipitation rate (%)		3.1	9.7	20.8

Variable (change in)	Year	Summer		
		p10	p50	p90
Mean Daily T (°C)	2040-2069	1.8	4.0	4.9
Mean Daily Max T (°C)		1.8	4.2	5.2
Mean Daily Min T (°C)		1.9	4.0	4.7
Precipitation rate (%)		-6.4	-5.7	24.1

Variable (change in)	Year	Fall		
		p10	p50	p90
Mean Daily T (°C)	2040-2069	1.6	3.7	4.2
Mean Daily Max T (°C)		1.7	3.7	4.5
Mean Daily Min T (°C)		1.6	3.7	4.1
Precipitation rate (%)		-3.8	-4.0	6.9

Variable (change in)	Year	Year		
		p10	p50	p90
Mean Daily T (°C)	2040-2069	1.7	4.0	4.5
Mean Daily Max T (°C)		1.7	4.1	4.6
Mean Daily Min T (°C)		1.7	3.9	4.4
Precipitation rate (%)		-1.2	5.6	16.6

- Dynamical downscaling
- CCSM, WRF, FLake
- IPCC SRES A2 scenario
- Changes in temperature for 2050-2060 period relative to 1979-2001
 - 2 to 3°C in S Ontario
 - Changes in precipitation for 2050-2060 relative to 1979-2001

Gula and Peltier

Variable (change in)	Year	WRF		
		Annual	Winter	Summer
Changes in mean T	2050-2060	2.5 to 3°C	2.5 to 3.5°C	2 to 3°C
Changes in Precip		-10 to 10%	-5 to 5%	0 to -20%
Changes in snow		-15 to 20%		

Gula and Peltier, 2012

Dynamical Downscaling over the Great Lakes Basin of North America Using the WRF Regional Climate Model: The Impact of the Great Lakes System on Regional Greenhouse Warming

Comparison

Researcher	Variable	Winter	Spring	Summer	Fall	Annual
CCCSN	Change in mean Temperature (°C)	3	3.4	2.8	2.9	2.8
Huang		4 (1.6 - 5.1)	3.3 (1.5 - 4.0)	4.0 (1.8 - 4.9)	3.7 (1.6 - 4.2)	4.0 (1.7 - 4.5)
Gula and Peltier		2.5 - 3.5		2-3		2.5 - 3
CCCSN	Change in Precipitation (%)	10.76	9.65	-0.62	3.85	10.76
Huang		15.3 (3.7 to 32.7)	9.7 (3.1 to 20.8)	-5.7 (-6.4 to - 24.1)	-4.0 (-3.8 to 6.9)	5.6 (-1.2 to 16.6)
Gula and Peltier		-5 to 5		0 to -20		-10 to 10

- Temperature (°C) projected to increase for all seasons and all projections (2050s)
- Projections of precipitation (%) varies depending on source of data (2050s)