

Climate Data for Agriculture

Nova Scotia data requested by Farmers for Climate Solutions

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Introduction

This document contains localized climate projections for the province of Nova Scotia and its eighteen individual counties, presented in a brief and accessible format. The information covered here includes highlights and key findings from updated climate projections prepared through the provincial climate change risk assessment conducted by Nova Scotia Environment & Climate Change. Data for additional indices or scenarios are available upon request, and will be made publicly accessible through the Government of Nova Scotia in the coming months.

This scientifically sound, locally relevant information is a starting point for understanding how climate change is expected to impact infrastructure, ecosystems, public health, the economy, and ways of life in the region. The information included here was requested by Farmers for Climate Solutions, and as such focuses on some key variables of interest to the agriculture sector. Ultimately this data reinforces the need for both climate change mitigation and adaptation in order to address climate risks and take advantage of potential opportunities.

The data presented here are based on model runs for a high emissions scenario (RCP8.5) from the Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report (AR5) from 2013, with the outputs from these global climate simulations statistically downscaled by the Pacific Climate Impacts Consortium (PCIC) to better account for local geography and climate patterns. The IPCC recently released their Sixth Assessment Report (AR6) in 2021, and that updated data is in the process of being downscaled across Canada. Early analysis indicates that the AR6 results represent an exacerbation of the trends discussed here. Compared to the AR5 data, AR6 shows some potentially notable increases in (and earlier onset of) warming, hydrologic cycle extremes, and sea level rise further into the century. The projections used by Nova Scotia will continue to be updated as data from AR6 (and other future assessments) becomes more accessible, to ensure that we are consistently using the best available science and do not underestimate the speed and severity of projected climatic changes.

It should be acknowledged that there are sources of uncertainty in climate projections, which stem from the chaotic nature of the climate system, limitations of computer models, and the actions that humans may take to mitigate greenhouse gas emissions in the coming years. However, after decades of research and observation, the consensus is that we have enough information to effectively take action. When planning for adaptation, building an understanding of the major regional climate change trends is a useful place to start.

Climate Change Projections

The evidence is clear – Nova Scotia's climate is changing. Analysis of local climate change projections and literature has identified how the province's climate is expected to change over the coming decades. The major climate change trends for the province are outlined below, followed by climate projections specific to each county in Nova Scotia.

Temperatures are continuing to rise.

Average annual temperature is projected to increase 2.6°C by mid-century and 4.5°C by the end of the century. More frequent extreme heat will make days and nights more uncomfortable, drought and wildfire more likely, and average winter temperatures may rise above freezing.

Precipitation patterns are changing.

Warmer temperatures will mean less snow and more rain, while rainfall events are also increasing in intensity. Total annual precipitation will likely increase, but more of that water will evaporate in warmer air or run off in more intense downpours. Risks of flooding and erosion are likely to increase.

Storms will be more frequent and more intense.

Warming oceans will enable tropical storms to track further north without losing strength, bringing higher peak wind speeds and more powerful storm surges. It will be more likely for larger storms to impact the province.

Sea levels are rising.

Projections for Nova Scotia indicate an increase of up to 1 metre in relative sea level by the end of the century. Higher sea levels have the potential to damage coastal communities and infrastructure, infiltrate freshwater supplies, and threaten sensitive coastal species and ecosystems. Storm surge and high tides will be more impactful with rising seas.

Ocean conditions are changing.

Sea surface and deep-water temperatures are increasing, ocean waters are becoming more acidic, dissolved oxygen levels are decreasing, and ocean currents could weaken due to the changing physics and chemistry of ocean waters. These changing conditions will likely make it harder for current ocean life and coastal ecosystems to thrive.

Regional Variability

Annual mean temperature: 1981-2010 (RCP8.5, median of 27 GCMs)



Annual mean temperature: 2065-2095 (RCP8.5, median of 27 GCMs)







Annual total precipitation: 2065-2095 (RCP8.5, median of 27 GCMs)





Growing season length: 1981-2010 (RCP8.5, median of 27 GCMs)

Growing season length: 2065-2095 (RCP8.5, median of 27 GCMs)



Annapolis County



Climate Change Projections for Annapolis County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	4.8°C	6.0°C	7.2°C	9.1°C
Avg. summer temperature	17.5°C	18.9°C	20.1°C	22.1°C
Very hot days (> 29°C)	2.7 days	8.8 days	18.9 days	41.4 days
Very cold days (< -15°C)	12.7 days	5.8 days	2.1 days	0.1 days
Precipitation				
Precipitation (spring)	302 mm	319 mm	329 mm	348 mm
Precipitation (summer)	251 mm	256 mm	257 mm	268 mm
Agriculture				
Frost free season length	157 days	176 days	193 days	220 days
Growing season length	205 days	219 days	233 days	257 days
Growing degree days (5°)	1819	2114	2388	2877
Growing degree days (10°)	920	1149	1351	1721

Antigonish County



Climate Change Projections for Antigonish County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	3.3°C	4.6°C	5.8°C	7.8°C
Avg. summer temperature	17.1°C	18.5°C	19.7°C	21.9°C
Very hot days (> 29°C)	3.5 days	8.6 days	17.3 days	37.4 days
Very cold days (< -15°C)	17.9 days	10.3 days	4.9 days	1.0 days
Precipitation				
Precipitation (spring)	287 mm	308 mm	316 mm	330 mm
Precipitation (summer)	262 mm	271 mm	273 mm	mm
Agriculture				
Frost free season length	158 days	175 days	191 days	218 days
Growing season length	194 days	209 days	222 days	247 days
Growing degree days (5°)	1719	1987	2255	2735
Growing degree days (10°)	863	1070	1273	1633

Cape Breton County



Climate Change Projections for Cape Breton County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	2.9°C	4.2°C	5.4°C	7.3°C
Avg. summer temperature	16.4°C	17.8°C	19.0°C	21.1°C
Very hot days (> 29°C)	0.5 days	2.3 days	6.6 days	21.4 days
Very cold days (< -15°C)	8.4 days	3.4 days	1.3 days	0.1 days
Precipitation				
Precipitation (spring)	331 mm	357 mm	361 mm	382 mm
Precipitation (summer)	270 mm	278 mm	284 mm	289 mm
Agriculture				
Frost free season length	175 days	193 days	211 days	238 days
Growing season length	193 days	209 days	225 days	252 days
Growing degree days (5°)	1622	1885	2143	2634
Growing degree days (10°)	785	977	1174	1539

Colchester County



Climate Change Projections for Colchester County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	3.9°C	5.1°C	6.4°C	8.3°C
Avg. summer temperature	17.3°C	18.8°C	19.9°C	22.1°C
Very hot days (> 29°C)	3.7 days	10.9 days	21.7 days	43.8 days
Very cold days (< -15°C)	24.5 days	15.8 days	8.3 days	2.2 days
Precipitation				
Precipitation (spring)	283 mm	298 mm	308 mm	327 mm
Precipitation (summer)	249 mm	254 mm	256 mm	270 mm
Agriculture				
Frost free season length	141 days	162 days	179 days	204 days
Growing season length	195 days	210 days	224 days	246 days
Growing degree days (5°)	1756	2036	2300	2779
Growing degree days (10°)	893	1109	1306	1672

Cumberland County



Climate Change Projections for Cumberland County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	4.0°C	5.3°C	6.6°C	8.5°C
Avg. summer temperature	17.4°C	18.9°C	20.1°C	22.3°C
Very hot days (> 29°C)	2.5 days	8.7 days	19.5 days	41.4 days
Very cold days (< -15°C)	24.7 days	14.7 days	7.6 days	1.6 days
Precipitation				
Precipitation (spring)	271 mm	285 mm	298 mm	315 mm
Precipitation (summer)	240 mm	249 mm	249 mm	261 mm
Agriculture				
Frost free season length	150 days	169 days	185 days	210 days
Growing season length	197 days	211 days	225 days	246 days
Growing degree days (5°)	1775	2066	2335	2828
Growing degree days (10°)	907	1136	1334	1718

Digby County



Climate Change Projections for Digby County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	5.0°C	6.3°C	7.5°C	9.3°C
Avg. summer temperature	16.7°C	18.1°C	19.3°C	21.2°C
Very hot days (> 29°C)	0.2 days	1.4 days	4.9 days	19.3 days
Very cold days (< -15°C)	5.8 days	2.2 days	0.6 days	0.0 days
Precipitation				
Precipitation (spring)	307 mm	322 mm	330 mm	348 mm
Precipitation (summer)	248 mm	251 mm	249 mm	260 mm
Agriculture				
Frost free season length	174 days	193 days	211 days	238 days
Growing season length	212 days	228 days	244 days	273 days
Growing degree days (5°)	1752	2052	2341	2832
Growing degree days (10°)	827	1055	1264	1634

Guysborough County



Climate Change Projections for Guysborough County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	3.3°C	4.5°C	5.8°C	7.6°C
Avg. summer temperature	16.3°C	17.7°C	18.9°C	20.9°C
Very hot days (> 29°C)	0.7 days	2.6 days	7.0 days	22.1 days
Very cold days (< -15°C)	16.2 days	9.6 days	4.7 days	1.1 days
Precipitation				
Precipitation (spring)	319 mm	342 mm	350 mm	368 mm
Precipitation (summer)	283 mm	292 mm	294 mm	306 mm
Agriculture				
Frost free season length	159 days	177 days	194 days	221 days
Growing season length	196 days	211 days	226 days	251 days
Growing degree days (5°)	1630	1895	2162	2637
Growing degree days (10°)	779	982	1176	1526

Halifax County



Climate Change Projections for Halifax County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	4.1°C	5.4°C	6.6°C	8.4°C
Avg. summer temperature	16.9°C	18.3°C	19.5°C	21.4°C
Very hot days (> 29°C)	1.7 days	5.1 days	11.7 days	29.1 days
Very cold days (< -15°C)	16.0 days	9.5 days	4.6 days	0.9 days
Precipitation				
Precipitation (spring)	329 mm	349 mm	359 mm	380 mm
Precipitation (summer)	277 mm	283 mm	285 mm	300 mm
Agriculture				
Frost free season length	159 days	177 days	194 days	220 days
Growing season length	204 days	218 days	233 days	258 days
Growing degree days (5°)	1725	1995	2263	2740
Growing degree days (10°)	848	1058	1251	1606

Hants County



Climate Change Projections for Hants County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	4.5°C	5.8°C	7.0°C	8.9°C
Avg. summer temperature	17.7°C	19.1°C	20.3°C	22.3°C
Very hot days (> 29°C)	4.4 days	12.3 days	23.5 days	46.5 days
Very cold days (< -15°C)	17.9 days	9.8 days	4.5 days	0.7 days
Precipitation				
Precipitation (spring)	301 mm	320 mm	327 mm	349 mm
Precipitation (summer)	245 mm	249 mm	251 mm	265 mm
Agriculture				
Frost free season length	157 days	174 days	191 days	217 days
Growing season length	204 days	217 days	232 days	254 days
Growing degree days (5°)	1843	2130	2400	2888
Growing degree days (10°)	948	1173	1372	1747

Inverness County



Climate Change Projections for Inverness County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	2.4°C	3.7°C	4.9°C	6.9°C
Avg. summer temperature	16.3°C	17.7°C	18.9°C	21.1°C
Very hot days (> 29°C)	0.9 days	3.4 days	8.7 days	24.7 days
Very cold days (< -15°C)	12.9 days	6.4 days	2.7 days	0.4 days
Precipitation				
Precipitation (spring)	292 mm	311 mm	320 mm	336 mm
Precipitation (summer)	264 mm	272 mm	277 mm	285 mm
Agriculture				
Frost free season length	161 days	178 days	194 days	224 days
Growing season length	185 days	200 days	213 days	239 days
Growing degree days (5°)	1561	1820	2075	2548
Growing degree days (10°)	754	943	1139	1492



Climate Change Projections for Kings County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	4.6°C	5.8°C	7.1°C	8.9°C
Avg. summer temperature	17.8°C	19.2°C	20.4°C	22.4°C
Very hot days (> 29°C)	5.3 days	14.2 days	25.5 days	48.7 days
Very cold days (< -15°C)	16.0 days	7.9 days	3.1 days	0.2 days
Precipitation				
Precipitation (spring)	288 mm	305 mm	312 mm	332 mm
Precipitation (summer)	240 mm	245 mm	247 mm	258 mm
Agriculture				
Frost free season length	155 days	172 days	189 days	215 days
Growing season length	203 days	217 days	230 days	252 days
Growing degree days (5°)	1849	2143	2412	2902
Growing degree days (10°)	957	1187	1386	1764

Lunenburg County



Climate Change Projections for Lunenburg County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	4.8°C	6.0°C	7.2°C	9.0°C
Avg. summer temperature	17.6°C	19.0°C	20.2°C	22.1°C
Very hot days (> 29°C)	4.6 days	12.0 days	22.3 days	44.1 days
Very cold days (< -15°C)	14.8 days	8.0 days	3.5 days	0.4 days
Precipitation				
Precipitation (spring)	332 mm	353 mm	361 mm	382 mm
Precipitation (summer)	260 mm	265 mm	265 mm	277 mm
Agriculture				
Frost free season length	158 days	174 days	190 days	216 days
Growing season length	207 days	220 days	235 days	260 days
Growing degree days (5°)	1855	2142	2409	2894
Growing degree days (10°)	948	1172	1373	1736

Pictou County



Climate Change Projections for Pictou County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	3.6°C	4.8°C	6.1°C	8.0°C
Avg. summer temperature	17.3°C	18.8°C	20.0°C	22.1°C
Very hot days (> 29°C)	4.5 days	11.3 days	21.4 days	42.3 days
Very cold days (< -15°C)	22.9 days	14.1 days	7.2 days	1.8 days
Precipitation				
Precipitation (spring)	277 mm	294 mm	302 mm	319 mm
Precipitation (summer)	251 mm	258 mm	258 mm	271 mm
Agriculture				
Frost free season length	148 days	167 days	183 days	210 days
Growing season length	194 days	209 days	222 days	245 days
Growing degree days (5°)	1752	2024	2291	2768
Growing degree days (10°)	892	1102	1304	1665

Queens County



Climate Change Projections for Queens County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	5.1°C	6.3°C	7.5°C	9.3°C
Avg. summer temperature	17.4°C	18.8°C	19.9°C	21.8°C
Very hot days (> 29°C)	3.2 days	9.0 days	17.5 days	37.3 days
Very cold days (< -15°C)	11.7 days	6.3 days	2.7 days	0.3 days
Precipitation				
Precipitation (spring)	343 mm	362 mm	371 mm	391 mm
Precipitation (summer)	261 mm	266 mm	266 mm	278 mm
Agriculture				
Frost free season length	159 days	177 days	194 days	223 days
Growing season length	211 days	226 days	242 days	269 days
Growing degree days (5°)	1851	2148	2418	2903
Growing degree days (10°)	926	1154	1356	1719

Richmond County



Climate Change Projections for Richmond County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	3.0°C	4.3°C	5.5°C	7.4°C
Avg. summer temperature	16.2°C	17.6°C	18.8°C	20.8°C
Very hot days (> 29°C)	0.1 days	0.6 days	2.8 days	14.8 days
Very cold days (< -15°C)	8.0 days	3.3 days	1.1 days	0.0 days
Precipitation				
Precipitation (spring)	322 mm	345 mm	351 mm	371 mm
Precipitation (summer)	274 mm	282 mm	287 mm	293 mm
Agriculture				
Frost free season length	178 days	196 days	214 days	240 days
Growing season length	195 days	212 days	228 days	255 days
Growing degree days (5°)	1609	1878	2137	2629
Growing degree days (10°)	762	963	1155	1518

Shelburne County



Climate Change Projections for Shelburne County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	5.1°C	6.3°C	7.5°C	9.2°C
Avg. summer temperature	16.2°C	17.6°C	18.7°C	20.5°C
Very hot days (> 29°C)	0.3 days	1.4 days	4.0 days	13.7 days
Very cold days (< -15°C)	6.0 days	2.8 days	1.0 days	0.0 days
Precipitation				
Precipitation (spring)	332 mm	349 mm	357 mm	378 mm
Precipitation (summer)	256 mm	261 mm	258 mm	271 mm
Agriculture				
Frost free season length	175 days	194 days	211 days	239 days
Growing season length	216 days	233 days	251 days	282 days
Growing degree days (5°)	1726	2026	2299	2785
Growing degree days (10°)	787	1013	1215	1569



Climate Change Projections for Victoria County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	2.1°C	3.4°C	4.7°C	6.6°C
Avg. summer temperature	16.1°C	17.4°C	18.7°C	20.8°C
Very hot days (> 29°C)	0.7 days	2.9 days	7.4 days	21.8 days
Very cold days (< -15°C)	12.0 days	5.6 days	2.3 days	0.4 days
Precipitation				
Precipitation (spring)	319 mm	340 mm	347 mm	367 mm
Precipitation (summer)	269 mm	276 mm	282 mm	290 mm
Agriculture				
Frost free season length	161 days	179 days	194 days	223 days
Growing season length	182 days	196 days	209 days	236 days
Growing degree days (5°)	1509	1760	2013	2481
Growing degree days (10°)	720	902	1095	1445

Yarmouth County



Climate Change Projections for Yarmouth County

Climate Index	Baseline (1981-2010)	Early century (2015-2045)	Mid century (2035-2065)	End century (2065-2095)
Temperature				
Avg. spring temperature	5.2°C	6.4°C	7.5°C	9.3°C
Avg. summer temperature	16.2°C	17.6°C	18.8°C	20.6°C
Very hot days (> 29°C)	0.0 days	0.4 days	1.8 days	9.7 days
Very cold days (< -15°C)	3.9 days	1.5 days	0.3 days	0.0 days
Precipitation				
Precipitation (spring)	318 mm	332 mm	340 mm	360 mm
Precipitation (summer)	253 mm	256 mm	252 mm	266 mm
Agriculture				
Frost free season length	182 days	202 days	219 days	245 days
Growing season length	217 days	234 days	251 days	282 days
Growing degree days (5°)	1729	2030	2313	2803
Growing degree days (10°)	786	1013	1221	1579

Climate Indices

Average temperature: The average of the daily mean temperature for the season.

Very hot days: The number of days the daily maximum temperature exceeded 29°C.

Very cold days: The number of days the daily minimum temperature was below -15°C.

Precipitation: The total precipitation above 1 mm for the season.

Frost free season: The number of days between the last occurrence of minimum temperature less than 0°C and the first occurrence of minimum temperature less than 0°C.

Growing season: The number of days in the season between the occurrence of six days in a row of mean daily temperature above 5°C and the occurrence of six days in a row of mean daily temperature below 5°C.

Growing degree days: The accumulated total of degrees Celsius above a mean temperature threshold (e.g., 5°C or 10°C) over the year. For any day above the threshold, the temperature that is accumulated is just the amount over the threshold.

References

All information presented here is derived from the draft version of Nova Scotia's new provincial climate change risk assessment prepared by Nova Scotia Environment & Climate Change (forthcoming in 2022). Full methodology, including the list of the 27 models used and additional details on climate indices, can be found in Appendix B of the report.

Data Source:

Pacific Climate Impacts Consortium, University of Victoria (Feb. 2019). Statistically Downscaled Climate Scenarios. Downloaded from

https://data.pacificclimate.org/portal/downscaled_gcms/map/ in December 2019. Downscaled scenarios were constructed from 27 Global Climate Models (GCMs) and 2 Representative Concentration Pathways (RCPs) (van Vuuren et al., 2011) from CMIP5 (Taylor et al., 2012) using the BCCAQv2 downscaling method.