Understanding Climate Change Impacts in Relation to Wellbeing for Nova Scotia

Appendices to Final Synthesis Report

February 2022

Prepared for Nova Scotia Environment and Climate Change

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Nova Scotia Environment and Climate Change

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Appendix A – Technical Steps in Constructing the Wellbeing at Risk Index

Constructing the Wellbeing at Risk Index (WRI) involves several steps, all of which are associated with their own sets of assumptions. These steps were listed and described briefly in Table 5-4 in the Final Synthesis Report. Here, we provide further technical details on some of the steps. Note that we collected all raw data to develop indicators as either GIS shapefiles or tabular data from Census Canada and Engage Nova Scotia. Some of the spatial data required special preparation before it could be converted into indicators for each census division (CD) and these preparation steps are described in Section A.7.

A.1 Data treatment & analysis

The processing of the raw indicator data collected involved, first, identifying missing data, and second, computing a range of descriptive statistics (including mean, median, standard deviation, minimum and maximum values, interquartile range, standard deviation, skewness and kurtosis) to help identify outliers.

With the exception of data made available from the Quality of Life Initiative led by Engage Nova Scotia (in partnership with the Canadian Index of Well-Being framework developed by Dr Bryan Smale of the University of Waterloo), all other indicator data sets were complete for all 18 census divisions. The Engage Nova Scotia data set, however, did not include values for the Luneburg, Queens, and Yarmouth census divisions. We imputed the missing data for these CDs using multivariate regression, with the Akaike Information Criterion (AICc) used to select the best model across all possible combinations of independent variables. The AIC approach selects the model with the greatest explanatory power using the fewest number of independent variables (i.e., it favours parsimony).

Outliers in the indicator data were identified using two methods; (1) a box plot based on the interquartile range (IQR), where a data point is a low outlier if it is less than the first quartile minus 3 or a high outlier if it is greater than the third quartile plus 3; *and* (2) the absolute skewness and kurtosis.

As per OECD and JCR (2008), an indicator data set is considered to have outliers if absolute skewness is greater than 2.0 and kurtosis greater than 3.5. The following algorithms are used to identify low and high outliers in a data set:

Within a raw data set with outliers, individual values (x) of indicator (q) for Census Division c are identified as <u>low</u> outliers if either of the following criteria were met:

- $x_{q,c} < Q_1 - 2(Q_3 - Q_1)$ where Q_1 and Q_3 are the first and third quartiles of the q th indicator. In other words, the value x for Census Division c is a low outlier if it is below a multiple (2) of the inter-quartile range; or

- $x_{q,c} < \mu(q) - 3\sigma(q)$ where $\mu(q)$ and $\sigma(q)$ are the mean and standard deviation, respectively, of indicator q. In other words, the value x for Census Division c is a low outlier if it is below a multiple (3) of the standard deviation.

For high outliers, the criteria are analogous:

- $x_{q,c} > Q_1 - 2(Q_3 - Q_1)$ where Q_1 and Q_3 are the first and third quartiles of the q th indicator. In other words, the value x for Census Division c is a high outlier if it is above a multiple (2) of the inter-quartile range; or
- $x_{q,c} > \mu(q) - 3\sigma(q)$ where $\mu(q)$ and $\sigma(q)$ are the mean and standard deviation, respectively, of indicator q. In other words, the value x for Census Division c is a high outlier if it is above a multiple (3) of the standard deviation.

If either approach identified outliers in the indicator data, it was treated using a sequence of methods; first, a log transformation was applied to the data; and if outliers were still present following application of the above tests, Winsorisation was used confining low outliers to the 2.5th percentile value and high outliers to the 97.5th percentile value.

The WRI can be estimated using either treated or untreated indicator data. The main results provided in this report are based on treated data.

A.2 Normalization

Most indicators are measured in different units. A key step in the data preparation process is to transform the data so all indicators are expressed on a common scale free from units, which renders them comparable. Indicators are transformed to a common scale to avoid problems of trying to aggregate different units of measurement (such as population, vegetation cover, trees, roads, disposable income, educational attainment, etc.). The process of rendering indicators comparable, which is frequently called “normalization” (Nardo et al., 2005), is illustrated in **Error! Reference source not found.** for two indicators from the City of Edmonton’s Climate Risk Index.

There are a range of approaches to transform indicator values to dimensionless values, including simple ranking, percentile ranking, standardization (Z-scores), min-max (linear) rescaling, categorical scales, and distance-to-target (OECD and JCR, 2008). The two most commonly used approaches are standardization and min-max rescaling (Nardo et al., 2005; Bandura, 2006; and Gasser et al, 2020). Indices adopting hierarchical structures typically apply the latter approach, whereas indices adopting indictive designs informed by Principal Component Analysis or similar techniques tend to apply standardization (Tate, 2013). Given its hierarchical structure, min-max (linear) rescaling is used in the construction of the WRI.

A key advantage of min-max rescaling over standardization is that it widens the range of an indicator. This is important for indicators with a small range of values, since it allows differentiation between spatial units with similar levels of performance, increasing their influence on the overall index more so than would be the case with standardization. However, min-max rescaling is not appropriate in the presence of extreme values or outliers, which can distort the normalized indicator. Standardization is more robust to outliers than min-max rescaling. Outliers are necessarily treated during the previous step of the process, so this is less of a concern.

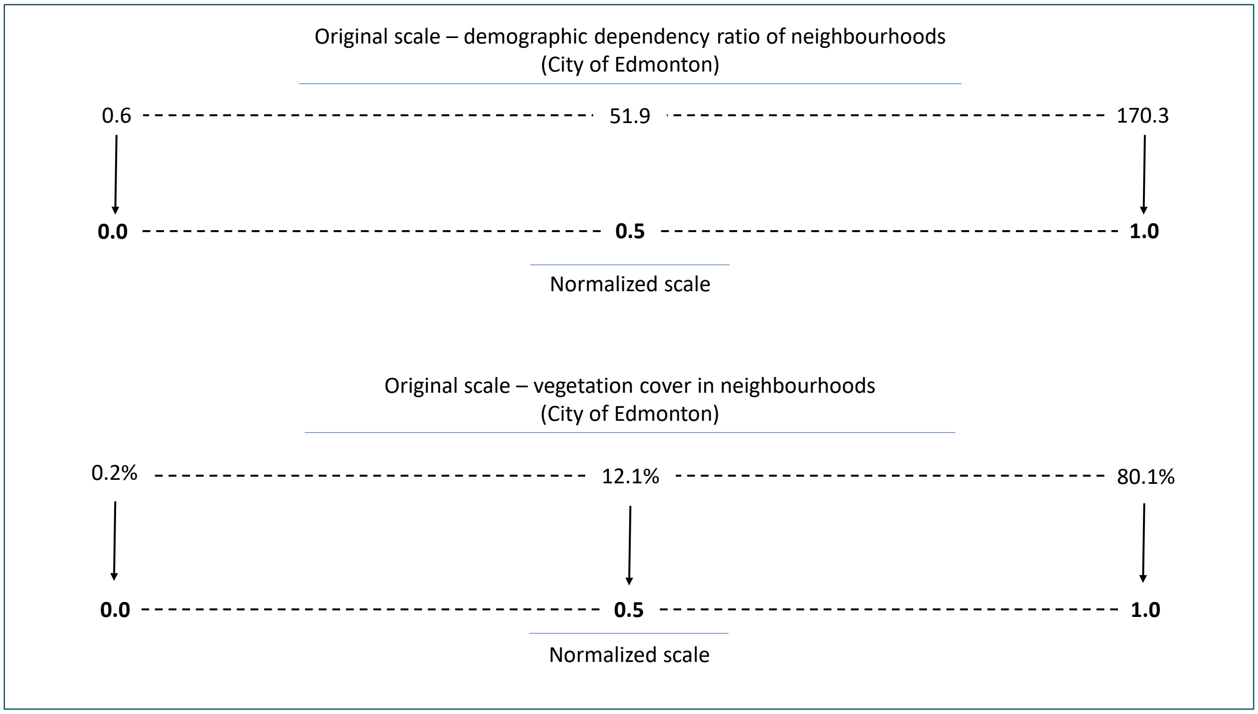

Figure 1. Illustration of normalization process for two indicators in the City of Edmonton Climate Risk Index.

With min-max rescaling a linear transformation is applied to normalize data relative to the global minimum and maximum in the data set. Typically, the rescaled data takes a value between 0-1, 1-10 or 1-100. Like the composite Index for Risk Management (InfoRM) of the Joint Research Centre of the European Commission (European Commission and JRC, 2014), we normalize indicators to the range of 1-10, as follows:

$$\hat{x}_{q,c}^{t} = a + \frac{x_{q,c}^{t} - min_c\left(x_q^t\right)}{max_c\left(x_q^t\right) - min_c\left(x_q^t\right)} \times (b - a)$$

Where a =1 and b =10. And:

$x_{q,c}^{t}$	=	Data point for the qth indicator for cth Census Division at time t.
$\hat{x}_{q,c}^{t}$	=	Normalized value for the qth indicator for cth Census Division at time t.
$min_c\left(x_q^t\right)$	=	Minimum value for the qth indicator across all census divisions $(c = 1, \ldots, 18)$ at time t.
$max_c\left(x_q^t\right)$	=	Maximum value for the qth indicator across all census divisions $(c = 1, \ldots, 18)$ at time t.

The direction of the transformed indicators matters and may need to be corrected, so that higher indicator values (closer to 10) correspond to worse conditions for the sub-index being measured (Climate Impact, Exposure, Vulnerability [Sensitivity and Low Coping Capacity]). For example, a high level of diversity in employment opportunities in a Census Division would have a low transformed value (closer to one), yet it is associated with low levels of sensitivity to hazards that disturb economic activity. Hence, it is necessary to make a directional adjustment to the transformed value for this indicator, so that a low transformed value for this indicator has a large (increasing) impact on Sensitivity Sub-index The value for directionally corrected (or inverted) indicators is found by subtracting the normalised indicator value from the maximum normalized value of the scale, which is 10:

$$\bar{\bar{x}}_{q,c}^{t} = 10 - \hat{x}_{q,c}^{t}$$

Where:

$\bar{\bar{x}}_{q,c}^{t}$	=	Inverted normalized value for the qth indicator for cth Census Division at time t

The directionally corrected normalized values, where required, are used in the calculations.

A.3 Weighting

When indicators, sub-pillars, pillars, and sub-indices are aggregated into a composite index like the WRI they are weighted in some way. Weights are essentially value judgements about the relative importance of different indicators and components of the index. Even the adoption of equal weighting does not imply no weighting; but rather that the weights are equal.

There are a range of participatory (normative), data-driven and hybrid approaches to generate indicator weights, but no consensus on the best approach (Nardo et al., 2005; and Decancq and Lugo, 2013). Most composite indicators, for practical reasons and in the absence of appropriate knowledge or statistical or empirical evidence, are based on equal weighting (OCED and JCR, 2008). Likewise, we apply equal weighting during the aggregation step to construct the WRI.

Due to the hierarchical design of the WRI, which aggregates multiple sub-pillars, pillars and sub-indices, implicitly assigning equal weights to individual indicators can lead to unequal weighting of individual components and an unbalanced structure for the WRI if the number of indicators in each component differs (OECD and JCR, 2008). To avoid this, we aggregate indicators first at the “disaggregate” then “aggregate” sub-pillar level, then the pillar level, and finally the sub-index level to the overall WRI.

A.4 Aggregation

For the reasons set out in Section **Error! Reference source not found.** and Box 1 in the main Synthesis Report, we use arithmetic (additive) aggregation throughout the WRI.

A.5 Assessment of statistical coherence

Following aggregation, it is necessary to assess the statistical coherence of the model by checking correlations between aggregation levels and the underlying indicators. This is accomplished by constructing correlation matrices between indicators, sub-pillars, pillars, sub-indices and the WRI.

Calculated correlations between indicators are checked for highly collinear indicators (with a correlation coefficient > +0.92)[1] and negative correlations, especially within the same sub-pillar. High correlations imply that the indicator pair is collinear—i.e., one indicator is a linear function of the other. Hence, when normalised they amount to the same indicator and including both in the same level of aggregation will double count (double weight) the same information. We address highly collinear indicators by either eliminating one of the indicators or assigning each a weight of 0.5. We also check calculated correlations between indicators for negative correlations that occur within the same sub-pillar as this implies that low values for one indicator are associated with high values of the other indicator. Negative correlations may suggest errors in the structure or calculations that need to be checked or imply trade-offs between indicators which may bias the sub-pillar score.

Calculated correlations between indicators and levels of aggregation and between levels of aggregation are also checked for anomalies, such as negative correlations and low (<+0.50) and extremely high positive correlations (>+0.92). Ideally, there should be significant positive correlations between indicators and the relevant sub-pillar and between higher levels of aggregation. Indicators should not, however, exhibit greater correlation with other sub-pillars than their own sub-pillar. This suggests the indicator might need to be moved to the other sub-pillar. Papadimitriou et al. (2019) consider a difference of 0.15 in correlation coefficients as indicative of an indicator that might belong to another sub-pillar; for example, this would be the case if an indicator had a correlation coefficient of 0.50 to its own sub-pillar compared to 0.65 with another sub-pillar. When considering correlations between levels of aggregation, values greater then 0.70 are desirable as this implies that (say) a pillar captures roughly 50% of the variation in the underlying sub-pillars and vice versa (Papadimitriou et al., 2019; and Papadimitriou and Giulio, 2019). Equally desirable is balance across correlation coefficients at a given level of aggregation. Ideally, the correlation coefficients at each level should be roughly similar as well as significantly positive. This ensures that each component makes a balanced contribution to the higher levels of aggregation. If the correlation coefficient of one component is much lower than that of other components, then the aggregate value will be unrepresentative of that component.

[1] This is the threshold used in statistical audits of the Sustainable Development Goals Index and the Equal Measures 2030 SDG Gender Index (Papadimitriou et al., 2019; and Papadimitriou and Giulio, 2019).

A.6 Sensitivity analysis & assessment of uncertainty

The development of the WRI, like all composite indices, involves many assumptions and subjective decisions—e.g., the design of the index, the selection and measurement of indicators, the approach to data normalization and aggregation, etc. Results and rankings may depend significantly on these choices. It is therefore advisable to test the robustness of the conclusions drawn from the index to the steps and assumptions underpinning its construction (OECD and JCR, 2008). The robustness of the index is best assessed using sensitivity analysis (Saisana et al., 2005) on the main sources of uncertainty, which can arise from some or all the steps in a model's construction (Saisana, 2008; and Saisana and Saltelli, 2010). For the WRI, these include:

- The formulation of the index;
- The selection of indicators;
- The treatment and editing of indicators;
- The normalization method;
- The choice of weights and aggregation scheme;

Sensitivity analyses are typically used to study how variation in the model's output is apportioned quantitatively to different sources of uncertainty, revealing what assumptions and decisions cause the most uncertainty and how those assumptions affect results (Saisana et al., 2005). **Due to resource constraints, it was not possible to perform a full sensitivity analysis of all key uncertainties for this report. The main sensitivity analyses we did perform pertain to uncertainties in the underlying climate data, which we assess by generating WRI results for RCP4.5 and RCP8.5 as well as for p05, p50, and p95.** The WRI Excel tool (provided to Nova Scotia Environment and Climate Change under separate cover) can be used to perform other sensitivity analyses if Nova Scotia Environment and Climate Change wishes to do a deeper dive into the effects of other key uncertainties on the model.

A.7 Special Data Treatments

Sea Level Rise Indicator

Ideally, developing a relative sea level rise exposure score for each Census Division (CD) would be done using province-wide 2D storm surge flood mapping for different sea level rise scenarios, overlaying building/structure maps on the flood maps, and calculating the area, number, or density of buildings exposed using map algebra. Since, no province-wide 2D storm surge flood mapping is available for Nova Scotia, we devised a method using a 10m elevation zone above sea level as our "exposure zone" per Manuel et al. (2016) and calculating the area of buildings/structures inside that zone. We then used the Geological Survey of Canada's Coastal Sensitivity Index (CSI) to capture the variation in coastal sensitivity within each Census Division (Manson et al. 2019). The CSI combines projected changes in sea level and wave heights with ground ice, surface material, slope, and tidal range to derive a sensitivity index for all of Canada. We averaged the CSI scores inside each Nova Scotia CD to get a CSI score per CD then multiplied this by the area of buildings inside the exposure zone of each CD to get a sea level rise exposure index. Since the CSI is only available for 2000s and 2090s, we used linear regression to interpolate CSI scores for the 2030s, 2050s, and 2080s. After calculating these final scores, we assigned a rank to each CD in each period. These ranks became inputs into the WRI.

Sensitive Habitat Indicator

We developed a sensitive habitat indicator for Nova Scotia using three spatial data sources:

Nova Scotia's Sensitive Habitats available at:
https://novascotia.ca/natr/Wildlife/habitats/hab-data/

Environment and Climate Change Canada's Critical Habitats available at:
https://open.canada.ca/data/en/dataset/b00a1126-fade-478e-acdd-c0972b4bbbcf

Nova Scotia Hydrographic Network's (NSHN) waterbody polygons available at:
https://nsgi.novascotia.ca/gdd/

After merging the provincial and federal habitat datasets, we used the NSHN data to help isolate marine, freshwater, and terrestrial habitats, which we then summarized by area (km^2) inside each Census Division (CD). Since marine habitats do not fall within CD boundaries, we devised a special method for approximating the area of marine habitat along the coastline of each CD. We first created a 10km buffer around Nova Scotia and calculated the total province-wide habitat, inclusive of marine habitat, within that buffer (5712.79 km^2). We then subtracted the area of freshwater and terrestrial habitat to get the total area of marine habitat (1762.97 km^2). Next, we estimated an approximate proportion of total marine habitat per CD using ArcGIS's Summarize Nearby function with a 5km buffer. This overestimates area because of overlap into other CDs, so we used it as only a relative value (%). Finally, we multiplied these proportions by the actual area of marine habitat to get a close approximation of the area of marine habitat per CD.

Dune/beach, Wetland, and Saltmarsh Indicators

We developed dune/beach, wetland, and saltmarsh indicators using two spatial data sources:

Nova Scotia Forest Inventory available at:
https://novascotia.ca/natr/forestry/gis/dl_forestry.asp

Nova Scotia Hydrographic Network's (NSHN) waterbody polygons available at:
https://nsgi.novascotia.ca/gdd/

We could summarize dune/beach and saltmarsh areas per CD directly from the Forest Inventory dataset, but the wetland dataset required some extra processing to separate it from salt marshes. We merged the wetland/saltmarsh data from the Forest Inventory with wetland data from the NSHN, extracted a separate saltmarshes layer from the Forest Inventory, then used the ArcGIS Erase function to remove saltmarshes from the merged data. The resulting shapefile represents wetlands from both the Forest Inventory and the NSHN data. We then used these data to calculate the area of wetland per CD.

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Appendix B – Climate Projections

Climate projections were developed for this project by Climatic Resources Consulting (CRC). Where possible, CRC followed the exact definition of climate indices used by the *Climpact2* tool (https://climpact-sci.org/assets/climpact2-user-guide.pdf). Any deviations from these calculations are noted below in the summary of indices. CRC validated computed indices by comparing the values for the grid cell containing Halifax with the indices computed by the online *Climpact2* tool (https://infoasis.shinyapps.io/climpact/). A walk-through of CRC's index-calculation program and validation is available by request.

Climate model projections for the province of Nova Scotia are based on outputs from an ensemble of 27 statistically downscaled General Circulation Model (GCM) projections (Pacific Climate Impacts Consortium - PCIC; pacificclimate.org) from the Coupled Model Intercomparison Project Phase 5 (CMIP; Taylor et al., 2012). The model output from the GCM sources is downscaled to a finer resolution using Bias Correction/Constructed Analogues with Quantile mapping recording (BCCAQ; Werner and Cannon, 2015). The daily temperature and precipitation data were bias corrected using daily gridded observations NRCANMet, which were produced by Natural Resources Canada (NRCan)(https://pacificclimate.org/data/statistically-downscaled-climate-scenarios). The data for the simulation period (1950-2100) is at a resolution of 300 arc-seconds or roughly 10 km. Data were downloaded from PCIC in December 2019. Models used were the RCP 4.5 and RCP 8.5 Bias Corrected (version 2) models. Datasets from PCIC include the following 27 GCMs for each RCP:

ACCESS1-0	FGOALS-g2	IPSL-CM5A-MR
bcc-csm1-1	GFDL-CM3	MIROC-ESM
bcc-csm1-1-m	GFDL-ESM2G	MIROC-ESM-CHEM
BNU-ESM	GFDL-ESM2M	MIROC5
CanESM2	HadGEM2-AO	MPI-ESM-LR
CCSM4	HadGEM2-CC	MPI-ESM-MR
CESM1-CAM5	HadGEM2-ES	MRI-CGCM3
CNRM-CM5	inmcm4	NorESM1-M
CSIRO-Mk3-6-0	IPSL-CM5A-LR	NorESM1-ME

Several of the climate indices were developed by CRC for multiple seasons. Where multiple seasons were provided, we indicate this in the indices summary below. The following key provides a definition for each season:

- **Annual:** January 1 through December 31.
- **Spring (Climatological):** Mar 1 through May 31
- **Summer (Climatological):** June 1 through August 31
- **Autumn (Climatological):** Sep 1 through November 30

- **Winter (Climatological):** December 1 through February 28
- **Winter (Extended):** November 1 through Feb 28
- **Heatwave Year:** May 1 through September 30
- **Coldwave Year:** November 1 through March 31

Note that the "Winter (Extended)" season was used for indices relevant for winter months to capture all the data for a contiguous winter season. "Heatwave Year" and "Coldwave Year" were used to capture data relevant to the heatwave and coldwave indices.

Nova Scotia census divisions were defined by shapefiles downloaded from Statistics Canada (https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2016-eng.cfm). The aggregation of indices within the boundaries was done by fitting the boundary to the grid cells of the models. That is, if a grid cell center was inside a census division, then it was assumed that the entire grid cell was within the boundaries of that division. This was deemed reasonable because census divisions are political boundaries, and do not necessarily reflect climatic regions.

B.1 Special data treatments

Special data treatments were required for sea level rise, wildfires, and precipitation and are described below:

Sea Level Rise Projections

Sea level rise (SLR) projections were developed for Canada by James et al., (2021). This information incorporates the most recent sea level projections from IPCC AR5 (Church et al., 2013a) which includes contributions from glaciers and thermo-steric expansion of the ocean. The local contributions to sea level rise associated with glacial isostatic adjustment were updated with the NAD83v70VG vertical land motion (Robin et al., 2020). Sea level projections are relative to the average sea level over the base period 1986-2005. The data from James et al., (2021) were provided as a series of geotiffs for the coastal areas of Canada. These data included projections of relative sea level rise for 2006, and the end of all decadal periods from 2010 through 2100, including the 5th percentile, median, and 95th percentile values.

CRC extracted SLR data from the geotiffs by finding the cells bounding the coastline of Nova Scotia, assigning these cells to their respective Census Division, and calculating statistics (minimum, mean, maximum) for each census division and for each percentile value. See Figure 2 below for an example of the coastline grid cells. Sea level rise around Sable Island was not included in any calculations.

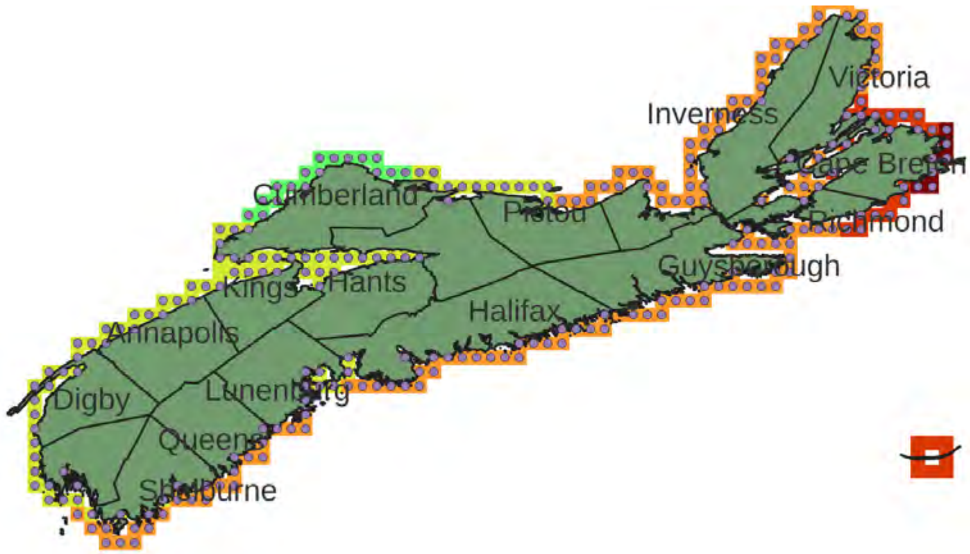

Figure 2. Example of sea level rise grid cells for the coastline of Nova Scotia.

Tables for the sea level statistics were created for each decadal data file, providing a time series of sea level rise for each census division. Additionally, an estimate of the 31-year rolling average of sea level rise for the 31 years ending in 2010, 2045, 2065, and 2095 were calculated by creating a linear fit to the time series data and interpolating to find the average. Results were provided as tables and maps. The result of the linear fits for estimating the 31-year rolling average had R^2 values very close to 1, indicating that the linear fit was accurate.

Note that the SLR data from James et. al. was interpolated onto a 0.1°×0.1° grid. Interpolating often smooths out local variability, so the results provided should be considered as a smoothed estimate of relative sea level rise. Also, the contribution to global sea level rise related to instabilities in the West Antarctic Ice Sheet (WAIS) are likely to be significant. However, projections of the response of the WAIS to anticipated warming involve large uncertainties. Further, the potential instability of the WAIS may be quite sensitive to how much global temperatures rise before 2100 (DeConto et al., 2020), which, in turn, is linked to significant uncertainties around which emissions pathway humanity follows over the coming decades. Lastly, because of the long response time of ocean waters and large ice sheets to warming, sea level rise will continue well beyond the end of this century. With continued unmitigated increases in global emissions, global seal level rise of more than 7 meters by 2300 cannot be ruled out (e.g., DeConto et al., 2021). Consequently, a prudent approach with respect to long-term coastal planning should consider low-likelihood, high-impact scenarios.

Wildfire Projections

The Canadian forest fire weather index system is a set of indices based on fuel volume, ‘wetness’, and weather (Van Wagner, 1987). To identify levels of fire danger, the Province of Nova Scotia directly uses the indices directly available at: https://novascotia.ca/natr/forestprotection/wildfire/forecasts.asp.

CRC used the modelled climate data and publicly available source code from Wang, et. al. (2015) to develop wildfire indices following the same approach. The method used by Wang, et. al. relies on a single-day snapshot of weather data taken at noon on that day, where the weather data are temperature, accumulated precipitation since noon the day before, relative humidity, and wind speed. The PCIC model data we used for this project were daily maximum temperature, daily minimum temperature, and accumulated precipitation. The daily maximum temperature was used to estimate temperature at noon. Daily precipitation was used to estimate accumulated precipitation from the day before, and relative humidity was estimated using the *Bosen* formula (Fredlund et. al., 2012):

$$relhum = 100 * ((T_d - 0.1\,T + 112) / (112 + 0.9\,T))^8$$

Where T is temperature and T_d is dew point temperature. Dew point temperature was estimated using the daily minimum temperature. Wind speed data were not available, so 15 km/h was used based on our review of monthly historical averages.

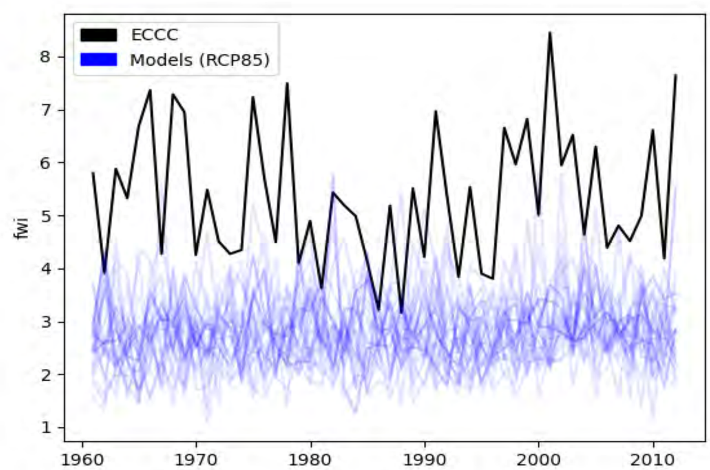

Figure 3. Average annual fire weather index (fwi) calculated from Environment Canada Data for Halifax Airport Hourly Data and modelled historical data (RCP 4.5).

Figure 3 above shows that there is an offset in the ECCC fire weather index (fwi) calculated from hourly historical data and the estimates produced by the RCP 4.5 models. The approximations of noon values with daily available values create an offset in the index and make the projections for this index uncertain. We recommend using data adjusted to the noon values for all variables instead of the daily values, which was not feasible within the scope of the current project. See discussion about Model Data Validation below. We recommend using adjusted data and using models that include wind speed, which was not feasible within the scope of the current project.

Precipitation (Intensity-Duration-Frequency Curves)

Intensity-duration-frequency (IDF) curves were updated for anticipated climatic conditions in the Nova Scotia during the 21st century using an online computerized IDF tool (Schardong et al., 2020). The updated IDF information is based on climate projections from the PCIC ensemble of downscaled, bias corrected climate models that are used for climate projections in this report. Future estimates of IDF information were generated for two greenhouse gas (GHG) emission pathways (RCP4.5 and RCP8.5) at three future time intervals: 2015-2045, 2035-2065, and 2065-2095. This information was compiled for one community in each of Nova Scotia's 18 census divisions. Future changes in precipitation relative to the base period of 1979 -2013 were calculated from the modeled historical data.

Intensity-duration-frequency (IDF) curves are based on sub-hourly rainfall intensities, down to the five-minute interval. Future projections for this project were required at the 15-minute interval. However, PCIC model projections are not available at sub-daily resolution, so the IDF tool uses a variety of statistical techniques to estimate the 15-minute intensity.

We were not able to obtain access to the full gridded IDF dataset from the authors; we were restricted to what the online tool provides. Unfortunately, the baseline period for modelled historical data of 1981-2010 was not available, hence the use of the 1979-2013 baseline. Further, the 1979-2013 baseline data were not from modelled historical data, but from one of two historical gridded products (NCARR, ERA-Interim). It is our opinion that this weakens the IDF results because we cannot provide a summary of the change in projected IDF curves that is consistent with the modelled results in the rest of the report. This limitation is in addition to the lack of census division level summaries.

IDF projections are still an area of emerging research. A complete and rigorous study of IDF projections for Nova Scotia would include:

- Further attempts to obtain all gridded data from the IDF tool authors, including the historical modelled baseline and
- Use of a 7% per degree increase in precipitation amounts that is discussed in Cannon et. al. (2020).

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B.2 Model Data Validation

Environment and Climate Change Canada (ECCC) maintains a set of Adjusted and Homogenized Canadian Climate Data (AHCCD) climate records that are quality controlled and are appropriate for use in climate research, including climate change studies. The PCIC model data used in this study (e.g., precipitation, maximum daily temperature) are estimates based on physically modelled processes over a fixed grid. This involves some aggregation and estimation because a single value must represent the value over an entire grid cell. Ideally, a close correspondence between the AHCCD timeseries and modelled historical timeseries would provide confidence in the model projections. However, when the grid cell encompasses varied terrain, elevations, hydroclimatic regions (to name a few) there may be an offset between the historical modelled data mean over the grid cell and the historical data collected at a local point. CRC’s validation of the various climate indices was based on comparison of modelled historical and AHCCD timeseries from the Yarmouth (southern), Halifax (central) and Sydney (northern) records, including aggregate statistics over time windows.

The following figures demonstrate the offset for historical data and the modelled data for some locations in Nova Scotia using a rolling 31-year average. For local applications (e.g. city level), modelled gridded data are usually adjusted to match historical point data using a delta method. This was not attempted in this project as the information in this project is provided at census-division level (which incorporate more than one grid point), and not at local point level. If climate indices from this project will be used at local level, we recommend to downscale the gridded data to the local point level using local historical observations for the point of interest.

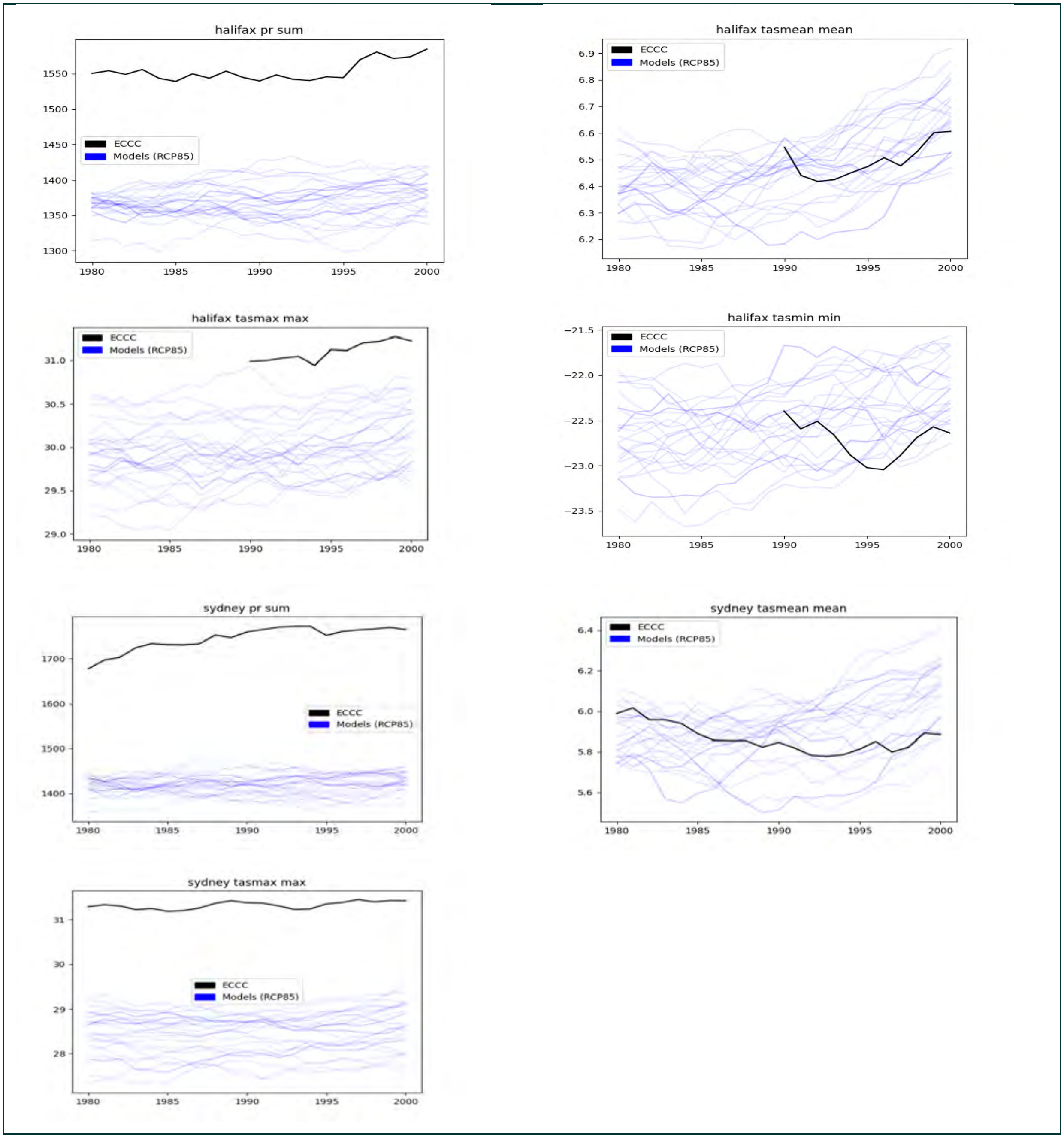

Figure 4. Comparison of offset between historical and modelled data for some locations in Nova Scotia (31-year rolling average).

B.3 Summary of climate indices

In the text that follows, the seasons are all *Climatological,* unless otherwise stated (e.g., Winter is Winter (Climatological)). The *Variable Name* is the label for cross-referencing purposes with the WRI. All indices indicate whether they were used for the WRI, including specific seasonal or threshold information. The summary below also indicates if the data will be available on the

Government of Nova Scotia's Open Data Portal. Variables and indices prepared for the Open Data Portal are available for each census division and for all Nova Scotia.

Accumulated Moisture
☒ WRI
☒ Open Data Portal
Season: Annual
Variable Name: am
The average estimated difference between total precipitation and evapotranspiration over a running total of 3 months. For each year, the difference between total precipitation and Thornthwaite potential evaporation is calculated for a three-month moving window. The annual value is the average over those 12 values.

Coldwave Frequency
☐WRI
☒ Open Data Portal
Season: Coldwave Year
Variable Name: cwf_tn10p
A baseline daily temperature is computed over the years 1981 through 2010. A coldwave occurs when there are three or more consecutive days below the 10th percentile baseline temperature. The *coldwave frequency* is the total number of days in all coldwaves over each season.

Coldwave Magnitude
☒ WRI (cwm)
☒ Open Data Portal
Season: Coldwave Year
Variable Name: cwm_tn10p
A baseline daily temperature is computed over the years 1981 through 2010. A coldwave occurs when there are three or more consecutive days below the 10th percentile baseline temperature. The *coldwave magnitude* is the average minimum temperature over the days in all coldwaves over each season.

Coldwave Number
☒ WRI (cwn)
☒ Open Data Portal
Season: Coldwave Year
Variable Name: cwn_tn10p
A baseline daily temperature is computed over the years 1981 through 2010. A coldwave occurs when there are three or more consecutive days below the 10th percentile baseline temperature. The *coldwave number* is the number of times this occurs over the period November 1 through March 31.

Consecutive Dry Days
☒ WRI (cdd)
☒ Website
Season: Annual
Variable Name: cdd
The maximum number of consecutive days over the season for which the precipitation was less than 1 mm.

Consecutive Hot Days
☒ WRI (chd)
☒ Open Data Portal
Season: Annual
Variable Name: chd
The maximum number of consecutive days over the season for which the maximum temperature was greater than 30°C.

Cooling Degree Days
☒ WRI (cdd18_ann)
☒ Open Data Portal
Season: Annual
Variable Name: cddcold18
The accumulated total of degrees Celsius above 18°C mean temperature over the season. For any day above 18°C, the temperature that is accumulated is just the amount over 18°C. If the temperature is less than 18°C, nothing is accumulated. E.g., a day of 20°C accumulates 2°C.

Critical Heat Days Duration
☒ WRI (chdd)
☒ Open Data Portal
Season: Annual
Variable Name: chdd
Maximum length of the number of spells when maximum temperature is above 29°C and minimum temperature is below 16°C.

Critical Heat Days Frequency
☒ WRI (chdf)
☒ Open Data Portal
Season: Annual
Variable Name: chdf
Total number of days over all spells when maximum temperature is above 29°C and minimum temperature is below 16°C.

Days with Rain

☒ WRI (dwr_win) (not Winter Extended)

☒ Open Data Portal

Season: Annual, Spring, Summer, Fall, Winter, Winter (Extended)

Variable Name: dwr

Number of days in a season for which the precipitation was above 1 mm and the mean temperature was above 0°C.

Days with Snow

☐ WRI

☒ Open Data Portal (not Winter Extended)

Season: Annual, Spring, Fall, Winter, Winter (Extended)

Variable Name: dws

The number of days for which there was more than 1 mm of precipitation when the mean temperature was less than 0°C.

Extreme Snow Days

☒ WRI (sd20)

☒ Open Data Portal

Season: Annual

Variable Name: sd

The number of days for which there was more than 20 mm of precipitation when the mean temperature was less than 0°C.

Frost-Free Season Length

☒ WRI (ff or freeze-free season length)

☒ Open Data Portal

Season: Annual

Variable Name: ff

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.

Frost Days

☒ WRI (frostdays)

☒ Open Data Portal

Season: Annual

Variable Name: frostdays

The number of days in the season for which the minimum temperature was below 0°C.

Growing Degree Days
☒ WRI (gddgrow5, gddgrow15)
☒ Open Data Portal
Season: Annual
Variable Name: gddgrow0, gddgrow5, gddgrow10, gddgrow15
The accumulated total of degrees Celsius above 0°C (5°C, 10°C, and 15°C), mean temperature over the season. For any day above the threshold, the temperature that is accumulated is just the amount over the threshold. Similar to Cooling Degree Days. In *Variable Name* the numeric suffix refers to the threshold temperature. E.g., gddgrow5 has a threshold temperature of 5°C.

Growing Season Length
☒ WRI (gsl)
☒ Open Data Portal
Season: Annual
Variable Name: gsl
The number of days in the season between the first 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.

Heating Degree Days
☒ WRI (hdd18_ann)
☒ Open Data Portal
Season: Annual, Winter (Extended)
Variable Name: hdd17, hdd18
The accumulated total of degrees Celsius below 18°C mean temperature over the season. For any day below 18°C, the temperature that is accumulated is just the amount under 18°C. The direct analogue of Cooling Degree Days.

Heatwave Frequency
☐ WRI
☒ Open Data Portal
Season: Heatwave Year
Variable Name: hwf_tx90p
A baseline daily temperature is computed over the years 1981 through 2010. A heatwave occurs when there are three or more consecutive days above the 90th percentile baseline temperature. The *heatwave frequency* is the total number days in all heatwaves over each season.

Heatwave Magnitude

☒ WRI (hwm)

☒ Open Data Portal

Season: Heatwave Year

Variable Name: hwm_tx90p

A baseline daily temperature is computed over the years 1981 through 2010. A heatwave occurs when there are three or more consecutive days above the 90th percentile baseline temperature. The *heatwave magnitude* is the average maximum temperature over the days in all heatwaves over each season.

Heatwave Number

☒ WRI (hwn)

☒ Open Data Portal

Season: Heatwave Year

Variable Name: hwn_tx90p

A baseline daily temperature is computed over the years 1981 through 2010. A heatwave occurs when there are three or more consecutive days above the 90th percentile baseline temperature. The *heatwave number* is the number of times this occurs over the period May 1 through September 30.

Ice Days

☐ WRI

☒ Open Data Portal

Season: Annual, Winter (Extended)

Variable Name: icedays

The number of days that the maximum daily temperature was below 0°C.

Maximum N-days Precipitation

☒ WRI (rx1day, rx5day)

☒ Open Data Portal

Season: Annual

Variable Name: rx1day, rx5day

The maximum rainfall that occurred over 1 and 5 consecutive days.

Maximum Daily Temperature

☒ WRI (txmax ann)

☒ Open Data Portal

Season: Annual

Variable Name: txmax

The highest maximum daily temperature over the season.

Average of Mean Daily Temperature
☒ WRI (tgmean_ann, tgmean sum)
☒ Website
Season: Annual, Fall, Spring, Summer, Winter
Variable Name: tgmean
The average of daily mean temperature over the season.

Mean of Maximum Daily Temperature
☒ WRI (txmean_sum, txmean_ann)
☒ Open Data Portal
Season: Annual, Summer
Variable Name: txmean
The average maximum daily temperature over the season.

Mean of Minimum Daily Temperature
☐ WRI
☒ Open Data Portal
Season: Annual
Variable Name: tnmean
The average minimum daily temperature over the season.

Minimum Daily Temperature
☒ WRI (tnmin ann)
☒ Open Data Portal

Season: Annual
Variable Name: tnmin
The lowest minimum temperature over the season.

Number of Days with Maximum Temperature Above a Threshold
☒ WRI (txg_hh(24.7), txg_lp(26.7), txgt_29)
☒ Open Data Portal
Season: Annual
Variable Name: txg24.7, txgt25, txg26.7, txgt27, txgt29, txgt30, txgt33
The number of days the daily maximum temperature exceeded the thresholds 25°C, 27°C, 29°C, 30°C, or 33°C.

Number of Days with Minimum Temperature Below a Threshold
☒ WRI (tnlt5, tnlt15)
☒ Open Data Portal

Season: Annual, Winter
Variable Name: tnlt5 (winter), tnlt15, tnlt25
The number of days the daily minimum temperature was below -5°C, -15°C or -25°C.

Number of Freeze-Thaw Cycles
☒ WRI (ft_ann)
☒ Open Data Portal

Season: Annual, Spring, Fall, Winter
Variable Name: ft
The number of days when the minimum temperature was below -2°C and the maximum temperature was above 2°C.

Number of Tropical Nights
☒ WRI (tr16)
☒ Open Data Portal
Season: Annual
Variable Name: tr16, tr18, tr20, tr22
The number of days when the minimum temperature was above 16°C, 18°C, 20°C, or 22°C.

Number of Wet Days
☒ WRI (r20mm ann)
☒ Open Data Portal
Season: Annual, Spring, Summer, Fall, Winter
Variable Name: r1mm, r10mm, r20mm
The number of days when the precipitation was above 1 mm, 10 mm, or 20 mm.

Sea Level Rise
☒ WRI (slr)
☒ Open Data Portal
Season: Annual
Variable Name: slr (max, mean, min)
For the WRI, SLR is an index value. Please see A.7 for more information.
For Open Data, the SLR values are estimates of sea level rise, relative 1986-2005, along the coastline according to James et al., 2021. Please see B.1 for more information.

Snow to Precipitation Ratio
☐WRI
☒ Open Data Portal
Season: Annual, winter
Variable Name: sr
The ratio (based on snow water equivalent) of the amount of precipitation that falls as snow to the total amount of precipitation over a season.

Snow Water Equivalent (SWE)
☒ WRI (swe_ann)
☒ Open Data Portal

Season: Annual, winter
Variable Name: swe
The amount of precipitation that's fallen as snow over the season. *Snow water equivalent* refers to the depth of water that would result from melting the snow.

Snowdays
☒ WRI (sd15_ann, sd15_shoulder)
☒ Open Data Portal (snowdays)

Season: Annual, winter, extended winter/shoulder seasons
Variable Name: snowdays
Number of days with snowfall above 15 cm

Standardized Precipitation Evapotranspiration Index (SPEI)
☒ WRI (spei)
☒ Open Data Portal
Season: Annual
Variable Name: spei
The three-month running accumulated moisture values are fit to a log-logistic distribution. The distribution is used to standardize the accumulated moisture values, and the SPEI value is the result. SPEI is therefore just a standardized value for the accumulated moisture index. The standardization procedure allows a comparison of *relative* amounts of accumulated moisture for a location. Because of this, SPEI values do not necessarily correspond to the same level of "drought" between locations, or even between time periods. For example, a -3.0 value of SPEI in a typically wet location may still provide enough moisture to grow some crops, but in a dry location, -3.0 may indicate an extreme drought. The values of SPEI depend on how accumulated moisture is calculated, the distribution used to fit the data, and the method of fitting the data. Because of this, the SPEI values in this project may differ from the SPEI values found on websites like *Climate Data Canada*. It is interesting to note that every online SPEI tool that we are familiar with uses the same underlying *R* software library.

Total Precipitation
☒ WRI
☒ Open Data Portal
Season: Annual, Spring, Summer, Fall, Winter
Variable Name: prcptot (prcptot_annual, prcptot_spring, prctot_summer, prcptot_fall, prcptot_winter)
The total precipitation above 1 mm for the season.

Fire Weather Index Amplitude
☒ WRI (fwia)
☐ Open Data Portal
Season: Fire
Variable Name: fwia
Maximum fire weather index.

Fire Weather Index Duration
☒ WRI (fwid)
☐ Open Data Portal
Season: Fire
Variable Name: fwid
Longest spell of fire weather index rated very high or severe.

Fire Weather Index Frequency
☒ WRI (fwif)
☐ Open Data Portal
Season: Fire
Variable Name: fwif
Total number of days when the fire weather index was rated very high or severe.

Appendix C – List of References used in the Development of the Indicator Inventory Database

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Appendix D – List of Spatial Data Sources Used for the Wellbeing at Risk Index

Data Name	Source
Sensitive Habitat	Nova Scotia Significant Species and Habitats Database: https://novascotia.ca/natr/Wildlife/habitats/hab-data/
Critical Habitat	ECCC Atlantic Canada Critical Habitat: https://open.canada.ca/data/en/dataset/b00a1126-fade-478e-acdd-c0972b4bbbcf
Forest Inventory	Nova Scotia Forest Inventory: https://novascotia.ca/natr/forestry/gis/pdf/Forest_metadata_web_attrib.pdf https://novascotia.ca/natr/forestry/gis/dl_forestry.asp
Dunes and Beaches	Nova Scotia Forest Inventory: https://novascotia.ca/natr/forestry/gis/pdf/Forest_metadata_web_attrib.pdf https://novascotia.ca/natr/forestry/gis/dl_forestry.asp
Wetlands	Nova Scotia Forest Inventory: https://novascotia.ca/natr/forestry/gis/pdf/Forest_metadata_web_attrib.pdf https://novascotia.ca/natr/forestry/gis/dl_forestry.asp Nova Scotia Hydrographic Network (wa_poly): https://nsgi.novascotia.ca/gdd/
Salt Marshes	Nova Scotia Forest Inventory: https://novascotia.ca/natr/forestry/gis/pdf/Forest_metadata_web_attrib.pdf https://novascotia.ca/natr/forestry/gis/dl_forestry.asp
Forests	Nova Scotia Forest Inventory: https://novascotia.ca/natr/forestry/gis/pdf/Forest_metadata_web_attrib.pdf https://novascotia.ca/natr/forestry/gis/dl_forestry.asp
Sea Level Rise	Geological Survey of Canada: James et al. (2021) - https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=327878 CanCoast Coastal Sensitivity Index: https://geoscan.nrcan.gc.ca/text/geoscan/fulltext/of_8551.pdf https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search1=R=314669 Manuel et al. 2016 (poster presentation) for 10m “coastal zone” assumption

Appendix E – Wellbeing-at-Risk Results for Each Census Division

Section **Error! Reference source not found.** of the main synthesis report summarizes results of the Wellbeing-at-Risk Index (WRI) for the province of Nova Scotia. This Appendix provides the graphical and tabular results for each of the province's 18 census divisions in alphabetical order.

This appendix for each census division identifying the four top-ranked climate impact drivers in the increasingly adverse outcomes category of impacts for both RCP8.5 and RCP4.5 (median). In addition, each census division profile identifies drivers of risk, changes over time, and capitals most influencing each Wellbeing-at-Risk Sub-Index. At the end of this appendix, there is a summary of potential adaptation opportunities relating to reducing exposure and sensitivity and improving coping capacity.

As discussed in Section 6, there are differences between RCP8.5 and RCP4.5. In general, across Nova Scotia, the predominance of projected changes in temperature trends and extremes as drivers of the Climate Impact Sub-index scores (and hence, Wellbeing-at-Risk Index scores) under RCP8.5 lessens under RCP4.5, with precipitation-based drivers becoming relatively more important. This results in more of a mix of precipitation-based and temperature-based climate impact drivers by the end of the century as opposed to primarily temperature-based climate impact drivers under RCP8.5. At an individual census division level, the four top-ranked climate impact drivers are often similar under RCP8.5 and RCP4.5, with fewer shifts past mid-century (i.e., the projected ranks of climate impact drivers remain more consistent over time).

E.1 Annapolis

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Annapolis census division, the following four impacts that rank higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Heat extremes for agriculture** driven most by high levels of exposure of agriculture and sensitivity of incomes dependent on agriculture.
- **Shifting ecoregions** driven most by the extent of climatic change and high levels of exposure of ecosystems to those changes.
- **Sea level rise and coastal flooding** driven most by the degree of climatic change and low coping capacity.
- **Agricultural pests and diseases** driven most by high levels of exposure of agriculture.

Between 2035-65 (2050s or mid-century), these four are still the top-ranked climate impact drivers with a slight change in order: sea level rise and coastal flooding switches rank order with shifting ecoregions, while heat extremes (agriculture) and agricultural pests and diseases remain in the same relative positions.

Between 2065-2095 (2080s or end of the century), average changes in temperature and precipitation put additional stress on ecosystems, with the following top-ranked increasing adverse outcomes for wellbeing in order of highest to lowest:

- **Heat extremes for agriculture**
- **Sea level rise and coastal flooding**
- **Heat extremes for ecosystems** driven most by exposure of ecosystems to extreme temperatures.
- **Shifting ecoregions**

The prevalence of top-ranked impacts driven by temperature is consistent with the patterns across Nova Scotia where projected higher and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century.

As temperatures increase, heavy snowfalls will decrease, thereby negatively impacting wellbeing **less** as time goes on, with the biggest gains to wellbeing from reduced heavy snowfall by mid-century. By the end of the century, reduced heating demand followed closely in rank by reduced heavy snowfall will be more impactful to wellbeing. In other words, lowered heating demand will contribute the most to improving wellbeing by the end of the century.

While benefits from winter tourism will decrease over time, a longer growing season and conditions for favourable summer tourism may present additional opportunities. However, the opportunities need to be considered in the context of increasing adverse outcomes, which occur concurrently. For example, a longer growing season can benefit agriculture and ecosystems, but increases in heat stress and pests and diseases need to be considered at the same time. In addition, those within Annapolis census division need to be a good position to take advantage of opportunities presented.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	5.55	7.21	5.48	6.93	5.55	7.21	5.02	4.98	4.59	5.36
Pluvial Flooding	5.34	5.37	5.46	5.85	4.92	3.69	4.78	5.60	5.27	5.93
Fluvial Flooding	5.24	5.52	5.14	5.10	4.89	4.10	4.35	5.55	5.17	5.93
Heat extreme - agriculture	6.31	6.93	6.38	7.20	6.61	8.12	6.28	6.01	6.40	5.63
Heat extreme - ecosystems	5.45	6.93	5.52	7.20	5.75	8.12	5.08	4.91	3.90	5.91
Heat extreme - human health	5.44	7.56	5.55	8.00	5.61	8.23	3.73	5.23	4.86	5.61
Heat extreme - transport infrastructure	5.17	6.26	5.40	7.18	5.62	8.04	3.28	5.57	5.28	5.87
Cooling demand	5.15	7.16	5.22	7.42	5.41	8.16	3.33	5.06	4.96	5.17
Agriculture pests and diseases	5.63	6.31	5.57	6.07	5.25	4.77	6.03	5.10	4.28	5.91
Shifting ecoregions	6.03	7.44	5.76	6.36	5.71	6.17	5.59	5.54	5.16	5.91
Vector-borne diseases	5.30	6.46	5.04	5.43	4.97	5.16	3.73	5.50	5.08	5.92
SLR and coastal flooding	5.96	8.88	5.96	8.88	5.96	8.88	3.83	5.58	5.22	5.93
Wildfire	4.73	4.06	5.38	6.65	5.59	7.50	4.67	5.09	4.25	5.93
Decreasing adverse outcomes										
Heavy snowfall	5.21	5.45	5.16	5.24	5.25	5.60	4.43	5.48	5.00	5.96
Freeze-thaw Cycles	4.62	3.97	4.59	3.84	4.48	3.41	4.72	4.90	4.33	5.47
Heating demand	5.11	6.14	4.88	5.19	5.25	6.68	3.33	5.49	5.78	5.20
Increasing beneficial outcomes										
Summer tourism & recreation	4.81	6.05	4.59	5.16	4.91	6.42	3.73	4.74	4.20	5.27
Growing season	6.40	7.19	6.23	6.55	6.44	7.36	5.74	6.32	7.00	5.65
Decreasing beneficial outcomes										
Winter tourism & recreation	5.22	6.06	5.20	5.98	5.15	5.78	3.73	5.54	5.13	5.95

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 5: Total WRI scores for median projections (50th percentile) under RCP8.5 for Annapolis census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	5	4	7	7	8	8	5	12	10	12
Pluvial Flooding	8	12	8	11	12	13	6	2	3	3
Fluvial Flooding	10	11	12	13	13	12	8	5	5	3
Heat extreme - agriculture	1	6	1	4	1	4	1	1	1	10
Heat extreme - ecosystems	6	6	6	4	3	4	4	13	13	6
Heat extreme - human health	7	2	5	2	6	2	10	8	9	11
Heat extreme - transport infrastructure	11	10	9	6	5	6	13	4	2	9
Cooling demand	12	5	11	3	9	3	12	11	8	13
Agriculture pests and diseases	4	9	4	10	10	11	2	9	11	6
Shifting ecoregions	2	3	3	9	4	9	3	6	6	6
Vector-borne diseases	9	8	13	12	11	10	10	7	7	5
SLR and coastal flooding	3	1	2	1	2	1	9	3	4	1
Wildfire	13	13	10	8	7	7	7	10	12	1
Decreasing adverse outcomes										
Heavy snowfall	1	2	1	1	2	2	2	2	2	1
Freeze-thaw Cycles	3	3	3	3	3	3	1	3	3	2
Heating demand	2	1	2	2	1	1	3	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	2	2	2
Growing season	1	1	1	1	1	1	1	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 6: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Annapolis census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Annapolis Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Annapolis census division is similar to that under a high emissions scenario (RCP8.5). Under RCP4.5 for early century (2015-2045), the four climate impact drivers that rank higher for increasing adverse outcomes under RCP4.5 are:

- **Heat extremes for agriculture** driven most exposure and sensitivity.
- **Sea level rise and coastal flooding** driven by low coping capacity.
- **Shifting ecoregions** driven most by exposure.
- **Agricultural pests and diseases** also driven by exposure of agricultural activity.

By mid-century (between 2035-2065), the four top-ranked climate impact drivers are projected to be the same. By end of the century (2080s), heat extremes for agriculture, sea level rise and coastal flooding, and shifting ecoregions remain in the top three ranks. Heat extremes for human health is ranked fourth, driven by the extent of projected climatic change.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	7	7	7	7	10	10	5	12	10	12
Pluvial Flooding	11	13	12	13	9	11	6	2	3	3
Fluvial Flooding	9	10	13	12	12	12	8	5	5	3
Heat extreme - agriculture	1	5	1	4	1	4	1	1	1	10
Heat extreme - ecosystems	6	5	6	4	5	4	4	13	13	6
Heat extreme - human health	5	2	5	2	4	2	10	8	9	11
Heat extreme - transport infrastructure	8	4	8	6	7	6	13	4	2	9
Cooling demand	10	3	9	3	8	3	12	11	8	13
Agriculture pests and diseases	4	8	4	8	6	8	2	9	11	6
Shifting ecoregions	3	9	3	9	3	7	3	6	6	6
Vector-borne diseases	13	11	11	10	11	9	10	7	7	5
SLR and coastal flooding	2	1	2	1	2	1	9	3	4	1
Wildfire	12	12	10	11	13	13	7	10	12	1
Decreasing adverse outcomes										
Heavy snowfall	1	2	1	1	1	2	2	2	2	1
Freeze-thaw Cycles	3	3	3	3	3	3	1	3	3	2
Heating demand	2	1	2	2	2	1	3	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	2	2	2
Growing season	1	1	1	1	1	1	1	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 7: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Annapolis census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Annapolis Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Annapolis census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

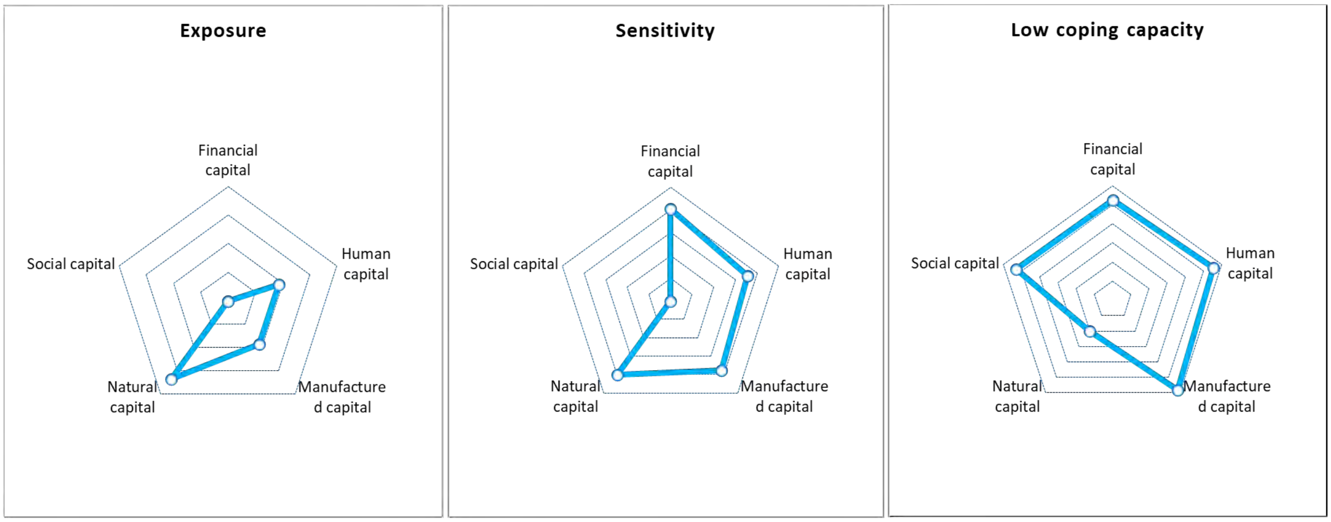

Figure 8: Influence of capital on each sub-index for Annapolis census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to manufactured capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Financial capital	Manufactured capital
Pluvial Flooding	Natural capital	Natural capital	Human capital
Fluvial Flooding	Natural capital	Natural capital	Human capital
Heat extreme - agriculture	Natural capital	Financial capital	Manufactured capital
Heat extreme - ecosystems	Natural capital	Natural capital	Manufactured capital
Heat extreme - human health	Human capital	Human capital	Human capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Social capital
Agriculture pests and diseases	Natural capital	Financial capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Manufactured capital	Human capital
SLR and coastal flooding	Natural capital	Natural capital	Human capital
Wildfire	Natural capital	Human capital	Human capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Human capital	Human capital
Freeze-thaw Cycles	Manufactured capital	Manufactured capital	Social capital
Heating demand	Manufactured capital	Manufactured capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Manufactured capital	Financial capital
Growing season	Natural capital	Financial capital	Natural capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Natural capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 1: Capital with most exposure to each climate-related impact driver in Annapolis census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.2 Antigonish

Climate Risk for Antigonish Census Division (High Emissions Scenario RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Antigonish census division, the following four climate impact drivers rank the higher for increasingly adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Pluvial flooding** driven most by a combination of high levels of exposure, sensitivity, and low coping capacity.
- **Fluvial flooding** driven most by the extent of climatic change and high levels of sensitivity and low coping capacity.
- **Sea level rise and coastal flooding** driven most by the degree of climatic change.
- **Heat extremes for agriculture** driven most by high levels of exposure of agriculture.

Between 2035-65 (2050s or mid-century) and between 2065-2095 (2080s or end of the century), these four are still the top-ranked climate impact drivers, with heat extremes for agriculture moving to the highest rank, followed by both forms of flooding, and sea level rise and coastal flooding.

The prevalence of top-ranked impacts is slightly different than that across Nova Scotia where projected higher and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century. For Antigonish census division, the top ranked climate impact drivers are a mix of temperature and precipitation-related hazards, but with heat extremes having more consequence by the end of the century.

As temperatures increase, heavy snowfalls will decrease, thereby negatively impacting wellbeing **less** as time goes on, with the biggest gains to wellbeing from reduced freeze-thaw cycles across all three time periods.

While benefits from winter tourism will decrease over time, conditions for favourable summer tourism may present additional opportunities. In addition, those within Antigonish census division need to be a good position to take advantage of opportunities presented.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	3.71	4.56	3.66	4.32	4.02	5.77	2.84	3.73	3.28	4.18
Pluvial Flooding	5.08	5.71	4.58	3.70	4.69	4.14	4.69	4.97	5.42	4.51
Fluvial Flooding	4.64	6.08	4.51	5.56	4.34	4.86	3.08	4.70	4.89	4.51
Heat extreme - agriculture	4.42	4.31	4.58	4.94	5.12	7.10	5.90	3.73	3.69	3.77
Heat extreme - ecosystems	3.33	4.31	3.49	4.94	4.03	7.10	1.28	3.87	4.39	3.34
Heat extreme - human health	4.09	4.72	4.09	4.73	4.28	5.47	3.56	4.03	3.94	4.13
Heat extreme - transport infrastructure	3.19	3.50	3.41	4.39	4.19	7.52	2.97	3.14	2.98	3.30
Cooling demand	3.57	4.47	3.78	5.27	4.24	7.13	3.02	3.40	2.66	4.14
Agriculture pests and diseases	3.83	5.74	4.00	6.40	4.07	6.70	3.28	3.16	2.97	3.34
Shifting ecoregions	3.21	5.20	3.26	5.39	3.28	5.48	1.48	3.08	2.82	3.34
Vector-borne diseases	4.14	5.42	4.30	6.09	4.29	6.02	3.56	3.78	4.02	3.54
SLR and coastal flooding	4.62	6.38	4.62	6.38	4.62	6.38	3.60	4.24	4.74	3.74
Wildfire	3.87	3.92	3.93	4.18	4.11	4.91	3.13	4.20	4.67	3.74
Decreasing adverse outcomes										
Heavy snowfall	4.14	5.66	4.13	5.64	4.20	5.89	3.17	3.86	4.02	3.70
Freeze-thaw Cycles	4.94	8.43	5.11	9.11	4.98	8.60	3.64	3.85	4.02	3.67
Heating demand	4.06	6.68	3.82	5.75	3.69	5.20	3.02	3.26	2.34	4.18
Increasing beneficial outcomes										
Summer tourism & recreation	5.04	4.13	5.17	4.62	5.29	5.09	3.56	6.25	5.00	7.49
Growing season	4.78	4.03	4.73	3.83	4.90	4.51	3.79	5.65	4.42	6.88
Decreasing beneficial outcomes										
Winter tourism & recreation	4.81	7.57	4.78	7.46	4.77	7.43	3.56	4.05	4.83	3.27

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 9: Total WRI scores for median projections (50th percentile) under RCP8.5 for Antigonish census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	9	8	10	11	12	8	11	9	9	3
Pluvial Flooding	1	4	2	13	2	13	2	1	1	1
Fluvial Flooding	2	2	4	4	4	12	8	2	2	1
Heat extreme - agriculture	4	10	3	7	1	3	1	8	8	6
Heat extreme - ecosystems	11	10	11	7	11	3	13	6	5	10
Heat extreme - human health	6	7	6	9	6	10	4	5	7	5
Heat extreme - transport infrastructure	13	13	12	10	8	1	10	12	10	13
Cooling demand	10	9	9	6	7	2	9	10	13	4
Agriculture pests and diseases	8	3	7	1	10	5	6	11	11	10
Shifting ecoregions	12	6	13	5	13	9	12	13	12	10
Vector-borne diseases	5	5	5	3	5	7	4	7	6	9
SLR and coastal flooding	3	1	1	2	3	6	3	3	3	7
Wildfire	7	12	8	12	9	11	7	4	4	7
Decreasing adverse outcomes										
Heavy snowfall	2	3	2	3	2	2	2	1	2	2
Freeze-thaw Cycles	1	1	1	1	1	1	1	2	1	3
Heating demand	3	2	3	2	3	3	3	3	3	1
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	1
Growing season	2	2	2	2	2	2	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 10: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Antigonish census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Antigonish Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Antigonish census division changes slightly compared with a high emissions scenario (RCP8.5). For early century (between 2015-2045), the four climate impacts that rank higher for increasingly adverse outcomes under RCP4.5 are:

- **Pluvial flooding** driven most exposure and high vulnerability.
- **Sea level rise and coastal flooding** driven most by the extent climatic change and a combination of exposure and vulnerability.
- **Fluvial flooding** driven by extent of climatic change and high vulnerability.
- **Heat extremes for agriculture** driven by exposure.

By mid-century (between 2035-3065), the ranked order of the top four changes slightly: pluvial flooding, heat extremes for agriculture, fluvial flooding, and sea level rise and coastal flooding. By end of the century (2080s or 2065-2095), the ranked position changes again, but remains consistent for this census division:

- **Sea level rise and coastal flooding**
- **Heat extremes for agriculture**

- **Fluvial flooding**
- **Pluvial flooding**

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	8	11	8	11	7	4	11	9	9	3
Pluvial Flooding	1	4	1	2	4	12	2	1	1	1
Fluvial Flooding	3	2	3	3	3	6	8	2	2	1
Heat extreme - agriculture	4	9	2	7	2	7	1	8	8	6
Heat extreme - ecosystems	11	9	11	7	10	7	13	6	5	10
Heat extreme - human health	5	7	6	10	6	10	4	5	7	5
Heat extreme - transport infrastructure	13	12	12	12	12	11	10	12	10	13
Cooling demand	7	6	7	6	8	3	9	10	13	4
Agriculture pests and diseases	9	8	9	5	9	9	6	11	11	10
Shifting ecoregions	12	3	13	9	13	5	12	13	12	10
Vector-borne diseases	6	5	5	4	5	2	4	7	6	9
SLR and coastal flooding	2	1	4	1	1	1	3	3	3	7
Wildfire	10	13	10	13	11	13	7	4	4	7
Decreasing adverse outcomes										
Heavy snowfall	3	3	2	3	2	3	2	1	2	2
Freeze-thaw Cycles	1	1	1	1	1	1	1	2	1	3
Heating demand	2	2	3	2	3	2	3	3	3	1
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	1
Growing season	2	2	2	2	2	2	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 11: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Antigonish census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Antigonish Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Antigonish census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

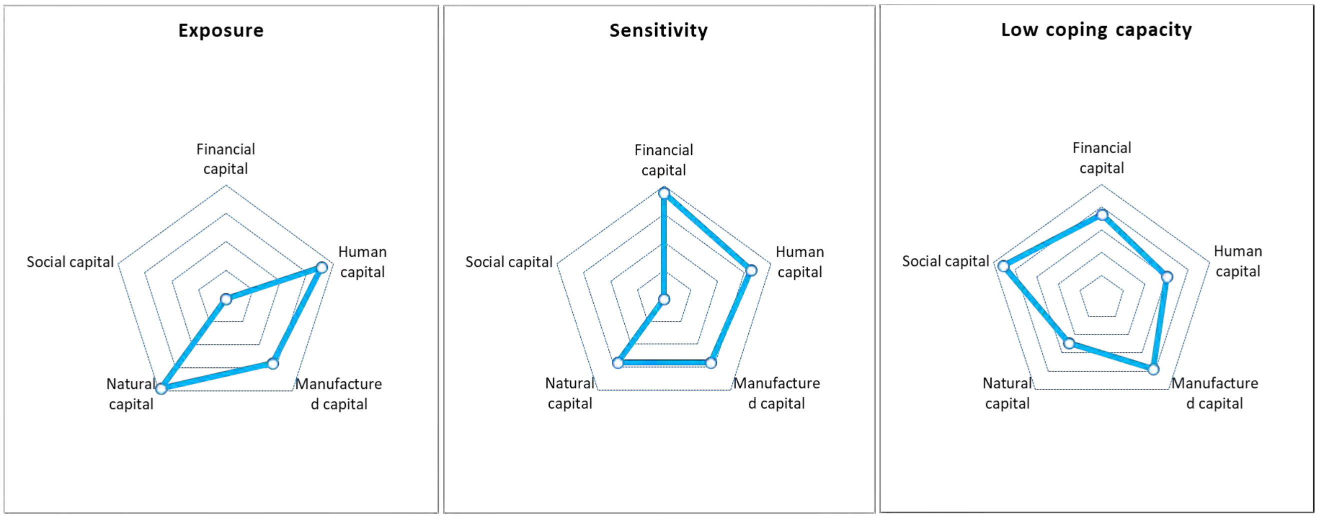

Figure 12: Influence of capital on each sub-index for Antigonish census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to natural capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*

Increasing adverse outcomes:			
Drought	Human capital	Financial capital	Natural capital
Pluvial Flooding	Natural capital	Natural capital	Natural capital
Fluvial Flooding	Human capital	Financial capital	Natural capital
Heat extreme - agriculture	Natural capital	Natural capital	Natural capital
Heat extreme - ecosystems	Natural capital	Financial capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Natural capital
Heat extreme - transport infrastructure	Manufactured capital	Human capital	Social capital
Cooling demand	Manufactured capital	Manufactured capital	Natural capital
Agriculture pests and diseases	Natural capital	Financial capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Human capital	Social capital
SLR and coastal flooding	Human capital	Manufactured capital	Social capital
Wildfire	Human capital	Financial capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Human capital	Financial capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Financial capital	Social capital
Heating demand	Manufactured capital	Manufactured capital	Natural capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Manufactured capital
Growing season	Natural capital	Natural capital	Human capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Human capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 2: Capital with most exposure to each climate-related impact in Antigonish census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.3 Cape Breton

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Cape Breton census division, the following four impacts rank higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Wildfire** driven most by the extent of projected conditions favourable for wildfires and low coping capacity.
- **Vector-borne diseases** driven most by a mix of the extent of climatic change favourable for vector-borne diseases and exposure.
- **Heat extremes for human health** driven most by exposure and vulnerability of people.
- **Fluvial flooding** driven by climate vulnerability (sensitivity and low coping capacity) of the region.

Between 2035-65 (2050s or mid-century), the climate hazards in the top four stay the same, but in a slightly different order. Fluvial flooding moves up and wildfire moves down. The difference is primarily in the extent of climatic change between the baseline period and mid-century for each of these climate hazards. Fluvial flooding is projected to see the highest increase in extent of climatic change. The ranks are fluvial flooding, vector-borne diseases, wildfire, and heat extremes for human health.

Between 2065-2095 (2080s or end of the century), both forms of flooding – fluvial and pluvial are in the top four along with heat extremes for human health and vector-borne diseases.

- **Fluvial flooding**
- **Heat extremes for human health**
- **Pluvial flooding** driven by a combination of climatic change and climate vulnerability
- **Vector-borne diseases**

The prevalence of top-ranked impacts is slightly different than that across Nova Scotia where projected higher and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century. For Cape Breton census division, the prevalence reflects a mix of temperature and precipitation-related hazards.

As temperatures increase, the number of freeze-thaw cycles will decrease, thereby negatively impacting wellbeing **less** as time goes by. The pattern for Cape Breton is consistent across the century, with reduced freeze-thaw cycles contributing to improved wellbeing, followed by reduced heavy snowfall, and reduced demand for heating buildings.

While benefits from winter tourism will decrease over time, conditions for favourable summer tourism may present additional opportunities for Cape Breton.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.91	2.87	4.79	2.40	4.96	3.07	7.26	4.76	4.41	5.11
Pluvial Flooding	5.49	4.92	5.76	6.00	5.96	6.81	6.47	5.28	5.18	5.38
Fluvial Flooding	5.58	5.08	6.13	7.31	6.06	7.03	6.87	5.18	4.98	5.38
Heat extreme - agriculture	3.38	2.06	3.59	2.89	3.96	4.38	3.56	3.95	3.17	4.73
Heat extreme - ecosystems	4.29	2.06	4.50	2.89	4.87	4.38	5.12	5.00	5.74	4.26
Heat extreme - human health	5.72	3.94	5.83	4.38	5.97	4.94	7.87	5.54	5.51	5.56
Heat extreme - transport infrastructure	4.70	2.12	4.92	2.99	5.34	4.67	7.77	4.45	4.78	4.13
Cooling demand	4.42	2.27	4.63	3.13	4.96	4.46	5.90	4.75	4.44	5.05
Agriculture pests and diseases	4.04	4.65	3.98	4.40	3.72	3.37	4.28	3.61	2.97	4.26
Shifting ecoregions	4.38	4.10	4.76	5.63	4.84	5.97	3.77	4.81	5.37	4.26
Vector-borne diseases	5.83	5.23	5.91	5.53	5.94	5.67	7.87	5.12	5.11	5.12
SLR and coastal flooding	5.39	6.34	5.39	6.34	5.39	6.34	5.09	5.06	4.64	5.48
Wildfire	5.84	6.85	5.83	6.83	5.10	3.91	6.58	4.96	4.45	5.48
Decreasing adverse outcomes										
Heavy snowfall	5.69	5.69	5.31	4.16	5.40	4.52	7.41	4.84	4.26	5.41
Freeze-thaw Cycles	6.57	10.00	6.57	10.00	6.57	10.00	7.09	4.61	4.39	4.82
Heating demand	5.25	5.57	5.22	5.47	5.36	6.03	5.90	4.76	4.37	5.15
Increasing beneficial outcomes										
Summer tourism & recreation	6.05	3.50	6.55	5.50	6.59	5.68	7.87	6.41	6.01	6.82
Growing season	4.74	3.39	5.14	4.98	5.28	5.56	6.35	4.61	3.01	6.20
Decreasing beneficial outcomes										
Winter tourism & recreation	5.73	3.30	5.49	2.38	5.77	3.46	7.87	5.87	7.47	4.27

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 13: Total WRI scores for median projections (50th percentile) under RCP8.5 for Cape Breton census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	7	9	8	13	9	13	4	9	11	7
Pluvial Flooding	5	5	5	4	3	2	7	2	4	4
Fluvial Flooding	4	4	1	1	1	1	5	3	6	4
Heat extreme - agriculture	13	12	13	11	12	9	13	12	12	9
Heat extreme - ecosystems	11	12	11	11	10	9	9	6	1	10
Heat extreme - human health	3	8	4	8	2	6	1	1	2	1
Heat extreme - transport infrastructure	8	11	7	10	6	7	3	11	7	13
Cooling demand	9	10	10	9	8	8	8	10	10	8
Agriculture pests and diseases	12	6	12	7	13	12	11	13	13	10
Shifting ecoregions	10	7	9	5	11	4	12	8	3	10
Vector-borne diseases	2	3	2	6	4	5	1	4	5	6
SLR and coastal flooding	6	2	6	3	5	3	10	5	8	2
Wildfire	1	1	3	2	7	11	6	7	9	2
Decreasing adverse outcomes										
Heavy snowfall	2	2	2	3	2	3	1	1	3	1
Freeze-thaw Cycles	1	1	1	1	1	1	2	3	1	3
Heating demand	3	3	3	2	3	2	3	2	2	2
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	1	1	1	1
Growing season	2	2	2	2	2	2	2	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 14: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Cape Breton census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Cape Breton Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Cape Breton census division changes compared with that under a high emissions scenario (RCP8.5). Between 2015-2045 (2030s), the following four climate impacts that rank higher for increasingly adverse outcomes under RCP4.5 are:

- **Heat extremes for human health** driven by exposure and high vulnerability.
- **Wildfire** relating to the extent of projected climatic changes and low coping capacity.
- **Drought** based on a combination of exposure and climatic impact.
- **Vector-borne diseases** most driven by exposure.

By mid-century (between 2035-2065), fluvial and pluvial flooding are the top-ranked climate impact drivers, followed by heat extremes for human health and vector-borne diseases. By the end of the century (between 2065-2095), the top-ranked climate impact drivers are:

- **Heat extremes for human health**
- **Fluvial flooding**
- **Vector-borne diseases**
- **Pluvial flooding**

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	3	3	7	8	6	6	4	9	11	7
Pluvial Flooding	6	4	1	1	4	3	7	2	4	4
Fluvial Flooding	5	5	2	2	2	2	5	3	6	4
Heat extreme - agriculture	13	10	13	12	13	11	13	12	12	9
Heat extreme - ecosystems	10	10	11	12	10	11	9	6	1	10
Heat extreme - human health	1	7	3	7	1	4	1	1	2	1
Heat extreme - transport infrastructure	8	12	8	11	7	9	3	11	7	13
Cooling demand	9	9	10	10	8	8	8	10	10	8
Agriculture pests and diseases	12	6	12	9	12	10	11	13	13	10
Shifting ecoregions	11	13	9	6	11	7	12	8	3	10
Vector-borne diseases	4	8	4	5	3	5	1	4	5	6
SLR and coastal flooding	7	2	6	3	5	1	10	5	8	2
Wildfire	2	1	5	4	9	13	6	7	9	2
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	2	3	1	1	3	1
Freeze-thaw Cycles	1	1	1	1	1	1	2	3	1	3
Heating demand	2	2	2	2	3	2	3	2	2	2
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	1	1	1	1
Growing season	2	2	2	2	2	2	2	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 15: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Cape Breton census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Cape Breton Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Cape Breton census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

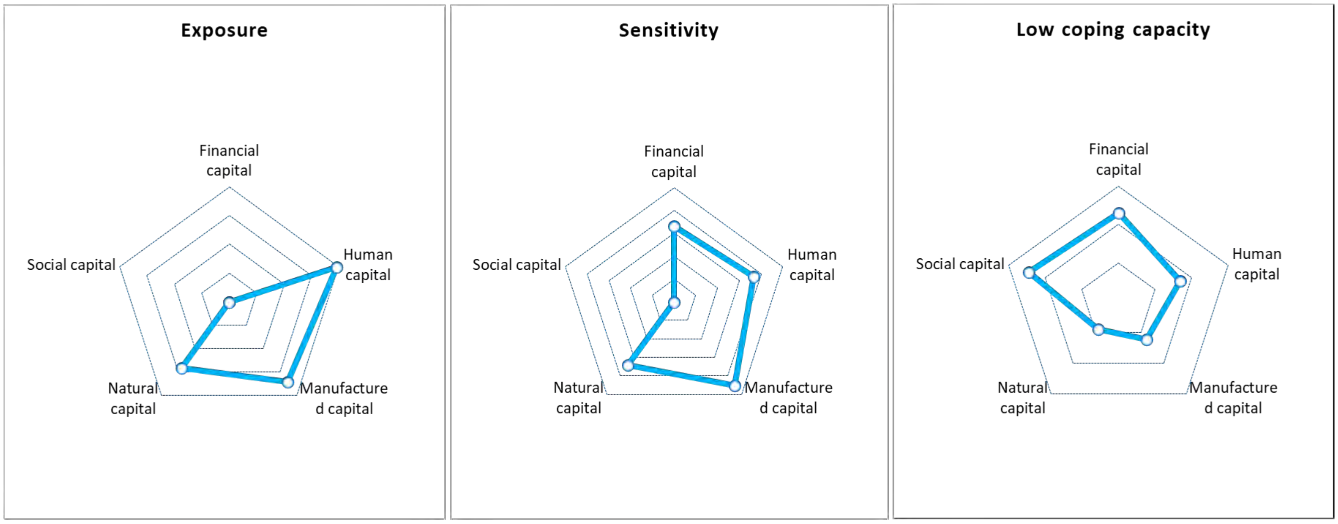

Figure 16: Influence of capital on each sub-index for Cape Breton census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Manufactured capital	Natural capital	Social capital
Pluvial Flooding	Human capital	Human capital	Social capital
Fluvial Flooding	Human capital	Human capital	Social capital
Heat extreme - agriculture	Natural capital	Financial capital	Social capital
Heat extreme - ecosystems	Natural capital	Financial capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Social capital
Cooling demand	Manufactured capital	Manufactured capital	Social capital
Agriculture pests and diseases	Natural capital	Natural capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Human capital	Manufactured capital	Social capital
Wildfire	Human capital	Manufactured capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Human capital	Human capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Manufactured capital	Social capital
Heating demand	Manufactured capital	Manufactured capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Manufactured capital	Manufactured capital
Growing season	Natural capital	Financial capital	Manufactured capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Natural capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 3: Capital with most exposure to each climate-related impact in Cape Breton census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.4 Colchester

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Colchester census division, the following four impacts rank higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Cooling demand** to keep buildings cool driven primarily by the extent of climatic change and low capacity to cope.
- **Heat extremes for human health** driven by a combination of extent of climatic change, exposure, and low coping capacity.
- **Pluvial flooding** driven most by exposure and climate vulnerability to this hazard.
- **Heat extremes for transportation infrastructure** (e.g., roads and railways) driven by the extent of climatic change.

Between 2035-65 (2050s or mid-century), the top two climate impact drivers are the same: cooling demand and heat extremes for human health. Heat extremes for transportation infrastructures is in the third rank. The conditions for wildfire are projected to have a relatively high increase in the extent of climatic change and is the fourth ranked climate impact driver in this impact category.

Between 2065-2095 (2080s or end of the century), all four climate impact drivers in the top ranks are heat-related.

- **Cooling demand**
- **Heat extremes for transportation infrastructure**
- **Heat extremes for human health**
- **Heat extremes for agriculture**

The prevalence of top-ranked hazards is consistent with that across Nova Scotia where projected higher and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century.

As temperatures increase, the demand for heating buildings will decrease and negatively impacts wellbeing **less** as time goes by. The pattern for Colchester is consistent across the century, with reduced heating demand contributing to improved wellbeing, followed by reduced freeze-thaw cycles, and reduced heavy snowfall.

While benefits from winter tourism will decrease over time, conditions for favourable summer tourism may present additional opportunities for Colchester.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.85	5.54	5.08	6.46	5.30	7.34	4.87	4.50	4.65	4.36
Pluvial Flooding	5.98	5.72	5.17	2.46	5.44	3.53	7.28	5.46	5.71	5.22
Fluvial Flooding	5.49	6.08	5.20	4.93	5.05	4.30	5.43	5.23	5.24	5.22
Heat extreme - agriculture	5.62	7.99	5.62	8.00	5.90	9.09	5.13	4.68	5.06	4.30
Heat extreme - ecosystems	4.92	7.99	4.92	8.00	5.19	9.09	2.74	4.47	4.57	4.37
Heat extreme - human health	6.02	7.97	5.97	7.80	6.06	8.15	6.10	4.99	4.75	5.23
Heat extreme - transport infrastructure	5.76	7.78	5.77	7.82	6.17	9.41	5.74	4.77	4.89	4.65
Cooling demand	6.11	8.00	6.13	8.08	6.34	8.93	6.94	4.74	3.82	5.66
Agriculture pests and diseases	4.73	4.82	5.13	6.40	5.08	6.22	4.22	4.94	5.51	4.37
Shifting ecoregions	5.28	6.22	5.24	6.06	5.15	5.68	4.45	5.23	6.09	4.37
Vector-borne diseases	5.36	5.67	5.39	5.79	5.31	5.49	6.10	4.83	5.18	4.47
SLR and coastal flooding	4.37	3.00	4.37	3.00	4.37	3.00	4.25	5.11	5.18	5.03
Wildfire	5.06	4.09	5.72	6.76	5.88	7.39	5.72	5.21	5.38	5.03
Decreasing adverse outcomes										
Heavy snowfall	4.97	5.62	4.95	5.53	5.06	5.97	4.95	4.66	4.61	4.70
Freeze-thaw Cycles	5.33	5.61	5.38	5.84	5.69	7.07	5.95	4.87	4.51	5.23
Heating demand	5.99	7.60	5.71	6.48	5.71	6.50	6.94	4.71	3.98	5.44
Increasing beneficial outcomes										
Summer tourism & recreation	6.13	7.33	6.06	7.03	6.04	6.98	6.10	5.55	4.46	6.63
Growing season	5.61	6.57	5.59	6.51	5.62	6.61	2.75	6.55	6.45	6.65
Decreasing beneficial outcomes										
Winter tourism & recreation	5.53	7.29	5.59	7.53	5.65	7.78	6.10	4.36	4.37	4.35

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 17: Total WRI scores for median projections (50th percentile) under RCP8.5 for Colchester census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	11	10	11	7	8	7	9	12	11	12
Pluvial Flooding	3	8	9	13	6	12	1	1	2	3
Fluvial Flooding	6	7	8	11	12	11	7	3	5	3
Heat extreme - agriculture	5	2	5	2	4	2	8	11	8	13
Heat extreme - ecosystems	10	2	12	2	9	2	13	13	12	9
Heat extreme - human health	2	4	2	5	3	5	3	6	10	2
Heat extreme - transport infrastructure	4	5	3	4	2	1	5	9	9	7
Cooling demand	1	1	1	1	1	4	2	10	13	1
Agriculture pests and diseases	12	11	10	8	11	8	12	7	3	9
Shifting ecoregions	8	6	7	9	10	9	10	2	1	9
Vector-borne diseases	7	9	6	10	7	10	3	8	6	8
SLR and coastal flooding	13	13	13	12	13	13	11	5	7	5
Wildfire	9	12	4	6	5	6	6	4	4	5
Decreasing adverse outcomes										
Heavy snowfall	3	2	3	3	3	3	3	3	1	3
Freeze-thaw Cycles	2	3	2	2	2	1	2	1	2	2
Heating demand	1	1	1	1	1	2	1	2	3	1
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	1	2	2	2
Growing season	2	2	2	2	2	2	2	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 18: Rankings of climate-related impacts for the median projections (50^{th} percentile) under RCP8.5 for the Colchester census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Colchester Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Colchester census division changes little compared with a high emissions scenario (RCP8.5) but is largely consistent with changes across the province. Between 2015-2045 (early century), the four climate impacts with higher rank for increasingly adverse outcomes under RCP4.5 are:

- **Cooling demand for buildings** driven by high exposure and low coping capacity.
- **Heat extremes for human** health driven most by a combination of degree of climatic change, high levels of exposure and low coping capacity.
- **Heat extremes for transportation infrastructure** driven most by the extent of climatic change.
- **Fluvial flooding** driven by high vulnerability.

By mid-century (between 2035-2065), the three top-ranked climate impact drivers are the same, but heat extremes for agriculture moves to the fourth ranked position. This projected pattern remains consistent through the end of the century (between 2065-2095).

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	12	11	12	10	11	8	9	12	11	12
Pluvial Flooding	9	13	6	12	8	12	1	1	2	3
Fluvial Flooding	4	7	5	6	5	7	7	3	5	3
Heat extreme - agriculture	5	4	4	3	4	2	8	11	8	13
Heat extreme - ecosystems	11	4	11	3	12	2	13	13	12	9
Heat extreme - human health	2	2	2	2	2	4	3	6	10	2
Heat extreme - transport infrastructure	3	1	3	1	3	5	5	9	9	7
Cooling demand	1	3	1	5	1	1	2	10	13	1
Agriculture pests and diseases	10	8	10	9	10	10	12	7	3	9
Shifting ecoregions	6	6	9	7	7	6	10	2	1	9
Vector-borne diseases	7	9	7	8	9	11	3	8	6	8
SLR and coastal flooding	13	12	13	13	13	13	11	5	7	5
Wildfire	8	10	8	11	6	9	6	4	4	5
Decreasing adverse outcomes										
Heavy snowfall	3	2	3	2	3	3	3	3	1	3
Freeze-thaw Cycles	2	3	2	3	2	2	2	1	2	2
Heating demand	1	1	1	1	1	1	1	2	3	1
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	2	1	2	1	2	2	2
Growing season	2	2	2	1	2	1	2	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 19: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Colchester census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Colchester Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Colchester census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

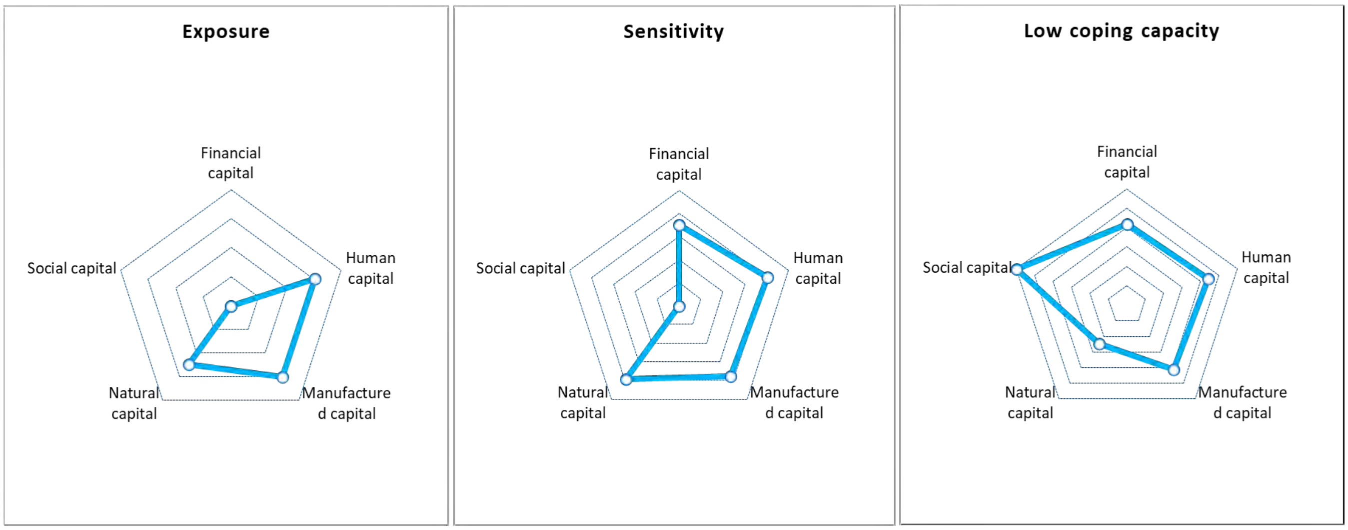

Figure 20: Influence of capital on each sub-index for Colchester census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index

	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			
Drought	Human capital	Human capital	Social capital
Pluvial Flooding	Natural capital	Natural capital	Social capital
Fluvial Flooding	Human capital	Natural capital	Social capital
Heat extreme - agriculture	Natural capital	Natural capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Natural capital
Heat extreme - transport infrastructure	Manufactured capital	Human capital	Social capital
Cooling demand	Manufactured capital	Human capital	Natural capital
Agriculture pests and diseases	Natural capital	Manufactured capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Human capital	Natural capital	Social capital
Wildfire	Manufactured capital	Financial capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Manufactured capital	Human capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Human capital	Social capital
Heating demand	Manufactured capital	Human capital	Natural capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Manufactured capital
Growing season	Natural capital	Natural capital	Manufactured capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 4. Capital with most exposure to each climate-related impact in Colchester census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.5 Cumberland

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Cumberland census division, the following four impacts are ranked higher increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Heat extremes for agriculture** driven by exposure and sensitivity of agricultural activity and extent of climatic change.
- **Cooling demand** to keep buildings cool driven by a combination of extent of climatic change and sensitivity.
- **Heat extremes for transportation infrastructure** (e.g., roads and railways) driven by the extent of climatic change and sensitivity.
- **Agricultural pests and diseases** through high exposure of agricultural activity.

This pattern is not projected to change over the course of the century for the two other time periods assessed: between 2035-2065 (2050s or mid-century) and between 2065-2095 (2080s or end of the century).

The prevalence of top-ranked hazards is consistent with that across Nova Scotia where projected high and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century.

As temperatures increase, the number of freeze-thaw cycles will decrease and negatively impact wellbeing **less** as time goes by. The pattern for Cumberland is consistent across the century, with reduced freeze-thaw cycles contributing to improved wellbeing, followed by reduced heating demand for buildings, and reduced heavy snowfall.

The longer growing season offers opportunities for Cumberland.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	6.00	7.64	6.05	7.87	6.14	8.21	5.20	5.57	6.66	4.48
Pluvial Flooding	5.82	5.53	5.31	3.46	5.44	3.98	6.99	5.39	5.71	5.06
Fluvial Flooding	5.38	5.73	4.99	4.16	4.95	4.03	5.34	5.23	5.39	5.06
Heat extreme - agriculture	7.04	9.07	7.08	9.23	7.16	9.56	7.28	5.89	7.34	4.45
Heat extreme - ecosystems	5.59	9.07	5.63	9.23	5.72	9.56	4.65	4.33	3.62	5.03
Heat extreme - human health	6.18	8.65	6.13	8.44	6.02	8.01	4.72	5.68	5.97	5.39
Heat extreme - transport infrastructure	6.80	9.28	6.76	9.13	6.85	9.48	5.31	6.30	7.38	5.23
Cooling demand	6.92	9.12	6.96	9.29	7.05	9.63	5.56	6.50	7.55	5.44
Agriculture pests and diseases	6.38	7.20	6.51	7.73	6.41	7.34	7.03	5.64	6.25	5.03
Shifting ecoregions	6.35	6.63	6.39	6.80	6.23	6.16	7.06	5.85	6.67	5.03
Vector-borne diseases	5.41	5.87	5.59	6.59	5.45	6.04	4.72	5.52	5.85	5.19
SLR and coastal flooding	6.15	6.49	6.15	6.49	6.15	6.49	6.86	5.62	5.62	5.63
Wildfire	4.78	3.04	5.06	4.14	5.46	5.74	5.18	5.46	5.28	5.63
Decreasing adverse outcomes										
Heavy snowfall	5.84	6.73	5.71	6.19	5.77	6.43	5.54	5.55	5.75	5.36
Freeze-thaw Cycles	6.24	8.49	6.38	9.05	6.49	9.48	5.72	5.38	5.29	5.47
Heating demand	6.24	6.05	6.11	5.52	6.21	5.91	5.56	6.68	8.07	5.29
Increasing beneficial outcomes										
Summer tourism & recreation	5.41	7.32	5.35	7.10	5.21	6.55	4.72	4.79	3.49	6.10
Growing season	6.54	6.36	6.51	6.25	6.50	6.19	5.68	7.06	7.42	6.69
Decreasing beneficial outcomes										
Winter tourism & recreation	5.80	8.43	5.79	8.43	5.83	8.58	4.72	5.01	4.93	5.10

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 21: Total WRI scores for median projections (50th percentile) under RCP8.5 for Cumberland census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	8	6	8	6	7	5	9	8	5	12
Pluvial Flooding	9	12	11	13	12	13	4	11	9	7
Fluvial Flooding	12	11	13	11	13	12	7	12	11	7
Heat extreme - agriculture	1	3	1	2	1	2	1	3	3	13
Heat extreme - ecosystems	10	3	9	2	9	2	13	13	13	9
Heat extreme - human health	6	5	7	5	8	6	11	5	7	4
Heat extreme - transport infrastructure	3	1	3	4	3	4	8	2	2	5
Cooling demand	2	2	2	1	2	1	6	1	1	3
Agriculture pests and diseases	4	7	4	7	4	7	3	6	6	9
Shifting ecoregions	5	8	5	8	5	9	2	4	4	9
Vector-borne diseases	11	10	10	9	11	10	11	9	8	6
SLR and coastal flooding	7	9	6	10	6	8	5	7	10	1
Wildfire	13	13	12	12	10	11	10	10	12	1
Decreasing adverse outcomes										
Heavy snowfall	3	2	3	2	3	2	3	2	2	2
Freeze-thaw Cycles	1	1	1	1	1	1	1	3	3	1
Heating demand	2	3	2	3	2	3	2	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	1	2	1	2	1	2	2	2	2
Growing season	1	2	1	2	1	2	1	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 22: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Cumberland census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Cumberland Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Cumberland census division is very similar with a high emissions scenario (RCP8.5). For early century (between 2015-2045), the following four climate impact drivers rank higher for increasing adverse outcomes under RCP4.5:

- **Heat extremes for agriculture** driven by exposure of agricultural activity and extent of climatic change.
- **Cooling demand for buildings** through a combination of the extent of climatic change and sensitivity (such as age of buildings).
- **Heat extremes for transportation** through the extent of climatic change and sensitivity (such as alternative transportation options).
- **Shifting ecoregions** through exposure and sensitivity (such as critical habitats).

This pattern is projected to remain consistent over the course of the century.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	8	7	8	7	8	6	9	8	5	12
Pluvial Flooding	12	13	12	13	11	12	4	11	9	7
Fluvial Flooding	11	11	11	11	12	11	7	12	11	7
Heat extreme - agriculture	1	3	1	2	1	2	1	3	3	13
Heat extreme - ecosystems	9	3	9	2	9	2	13	13	13	9
Heat extreme - human health	5	5	5	5	7	5	11	5	7	4
Heat extreme - transport infrastructure	3	1	3	1	3	4	8	2	2	5
Cooling demand	2	2	2	4	2	1	6	1	1	3
Agriculture pests and diseases	7	10	7	10	6	9	3	6	6	9
Shifting ecoregions	4	6	4	6	4	7	2	4	4	9
Vector-borne diseases	10	8	10	8	10	10	11	9	8	6
SLR and coastal flooding	6	9	6	9	5	8	5	7	10	1
Wildfire	13	12	13	12	13	13	10	10	12	1
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	3	3	3	2	2	2
Freeze-thaw Cycles	2	1	2	1	2	1	1	3	3	1
Heating demand	1	2	1	2	1	2	2	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	1	2	1	2	1	2	2	2	2
Growing season	1	2	1	2	1	2	1	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 23: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Cumberland census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Cumberland Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Cumberland census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

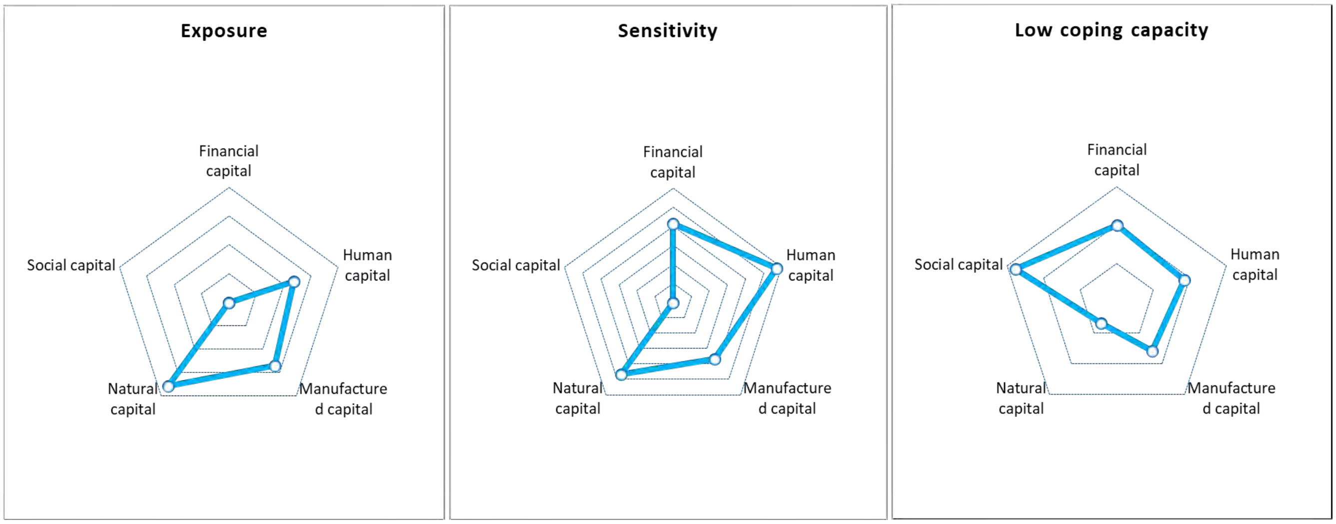

Figure 24: Influence of capital on each sub-index for Cumberland census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Human capital	Social capital
Pluvial Flooding	Natural capital	Human capital	Social capital
Fluvial Flooding	Natural capital	Human capital	Social capital
Heat extreme - agriculture	Natural capital	Financial capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Human capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Human capital	Social capital
Cooling demand	Manufactured capital	Human capital	Social capital
Agriculture pests and diseases	Natural capital	Human capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Manufactured capital	Natural capital	Social capital
Wildfire	Manufactured capital	Human capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Natural capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Human capital	Social capital
Heating demand	Manufactured capital	Human capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Manufactured capital	Manufactured capital
Growing season	Natural capital	Natural capital	Natural capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Natural capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 5. Capital with most exposure to each climate-related impact in Cumberland census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.6 Digby

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Digby census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Cooling demand** to keep buildings cool driven by exposure and sensitivity.
- **Drought** driven by the extent of projected conditions that can cause drought.
- **Agricultural pests and diseases** through high exposure of agricultural activity.
- **Heat extremes for agriculture** driven by sensitivity of agricultural activity to high temperatures.

All four of these climate hazards remain in the top four between 2035-2065 (2050s or mid-century), but in a slightly different order. Drought moves to the third rank and agricultural pests and diseases moves to the second rank. Between 2065-2095 (2080s or end of the century), there are additional changes.

- **Cooling demand**
- **Agricultural pests and diseases**
- **Drought**
- **Sea level rise and coastal flooding** driven by the extent of climatic changes relative to other hazards.

The prevalence of top-ranked hazards is slightly different than that across Nova Scotia where projected high and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century.

As climate conditions change, there are a number of hazards that will negatively impact wellbeing **less** as time goes by. The pattern for Digby is consistent across the century, with reduced heating demand contributing to improved wellbeing, followed by reduced heavy snowfall, and reduced number of freeze-thaw cycles.

The longer growing season offers opportunities for the Digby area but will need to be managed with other risks to agriculture, such as drought.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	6.17	7.99	6.06	7.56	5.90	6.91	4.29	6.20	5.89	6.52
Pluvial Flooding	5.79	5.77	5.31	3.83	5.74	5.56	4.25	6.57	5.71	7.44
Fluvial Flooding	5.50	4.79	5.31	4.01	5.42	4.49	4.43	6.39	5.34	7.44
Heat extreme - agriculture	6.04	5.77	6.00	5.61	5.88	5.09	4.69	6.86	7.31	6.40
Heat extreme - ecosystems	5.53	5.77	5.49	5.61	5.36	5.09	6.70	4.83	3.70	5.96
Heat extreme - human health	5.54	5.37	5.80	6.41	5.78	6.33	3.27	6.75	6.17	7.34
Heat extreme - transport infrastructure	5.75	6.12	5.86	6.58	5.53	5.25	3.68	6.60	7.09	6.10
Cooling demand	6.25	5.48	6.24	5.43	6.13	5.02	5.37	7.07	7.33	6.82
Agriculture pests and diseases	6.09	5.73	6.12	5.86	6.02	5.46	5.92	6.35	6.74	5.96
Shifting ecoregions	5.81	6.28	5.73	5.97	5.61	5.48	5.40	5.78	5.60	5.96
Vector-borne diseases	5.50	5.84	5.22	4.69	5.23	4.72	3.27	6.45	6.22	6.68
SLR and coastal flooding	5.88	7.15	5.88	7.15	5.88	7.15	4.46	5.95	5.16	6.74
Wildfire	5.09	4.71	5.08	4.69	5.11	4.80	4.09	5.77	4.80	6.74
Decreasing adverse outcomes										
Heavy snowfall	5.43	6.07	5.57	6.63	5.61	6.81	4.30	5.67	4.67	6.66
Freeze-thaw Cycles	4.26	1.58	4.46	2.37	4.20	1.33	4.36	5.55	5.08	6.02
Heating demand	6.08	4.12	5.94	3.55	6.07	4.04	5.37	7.43	8.16	6.70
Increasing beneficial outcomes										
Summer tourism & recreation	4.41	5.83	4.29	5.35	4.47	6.05	3.27	4.27	3.41	5.14
Growing season	6.25	8.06	6.42	8.74	6.53	9.19	6.03	5.46	6.26	4.65
Decreasing beneficial outcomes										
Winter tourism & recreation	4.49	5.63	4.50	5.68	4.56	5.93	3.27	4.52	2.99	6.05

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 25: Total WRI scores for median projections (50th percentile) under RCP8.5 for Digby census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	2	1	3	1	3	2	8	9	7	8
Pluvial Flooding	7	6	10	13	7	4	9	5	8	1
Fluvial Flooding	12	12	11	12	10	13	7	7	10	1
Heat extreme - agriculture	4	7	4	7	5	8	5	2	2	9
Heat extreme - ecosystems	10	7	9	7	11	8	1	13	13	11
Heat extreme - human health	9	11	7	4	6	3	12	3	6	3
Heat extreme - transport infrastructure	8	4	6	3	9	7	11	4	3	10
Cooling demand	1	10	1	9	1	10	4	1	1	4
Agriculture pests and diseases	3	9	2	6	2	6	2	8	4	11
Shifting ecoregions	6	3	8	5	8	5	3	11	9	11
Vector-borne diseases	11	5	12	10	12	12	12	6	5	7
SLR and coastal flooding	5	2	5	2	4	1	6	10	11	5
Wildfire	13	13	13	11	13	11	10	12	12	5
Decreasing adverse outcomes										
Heavy snowfall	2	1	2	1	2	1	3	2	3	2
Freeze-thaw Cycles	3	3	3	3	3	3	2	3	2	3
Heating demand	1	2	1	2	1	2	1	1	1	1
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	2	2	1
Growing season	1	1	1	1	1	1	1	1	1	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 26: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Digby census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Digby Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Digby census division changes little compared with a high emissions scenario (RCP8.5). Between 2015-2045 (2030s), the four climate impact drivers ranked higher for increasingly adverse outcomes under RCP4.5 are:

- **Cooling demand for buildings** driven by most by high vulnerability (such as affordability of the basics and building age) and somewhat by exposure.
- **Drought** driven most by the extent of climatic change.
- **Agricultural pests and diseases** through high exposure of agricultural activity and climatic changes.
- **Heat extremes for agriculture**.

Between 2035-2065 (mid-century), the top-ranked climate impact drivers are the same, although in a slightly different rank: cooling demand for buildings, agricultural pests and disease, drought, and heat extremes for agriculture. By end of the century (2065-2095), the picture is slightly different again:

- **Cooling demand for buildings.**
- **Heat extremes for agriculture.**

- **Heat extremes for transportation** driven by the extent of climatic change and higher sensitivity.
- **Agricultural pests and diseases.**

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	2	1	3	1	5	3	8	9	7	8
Pluvial Flooding	10	11	9	11	10	11	9	5	8	1
Fluvial Flooding	11	13	12	12	12	12	7	7	10	1
Heat extreme - agriculture	4	6	4	5	2	6	5	2	2	9
Heat extreme - ecosystems	9	6	10	5	9	6	1	13	13	11
Heat extreme - human health	7	5	7	4	7	4	12	3	6	3
Heat extreme - transport infrastructure	5	3	5	2	3	1	11	4	3	10
Cooling demand	1	8	1	8	1	8	4	1	1	4
Agriculture pests and diseases	3	4	2	7	4	10	2	8	4	11
Shifting ecoregions	8	9	8	9	8	5	3	11	9	11
Vector-borne diseases	12	10	11	10	11	9	12	6	5	7
SLR and coastal flooding	6	2	6	3	6	2	6	10	11	5
Wildfire	13	12	13	13	13	13	10	12	12	5
Decreasing adverse outcomes										
Heavy snowfall	2	1	2	1	2	1	3	2	3	2
Freeze-thaw Cycles	3	3	3	3	3	3	2	3	2	3
Heating demand	1	2	1	2	1	2	1	1	1	1
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	2	2	1
Growing season	1	1	1	1	1	1	1	1	1	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 27: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Digby Census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Digby Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Antigonish census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

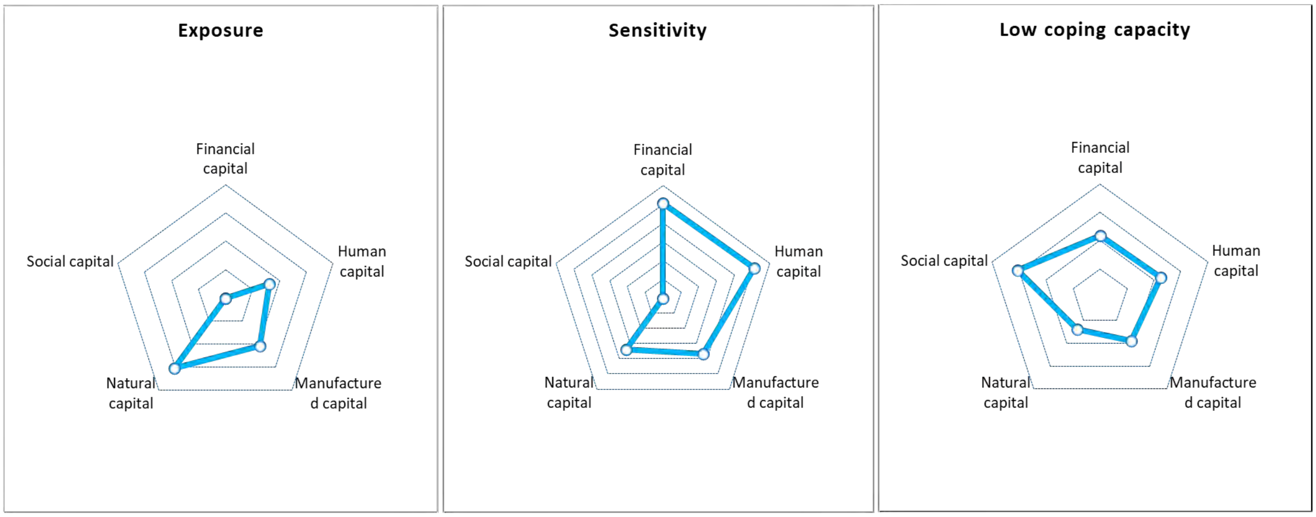

Figure 28: Influence of capital on each sub-index for Digby census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Human capital	Social capital
Pluvial Flooding	Natural capital	Human capital	Social capital
Fluvial Flooding	Natural capital	Human capital	Social capital
Heat extreme - agriculture	Natural capital	Financial capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Human capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Human capital	Social capital
Cooling demand	Manufactured capital	Human capital	Social capital
Agriculture pests and diseases	Natural capital	Human capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Manufactured capital	Natural capital	Social capital
Wildfire	Manufactured capital	Human capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Natural capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Human capital	Social capital
Heating demand	Manufactured capital	Human capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Manufactured capital	Manufactured capital
Growing season	Natural capital	Natural capital	Natural capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Natural capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 6. Capital with most exposure to each climate-related impact in Digby census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.7 Guysborough

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Guysborough census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Heat extremes for ecosystems** driven by a combination of the extent of projected climatic changes and exposure.
- **Shifting ecoregions** driven by a combination of the extent of projected climatic changes, exposure, and low coping capacity.
- **Fluvial flooding** through the extent of changes in conditions compared with the baseline.
- **Agricultural pests and diseases** primarily through exposure and low coping capacity.

All four of these climate hazards remain in the top four between 2035-2065 (2050s or mid-century) and in the same relative order. Between 2065-2095 (2080s or end of the century), there are some changes.

- **Heat extremes for ecosystems**
- **Shifting ecoregions**
- **Agricultural pests and diseases**
- **Vector-borne diseases** (e.g., Lyme disease) driven by high sensitivity and relative increases in projected climatic conditions favourable for these diseases.

The prevalence of top-ranked impacts driven by temperature is largely consistent with the that across Nova Scotia where projected high and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century. However, the specific climate hazards are slightly different except for heat extremes for ecosystems.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The pattern for Guysborough in the early and mid part of the century is similar, with reduced heating demand, followed by reduced heavy snowfall, and reduced number of freeze-thaw cycles as decreasing negative effects. Towards the end of the century, the reduction in heavy snowfall has the potential to most improve wellbeing.

The longer growing season offers opportunities for the Guysborough area, as do summer tourism opportunities, with decreasing benefits from winter tourism and recreation.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.53	4.64	4.38	4.05	4.32	3.78	3.53	4.98	4.09	5.87
Pluvial Flooding	4.45	6.44	4.25	5.63	4.10	5.03	2.72	4.33	3.59	5.06
Fluvial Flooding	4.85	7.06	4.90	7.24	4.65	6.23	3.63	4.36	3.66	5.06
Heat extreme - agriculture	4.43	4.01	4.55	4.50	4.65	4.89	2.16	5.78	5.06	6.50
Heat extreme - ecosystems	5.47	4.01	5.59	4.50	5.69	4.89	6.21	5.83	5.34	6.32
Heat extreme - human health	3.48	4.10	3.68	4.89	3.76	5.22	1.11	4.35	3.56	5.14
Heat extreme - transport infrastructure	4.12	4.08	4.35	5.00	4.39	5.19	1.90	5.24	4.40	6.09
Cooling demand	3.79	3.76	3.93	4.31	4.03	4.70	2.87	4.27	3.70	4.85
Agriculture pests and diseases	4.66	4.67	4.75	5.04	4.77	5.10	3.54	5.22	4.12	6.32
Shifting ecoregions	5.15	5.63	5.16	5.64	5.27	6.08	4.79	5.10	3.88	6.32
Vector-borne diseases	4.59	5.22	4.71	5.70	4.70	5.67	1.11	6.02	6.80	5.23
SLR and coastal flooding	4.03	5.27	4.03	5.27	4.03	5.27	1.73	4.57	4.03	5.10
Wildfire	4.16	3.87	4.27	4.31	4.19	3.98	2.41	5.19	5.27	5.10
Decreasing adverse outcomes										
Heavy snowfall	4.41	4.70	4.36	4.52	4.53	5.19	2.48	5.22	5.07	5.37
Freeze-thaw Cycles	4.13	5.99	4.35	6.86	4.41	7.09	2.91	3.81	2.61	5.01
Heating demand	4.69	6.42	4.49	5.64	4.48	5.59	2.87	4.73	4.43	5.03
Increasing beneficial outcomes										
Summer tourism & recreation	4.17	4.93	4.13	4.78	4.25	5.24	1.11	5.32	5.92	4.72
Growing season	4.92	5.09	4.76	4.47	4.97	5.29	4.81	4.88	4.42	5.35
Decreasing beneficial outcomes										
Winter tourism & recreation	4.62	6.30	4.67	6.51	4.74	6.77	1.11	5.54	4.65	6.43

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 29: Total WRI scores for median projections (50th percentile) under RCP8.5 for Guysborough census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	6	7	7	13	8	13	5	8	7	6
Pluvial Flooding	7	2	10	4	10	8	7	12	12	11
Fluvial Flooding	3	1	3	1	6	1	3	10	11	11
Heat extreme - agriculture	8	10	6	9	5	9	9	3	4	1
Heat extreme - ecosystems	1	10	1	9	1	9	1	2	2	2
Heat extreme - human health	13	8	13	8	13	5	12	11	13	8
Heat extreme - transport infrastructure	10	9	8	7	7	6	10	4	5	5
Cooling demand	12	13	12	12	12	11	6	13	10	13
Agriculture pests and diseases	4	6	4	6	3	7	4	5	6	2
Shifting ecoregions	2	3	2	3	2	2	2	7	9	2
Vector-borne diseases	5	5	5	2	4	3	12	1	1	7
SLR and coastal flooding	11	4	11	5	11	4	11	9	8	9
Wildfire	9	12	9	11	9	12	8	6	3	9
Decreasing adverse outcomes										
Heavy snowfall	2	3	2	3	1	3	3	1	1	1
Freeze-thaw Cycles	3	2	3	1	3	1	1	3	3	3
Heating demand	1	1	1	2	2	2	2	2	2	2
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	1	2	2	2	1	1	2
Growing season	1	1	1	2	1	1	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 30: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Guysborough census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Guysborough Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Guysborough census division changes is only slightly different than under a high emissions scenario (RCP8.5), particularly in the earlier part of the century. It is consistent with changes across the province.

Between 2015-2045 (early century), the four higher ranked climate impacts for increasing adverse outcomes under RCP4.5 are:

- **Heat extremes for ecosystems** driven most by exposure and high vulnerability.
- **Shifting ecoregions** driven most by the extent of climatic change, exposure, and low coping capacity.
- **Fluvial flooding** driven most by the extent of climatic change and somewhat by exposure.
- **Heat extremes for agriculture** driven by high vulnerability (a combination of low coping capacity and sensitivity to changes in agriculture).

Between 2035-2065, the top-ranked climate impact drivers change slightly, with drought replacing heat extremes for agriculture. This reflects the changes in precipitation pattern than can bring both drought conditions and flooding. Between 2065-2095, the top-ranked hazards shift slightly again:

- **Heat extremes for ecosystems**
- **Shifting ecoregions**
- **Fluvial flooding**
- **Agricultural pests and diseases** driven by low coping capacity and exposure.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	6	11	4	3	5	5	5	8	7	6
Pluvial Flooding	10	10	9	6	10	9	7	12	12	11
Fluvial Flooding	3	1	3	1	3	1	3	10	11	11
Heat extreme - agriculture	4	7	7	9	7	10	9	3	4	1
Heat extreme - ecosystems	1	7	1	9	1	10	1	2	2	2
Heat extreme - human health	13	5	13	8	13	6	12	11	13	8
Heat extreme - transport infrastructure	5	2	8	4	8	4	10	4	5	5
Cooling demand	9	9	12	12	11	12	6	13	10	13
Agriculture pests and diseases	8	12	6	11	4	7	4	5	6	2
Shifting ecoregions	2	3	2	7	2	8	2	7	9	2
Vector-borne diseases	7	6	5	2	6	3	12	1	1	7
SLR and coastal flooding	11	4	11	5	9	2	11	9	8	9
Wildfire	12	13	10	13	12	13	8	6	3	9
Decreasing adverse outcomes										
Heavy snowfall	3	3	2	3	2	3	3	1	1	1
Freeze-thaw Cycles	2	1	3	1	3	1	1	3	3	3
Heating demand	1	2	1	2	1	2	2	2	2	2
Increasing beneficial outcomes										
Summer tourism & recreation	2	1	2	1	2	2	2	1	1	2
Growing season	1	2	1	2	1	1	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 31: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Guysborough census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Guysborough Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Guysborough census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

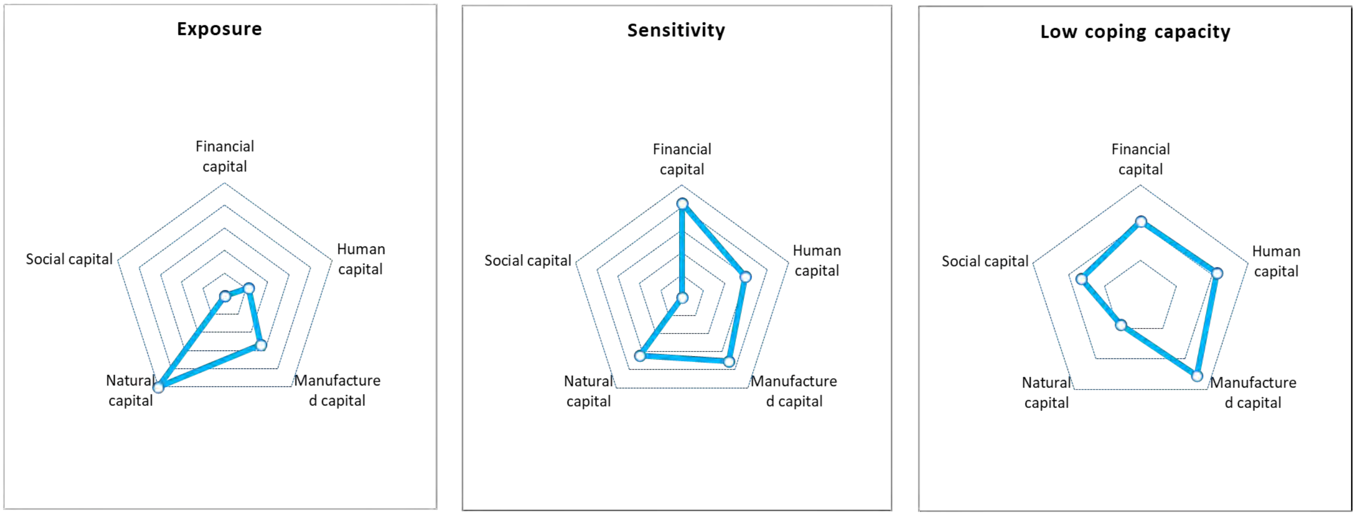

Figure 32: Influence of capital on each sub-index for Guysborough census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to natural capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Financial capital	Natural capital
Pluvial Flooding	Natural capital	Manufactured capital	Natural capital
Fluvial Flooding	Natural capital	Manufactured capital	Natural capital
Heat extreme - agriculture	Natural capital	Natural capital	Manufactured capital
Heat extreme - ecosystems	Natural capital	Financial capital	Manufactured capital
Heat extreme - human health	Human capital	Financial capital	Manufactured capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Manufactured capital	Human capital
Agriculture pests and diseases	Natural capital	Financial capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Manufactured capital	Manufactured capital
SLR and coastal flooding	Manufactured capital	Manufactured capital	Manufactured capital
Wildfire	Natural capital	Financial capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Natural capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Human capital	Human capital
Heating demand	Manufactured capital	Manufactured capital	Human capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Financial capital	Social capital
Growing season	Natural capital	Financial capital	Social capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 7. Capital with most exposure to each climate-related impact in Guysborough census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.8 Halifax

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Halifax census division, the following four climate impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Fluvial flooding** driven by a combination of the extent of projected climatic changes and high vulnerability (sensitivity and low coping capacity).
- **Shifting ecoregions** driven by a combination of the extent of projected climatic changes and sensitivity to the hazard.
- **Vector-borne diseases** (e.g., Lyme disease) driven by exposure and extent of changes to climatic conditions favourable for these kinds of diseases.
- **Heat extremes for human health** driven by high exposure, as well as extent of climatic changes compared with baseline and relative to the other hazards in this category.

Over the latter half of the century (both mid-century and end of century), the top four ranked hazards change a little. Shifting ecoregions, fluvial flooding and vector-borne diseases remain in the same relative rank. Heat extremes for human health is no longer ranked fourth and is replaced with wildfire, driven by a mix of all the climate risk elements – projected changes, exposure, and vulnerability.

- **Shifting ecoregions**
- **Fluvial flooding**
- **Vector-borne diseases**
- **Wildfire**

The prevalence of top-ranked impacts driven by a mix of temperature and precipitation is slightly different than that across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The ranks for the early and mid part of the century are similar, with reduced freeze-thaw cycles, followed by reduced heating demand, and reduced heavy snowfall have decreasing negative effects. Towards the end of the century, the reduction in heavy snowfall has the potential to most improve wellbeing.

The longer opportunity for an extended summer tourism and recreation season offers opportunities and must be managed with decreasing winter tourism and recreation opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	5.61	4.02	5.85	5.01	5.68	4.33	9.23	4.59	4.65	4.53
Pluvial Flooding	5.49	2.96	5.79	4.17	5.54	3.15	8.51	5.24	5.71	4.77
Fluvial Flooding	6.62	6.77	6.74	7.28	6.42	5.99	9.00	5.35	5.92	4.77
Heat extreme - agriculture	4.29	4.71	4.30	4.77	4.44	5.31	5.59	3.43	2.42	4.44
Heat extreme - ecosystems	5.89	4.71	5.91	4.77	6.04	5.31	9.06	4.90	5.69	4.12
Heat extreme - human health	6.08	5.22	6.10	5.33	6.13	5.44	10.00	4.54	4.88	4.21
Heat extreme - transport infrastructure	5.64	4.26	5.68	4.44	5.87	5.18	10.00	4.15	3.75	4.55
Cooling demand	5.62	4.85	5.65	4.97	5.73	5.31	9.42	4.09	2.88	5.31
Agriculture pests and diseases	5.14	3.72	5.31	4.42	5.27	4.25	8.09	4.37	4.63	4.12
Shifting ecoregions	6.51	6.40	6.36	5.80	6.45	6.16	9.37	5.13	6.14	4.12
Vector-borne diseases	6.44	6.17	6.24	5.38	6.25	5.42	10.00	4.80	5.41	4.19
SLR and coastal flooding	4.61	2.93	4.61	2.93	4.61	2.93	4.93	5.28	5.83	4.73
Wildfire	5.90	3.62	6.20	4.85	6.18	4.74	9.72	5.12	5.51	4.73
Decreasing adverse outcomes										
Heavy snowfall	5.49	3.60	5.63	4.18	5.87	5.15	9.65	4.35	4.40	4.30
Freeze-thaw Cycles	6.85	6.32	6.68	5.63	6.77	6.01	9.09	6.00	6.34	5.66
Heating demand	5.90	7.39	5.74	6.74	5.84	7.13	9.42	3.40	1.84	4.96
Increasing beneficial outcomes										
Summer tourism & recreation	7.23	4.59	7.09	4.01	7.04	3.82	10.00	7.17	7.47	6.86
Growing season	5.93	5.25	5.92	5.20	5.93	5.23	9.11	4.68	3.13	6.24
Decreasing beneficial outcomes										
Winter tourism & recreation	6.82	7.30	6.84	7.41	7.00	8.06	10.00	4.98	5.96	4.01

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 33: Total WRI scores for median projections (50th percentile) under RCP8.5 for Halifax census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	9	9	7	5	9	10	7	8	9	7
Pluvial Flooding	10	12	8	12	10	12	10	3	4	2
Fluvial Flooding	1	1	1	1	2	2	9	1	2	2
Heat extreme - agriculture	13	6	13	8	13	5	12	13	13	8
Heat extreme - ecosystems	6	6	6	8	6	5	8	6	5	11
Heat extreme - human health	4	4	5	4	5	3	1	9	8	9
Heat extreme - transport infrastructure	7	8	9	10	7	8	1	11	11	6
Cooling demand	8	5	10	6	8	7	5	12	12	1
Agriculture pests and diseases	11	10	11	11	11	11	11	10	10	11
Shifting ecoregions	2	2	2	2	1	1	6	4	1	11
Vector-borne diseases	3	3	3	3	3	4	1	7	7	10
SLR and coastal flooding	12	13	12	13	12	13	13	2	3	4
Wildfire	5	11	4	7	4	9	4	5	6	4
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	2	3	1	2	2	3
Freeze-thaw Cycles	1	2	1	2	1	2	3	1	1	1
Heating demand	2	1	2	1	3	1	2	3	3	2
Increasing beneficial outcomes										
Summer tourism & recreation	1	2	1	2	1	2	1	1	1	1
Growing season	2	1	2	1	2	1	2	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 34: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Halifax census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Halifax Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Halifax census division changes slightly compared with a high emissions scenario (RCP8.5). Between 2015-2045 (early century), the four climate impacts ranked higher for increasing adverse outcomes under RCP4.5 are:

- **Fluvial flooding** driven by the extent of climatic change, and high vulnerability.
- **Shifting ecoregions** through a combination of the extent of climatic change and sensitivity.
- **Heat extremes for human health** driven by exposure.
- **Vector-borne diseases** driven by exposure.

Between 2035-2065, the four top-ranked climate impact drivers remain the same, but vector-borne diseases and heat extremes for human health switch rank order. By end of the century (2065-2095), pluvial flooding is in the four top-ranked climate impacts, demonstrating the mix of temperature and precipitation drivers, which also interact.

- **Fluvial flooding.**
- **Shifting ecoregions**
- **Pluvial flooding** through the extent of climatic change and vulnerability.

- **Vector-borne diseases.**

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	10	11	8	11	9	11	7	8	9	7
Pluvial Flooding	5	7	5	5	3	2	10	3	4	2
Fluvial Flooding	1	1	1	1	1	1	9	1	2	2
Heat extreme - agriculture	13	8	13	8	13	8	12	13	13	8
Heat extreme - ecosystems	7	8	6	8	6	8	8	6	5	11
Heat extreme - human health	3	3	4	3	5	4	1	9	8	9
Heat extreme - transport infrastructure	6	4	9	7	8	10	1	11	11	6
Cooling demand	8	5	10	6	10	6	5	12	12	1
Agriculture pests and diseases	11	10	11	10	11	7	11	10	10	11
Shifting ecoregions	2	2	2	2	2	3	6	4	1	11
Vector-borne diseases	4	6	3	4	4	5	1	7	7	10
SLR and coastal flooding	12	12	12	12	12	12	13	2	3	4
Wildfire	9	13	7	13	7	13	4	5	6	4
Decreasing adverse outcomes										
Heavy snowfall	2	3	2	3	2	2	1	2	2	3
Freeze-thaw Cycles	1	2	1	2	1	3	3	1	1	1
Heating demand	3	1	3	1	3	1	2	3	3	2
Increasing beneficial outcomes										
Summer tourism & recreation	1	2	1	2	1	2	1	1	1	1
Growing season	2	1	2	1	2	1	2	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 35: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Halifax census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Halifax Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Antigonish census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

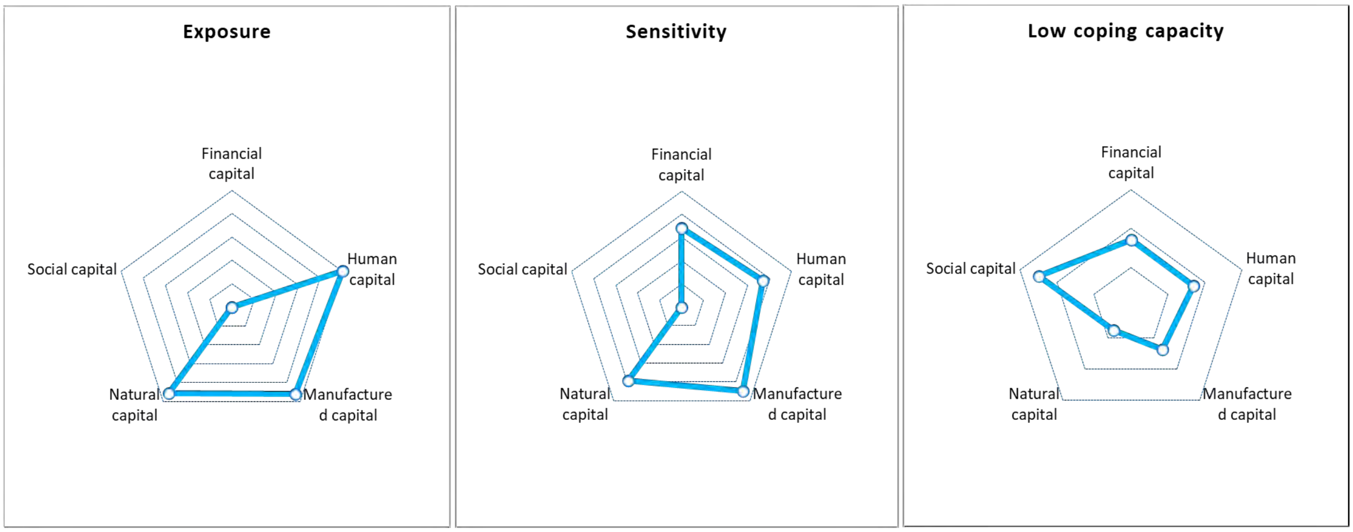

Figure 36: Influence of capital on each sub-index for Halifax census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Human capital	Manufactured capital	Social capital
Pluvial Flooding	Human capital	Human capital	Social capital
Fluvial Flooding	Human capital	Human capital	Social capital
Heat extreme - agriculture	Natural capital	Natural capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Social capital
Cooling demand	Manufactured capital	Manufactured capital	Social capital
Agriculture pests and diseases	Natural capital	Manufactured capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Natural capital	Social capital
SLR and coastal flooding	Human capital	Natural capital	Social capital
Wildfire	Human capital	Manufactured capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Human capital	Financial capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Financial capital	Social capital
Heating demand	Manufactured capital	Human capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Manufactured capital	Manufactured capital
Growing season	Natural capital	Natural capital	Manufactured capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 8. Capital with most exposure to each climate-related impact in Halifax census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.9 Hants

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Hants census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Heat extremes for agriculture** driven by a combination of the extent of projected climatic changes and high exposure of agricultural activity.
- **Fluvial flooding** primarily driven by high vulnerability (high sensitivity and low coping capacity) to the hazard.
- **Heat extremes for human health** driven by the extent of projected climate changes.
- **Pluvial flooding** driven by high exposure and vulnerability.

Between 2035-2065 (mid century), the top four hazards change, and wildfire emerges and the top concern.

- **Wildfire** driven by the extent of projected changes to conditions for wildfire.
- **Heat extremes for agriculture**
- **Heat extremes for human health**
- **Fluvial flooding**

The prevalence of top-ranked climate impacts driven by temperature is consistent with that across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century, the four top concerns between 2065-2095 driven by temperature increases. The top three remain the same, but fluvial flooding is no longer in the top four rank, replaced by heat extremes for ecosystems.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. These change over time, with the reduction in freeze-thaw cycles having the most consequences for wellbeing between 2015-2045 and again 2065-2095.

The longer opportunity for an extended summer tourism and recreation season offers opportunities and must be managed with decreasing winter tourism and recreation opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.38	5.66	4.60	6.53	4.73	7.06	5.12	3.36	2.80	3.92
Pluvial Flooding	5.36	5.79	4.93	4.06	5.04	4.51	5.87	4.89	5.81	3.97
Fluvial Flooding	5.42	6.78	5.20	5.90	5.01	5.16	5.43	4.73	5.48	3.97
Heat extreme - agriculture	5.43	7.59	5.42	7.53	5.59	8.23	7.26	3.44	3.17	3.72
Heat extreme - ecosystems	5.09	7.59	5.07	7.53	5.25	8.23	4.13	4.32	5.10	3.54
Heat extreme - human health	5.37	8.13	5.29	7.78	5.27	7.72	5.65	3.86	4.19	3.52
Heat extreme - transport infrastructure	4.65	6.72	4.70	6.91	4.97	7.98	4.14	3.87	4.23	3.51
Cooling demand	4.86	7.94	4.86	7.94	4.98	8.42	5.31	3.09	2.73	3.45
Agriculture pests and diseases	3.96	5.12	3.94	5.06	3.98	5.21	4.56	3.08	2.62	3.54
Shifting ecoregions	4.51	7.11	4.36	6.54	4.25	6.10	4.07	3.42	3.30	3.54
Vector-borne diseases	5.23	6.30	4.98	5.29	4.99	5.35	5.65	4.49	5.00	3.99
SLR and coastal flooding	4.12	3.55	4.12	3.55	4.12	3.55	3.76	4.58	5.27	3.89
Wildfire	4.71	4.99	5.61	8.57	5.61	8.56	5.46	4.20	4.51	3.89
Decreasing adverse outcomes										
Heavy snowfall	4.31	3.27	4.60	4.42	4.82	5.30	5.29	4.34	4.77	3.91
Freeze-thaw Cycles	4.88	6.58	4.70	5.88	4.82	6.35	4.59	4.17	4.54	3.81
Heating demand	4.79	7.38	4.73	7.16	4.72	7.11	5.31	3.23	2.99	3.47
Increasing beneficial outcomes										
Summer tourism & recreation	5.78	5.28	5.55	4.37	5.60	4.58	5.65	6.10	4.86	7.34
Growing season	5.39	5.63	5.37	5.53	5.44	5.84	4.78	5.58	4.18	6.98
Decreasing beneficial outcomes										
Winter tourism & recreation	6.12	7.48	6.18	7.73	6.22	7.87	5.65	5.67	7.85	3.50

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 37: Total WRI scores for median projections (50th percentile) under RCP8.5 for Hants census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	11	10	10	8	10	7	8	11	11	4
Pluvial Flooding	4	9	7	12	5	12	2	1	1	2
Fluvial Flooding	2	6	4	9	6	11	6	2	2	2
Heat extreme - agriculture	1	3	2	4	2	3	1	9	10	7
Heat extreme - ecosystems	6	3	5	4	4	3	11	5	4	8
Heat extreme - human health	3	1	3	3	3	6	3	8	8	11
Heat extreme - transport infrastructure	9	7	9	6	9	5	10	7	7	12
Cooling demand	7	2	8	2	8	2	7	12	12	13
Agriculture pests and diseases	13	11	13	11	13	10	9	13	13	8
Shifting ecoregions	10	5	11	7	11	8	12	10	9	8
Vector-borne diseases	5	8	6	10	7	9	3	4	5	1
SLR and coastal flooding	12	13	12	13	12	13	13	3	3	5
Wildfire	8	12	1	1	1	1	5	6	6	5
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	2	3	2	1	1	1
Freeze-thaw Cycles	1	2	2	2	1	2	3	2	2	2
Heating demand	2	1	1	1	3	1	1	3	3	3
Increasing beneficial outcomes										
Summer tourism & recreation	1	2	1	2	1	2	1	1	1	1
Growing season	2	1	2	1	2	1	2	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 38: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Hants census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Hants Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Hants census division changes compared with a high emissions scenario (RCP8.5). Between 2015-2045 (early century), the following four higher ranked climate impacts for increasing adverse outcomes under RCP4.5 are:

- **Heat extremes for agriculture** based on exposure and extent of climatic change.
- **Heat extremes for human health** also based on exposure and projected extent of climatic change.
- **Fluvial flooding** driven by high vulnerability.
- **Heat extremes for ecosystems** driven by climatic changes and associated sensitivity.

By mid century (between 2035-2065), the top three ranked climate impact drivers remain the same, but wildfire moves into the fourth rank relative to all the impacts in this category. By the end of the century (2065-2095), the picture changes a bit more and is consistent with the pattern across the rest of the province:

- **Heat extremes for agriculture**
- **Fluvial flooding**
- **Heat extremes for human health**

- **Pluvial flooding** driven by exposure, and vulnerability.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	11	11	10	9	11	11	8	11	11	4
Pluvial Flooding	9	13	7	12	4	12	2	1	1	2
Fluvial Flooding	3	7	3	8	2	8	6	2	2	2
Heat extreme - agriculture	1	3	1	3	1	3	1	9	10	7
Heat extreme - ecosystems	4	3	6	3	7	3	11	5	4	8
Heat extreme - human health	2	1	2	1	3	1	3	8	8	11
Heat extreme - transport infrastructure	8	5	9	5	9	7	10	7	7	12
Cooling demand	7	2	8	2	8	2	7	12	12	13
Agriculture pests and diseases	13	10	13	11	13	9	9	13	13	8
Shifting ecoregions	10	6	11	7	10	5	12	10	9	8
Vector-borne diseases	5	9	5	10	6	10	3	4	5	1
SLR and coastal flooding	12	12	12	13	12	13	13	3	3	5
Wildfire	6	8	4	6	5	6	5	6	6	5
Decreasing adverse outcomes										
Heavy snowfall	1	3	2	3	1	3	2	1	1	1
Freeze-thaw Cycles	2	2	3	2	2	2	3	2	2	2
Heating demand	3	1	1	1	3	1	1	3	3	3
Increasing beneficial outcomes										
Summer tourism & recreation	1	2	1	2	1	2	1	1	1	1
Growing season	2	1	2	1	2	1	2	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 39: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Hants census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Hants Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Antigonish census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

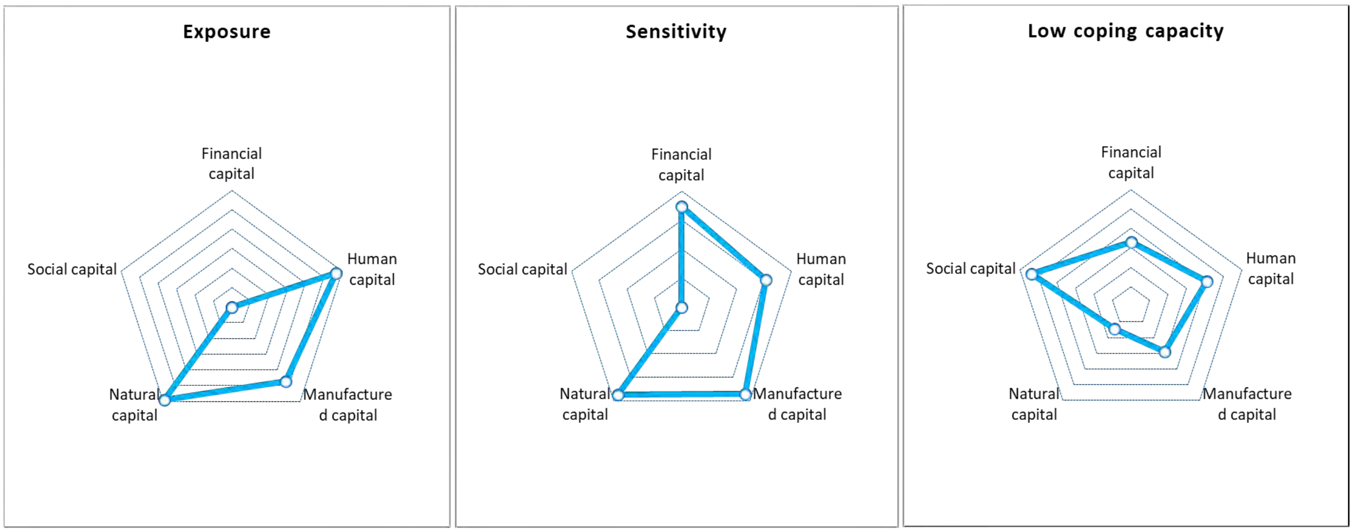

Figure 40: Influence of capital on each sub-index for Hants census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Natural capital	Social capital
Pluvial Flooding	Natural capital	Natural capital	Social capital
Fluvial Flooding	Natural capital	Natural capital	Social capital
Heat extreme - agriculture	Natural capital	Natural capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Social capital
Cooling demand	Manufactured capital	Manufactured capital	Social capital
Agriculture pests and diseases	Natural capital	Natural capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Human capital	Natural capital	Social capital
Wildfire	Manufactured capital	Financial capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Human capital	Manufactured capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Financial capital	Social capital
Heating demand	Manufactured capital	Manufactured capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Manufactured capital
Growing season	Natural capital	Natural capital	Manufactured capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Natural capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 9. Capital with most exposure to each climate-related impact in Hants census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.10 Inverness

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Inverness census division, the following four impacts are four ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Shifting ecoregions** driven by a combination of high exposure and vulnerability.
- **Agricultural pests and diseases** driven by a combination of the extent of climatic change and exposure.
- **Wildfire** driven by the extent of projected climate changes and sensitivity.
- **Pluvial flooding** driven by extent of climatic changes and low coping capacity.

Between 2035-2065 (mid century), shifting ecoregions and agricultural pests and diseases remain the top two, but vector-borne diseases (driven by sensitivity and extent of climatic changes), and heat extremes for ecosystems (through sensitivity) are included. Towards the end of the century (2065-2095), the top four hazards of concern are:

- **Shifting ecoregions**
- **Heat extremes for ecosystems**
- **Agricultural pests and diseases**
- **Heat extremes for agriculture** through exposure.

This prevalence of top-ranked impacts driven by temperature is consistent with patterns across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. These change over time, but with the reduction in freeze-thaw cycles will have the most consequences for wellbeing from mid-century onwards, followed by reduced heavy snowfall and reduced heating demand.

The longer opportunity for an extended summer tourism and recreation season offers opportunities and must be managed with decreasing winter tourism and recreation opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.49	5.14	4.29	4.33	4.74	6.13	3.37	4.73	3.96	5.51
Pluvial Flooding	4.96	6.18	4.51	4.36	4.75	5.30	4.45	4.61	4.02	5.21
Fluvial Flooding	4.16	3.95	4.20	4.11	4.24	4.28	3.19	4.75	4.30	5.21
Heat extreme - agriculture	4.44	3.34	4.60	3.96	5.16	6.19	4.93	4.75	4.07	5.43
Heat extreme - ecosystems	4.65	3.34	4.81	3.96	5.36	6.19	3.88	5.69	6.21	5.17
Heat extreme - human health	4.13	3.72	4.22	4.07	4.62	5.66	3.26	4.78	4.04	5.51
Heat extreme - transport infrastructure	4.03	3.19	4.13	3.61	4.96	6.92	3.97	4.47	3.98	4.96
Cooling demand	3.82	3.12	4.00	3.81	4.49	5.79	2.61	4.78	4.37	5.19
Agriculture pests and diseases	5.59	6.95	5.47	6.47	5.31	5.80	6.66	4.38	3.59	5.17
Shifting ecoregions	5.62	3.88	5.76	4.46	5.81	4.67	7.12	5.73	6.30	5.17
Vector-borne diseases	4.71	5.52	4.92	6.38	4.82	5.95	3.26	5.03	5.07	4.99
SLR and coastal flooding	4.62	5.25	4.62	5.25	4.62	5.25	3.78	4.72	4.57	4.88
Wildfire	5.05	6.34	4.68	4.86	4.38	3.65	3.97	4.95	5.02	4.88
Decreasing adverse outcomes										
Heavy snowfall	4.53	4.81	4.55	4.88	4.54	4.84	4.52	4.39	3.82	4.97
Freeze-thaw Cycles	4.27	4.43	4.58	5.70	5.04	7.51	4.43	4.10	3.65	4.55
Heating demand	4.48	4.86	4.33	4.26	4.34	4.30	2.61	5.22	5.08	5.36
Increasing beneficial outcomes										
Summer tourism & recreation	4.87	4.01	5.20	5.31	5.68	7.25	3.26	6.11	6.52	5.71
Growing season	4.30	2.14	4.34	2.31	4.79	4.10	5.26	4.90	4.15	5.65
Decreasing beneficial outcomes										
Winter tourism & recreation	4.38	4.44	4.32	4.18	4.03	3.03	3.26	4.91	4.68	5.15

Figure 41: Total WRI scores for median projections (50th percentile) under RCP8.5 for Inverness census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	8	6	9	7	8	4	9	9	12	2
Pluvial Flooding	4	3	8	6	7	9	4	11	10	4
Fluvial Flooding	10	7	11	8	13	12	12	7	7	4
Heat extreme - agriculture	9	10	7	10	4	2	3	8	8	3
Heat extreme - ecosystems	6	10	4	10	2	2	7	2	2	7
Heat extreme - human health	11	9	10	9	10	8	10	6	9	1
Heat extreme - transport infrastructure	12	12	12	13	5	1	5	12	11	11
Cooling demand	13	13	13	12	11	7	13	5	6	6
Agriculture pests and diseases	2	1	2	1	3	6	2	13	13	7
Shifting ecoregions	1	8	1	5	1	11	1	1	1	7
Vector-borne diseases	5	4	3	2	6	5	10	3	3	10
SLR and coastal flooding	7	5	6	3	9	10	8	10	5	12
Wildfire	3	2	5	4	12	13	6	4	4	12
Decreasing adverse outcomes										
Heavy snowfall	1	2	2	2	2	2	1	2	2	2
Freeze-thaw Cycles	3	3	1	1	1	1	2	3	3	3
Heating demand	2	1	3	3	3	3	3	1	1	1
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	1
Growing season	2	2	2	2	2	2	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 42: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Inverness census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Inverness Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Inverness census division changes only slightly compared with a high emissions scenario (RCP8.5). For 2015-2045, the four following climate impacts are ranked higher for increasingly adverse outcomes under RCP4.5:

- **Shifting ecoregions** driven by exposure and high vulnerability scores.
- **Agricultural pests and diseases** driven by a mix of exposure and the extent of climatic change.
- **Pluvial flooding** driven by the extent of climatic change.
- **Heat extremes for ecosystems** driven by sensitivity of habitats.

By mid-century (2050s), the four higher ranked climate impact drivers remain the same but in a slightly different rank: shifting ecoregions, pluvial flooding, agricultural pests and disease, and heat extremes for ecosystems. By end of the century (2080s), the top four have shift slightly again:

- **Shifting ecoregions.**
- **Agricultural pests and diseases.**
- **Heat extremes for ecosystems.**

- **Heat extremes for agriculture** driven by exposure and low coping capacity.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	7	3	8	6	7	1	9	9	12	2
Pluvial Flooding	3	1	2	1	8	10	4	11	10	4
Fluvial Flooding	9	5	9	5	12	12	12	7	7	4
Heat extreme - agriculture	5	7	5	9	4	6	3	8	8	3
Heat extreme - ecosystems	4	7	4	9	3	6	7	2	2	7
Heat extreme - human health	10	10	10	8	10	5	10	6	9	1
Heat extreme - transport infrastructure	11	11	11	11	9	9	5	12	11	11
Cooling demand	13	9	12	12	11	8	13	5	6	6
Agriculture pests and diseases	2	2	3	4	2	3	2	13	13	7
Shifting ecoregions	1	12	1	7	1	11	1	1	1	7
Vector-borne diseases	8	6	7	3	5	4	10	3	3	10
SLR and coastal flooding	6	4	6	2	6	2	8	10	5	12
Wildfire	12	13	13	13	13	13	6	4	4	12
Decreasing adverse outcomes										
Heavy snowfall	3	3	2	2	2	3	1	2	2	2
Freeze-thaw Cycles	2	2	3	3	3	2	2	3	3	3
Heating demand	1	1	1	1	1	1	3	1	1	1
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	1
Growing season	2	2	2	2	2	2	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 43: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Inverness census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Inverness Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Inverness census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

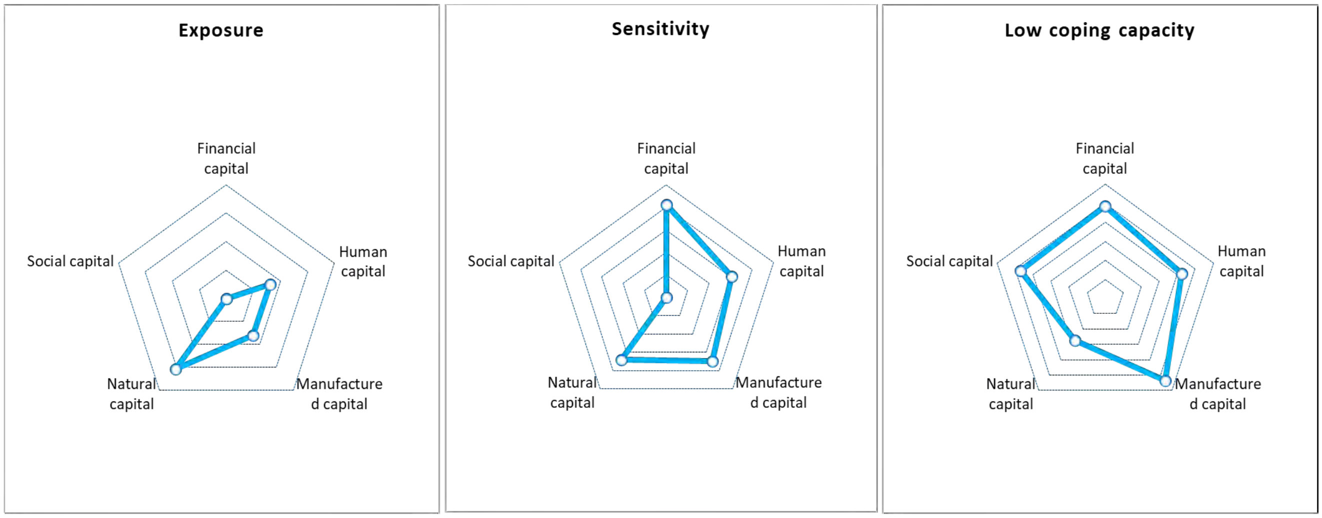

Figure 44: Influence of capital on each sub-index for Inverness census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to natural capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			
Drought	Natural capital	Natural capital	Natural capital

Pluvial Flooding	Natural capital	Natural capital	Natural capital
Fluvial Flooding	Natural capital	Natural capital	Natural capital
Heat extreme - agriculture	Natural capital	Financial capital	Natural capital
Heat extreme - ecosystems	Natural capital	Financial capital	Manufactured capital
Heat extreme - human health	Human capital	Manufactured capital	Natural capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Natural capital
Agriculture pests and diseases	Natural capital	Natural capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Financial capital	Manufactured capital
SLR and coastal flooding	Natural capital	Manufactured capital	Manufactured capital
Wildfire	Natural capital	Natural capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Manufactured capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Manufactured capital	Social capital
Heating demand	Manufactured capital	Manufactured capital	Natural capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Human capital
Growing season	Natural capital	Financial capital	Human capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Financial capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 10. Capital with most exposure to each climate-related impact in Inverness census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.11 Kings

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Kings census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest.

- **Heat extremes for agriculture** driven primarily by exposure, as well as sensitivity to the hazard.
- **Sea level rise and coastal flooding** driven by a combination of the extent of climatic change and low coping capacity.
- **Pluvial flooding** driven by exposure and vulnerability.
- **Heat extremes for human health** driven primarily by the extent of climatic impact and somewhat by exposure

Between 2035-2065 (mid century), sea level rise and coastal flooding moves to the third ranked position and wildfire moves to the second ranked position, driven by the extent of climatic change and low coping capacity: heat extremes for agriculture, wildfire, sea level rise and coastal flooding, and heat extremes for human health. Towards the end of the century (2065-2095), the top four hazards of concern are:

- **Heat extremes for agriculture**
- **Wildfire**
- **Sea level rise and coastal flooding**
- **Cooling demand for buildings** through extent of climatic change and exposure.

The prevalence of top-ranked impacts driven by temperature is largely consistent with the pattern across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century, although this census division has a higher rank for sea level rise and coastal flooding relative to many other census divisions.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. These are consistent over the century and the reduction in freeze-thaw cycles will have the most consequences for wellbeing, followed by reduced heating demand and reduced heavy snowfall.

The longer opportunity for a longer growing season offers opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	5.07	7.12	5.11	7.30	5.44	8.60	5.14	4.00	4.52	3.48
Pluvial Flooding	5.95	5.68	5.60	4.28	5.51	3.89	7.74	5.20	6.36	4.03
Fluvial Flooding	5.40	6.37	5.01	4.82	4.96	4.62	5.32	4.96	5.88	4.03
Heat extreme - agriculture	6.72	7.58	6.84	8.08	7.09	9.09	9.74	4.77	6.09	3.45
Heat extreme - ecosystems	4.27	7.58	4.39	8.08	4.65	9.09	2.00	3.75	3.44	4.06
Heat extreme - human health	5.77	8.00	5.79	8.10	5.82	8.19	6.58	4.25	4.76	3.74
Heat extreme - transport infrastructure	5.03	6.44	5.33	7.65	5.67	9.01	5.27	4.21	4.03	4.38
Cooling demand	5.59	7.98	5.69	8.38	5.90	9.22	6.58	3.89	3.55	4.24
Agriculture pests and diseases	4.89	6.56	4.78	6.11	4.58	5.31	5.31	3.85	3.64	4.06
Shifting ecoregions	4.52	7.39	4.31	6.52	4.22	6.16	2.90	3.90	3.74	4.06
Vector-borne diseases	5.48	6.27	5.28	5.47	5.18	5.07	6.58	4.53	4.84	4.23
SLR and coastal flooding	6.10	10.00	6.10	10.00	6.10	10.00	4.17	5.12	5.49	4.74
Wildfire	5.39	6.58	6.11	9.47	6.23	9.94	5.68	4.64	4.54	4.74
Decreasing adverse outcomes										
Heavy snowfall	4.97	5.42	4.91	5.19	5.02	5.63	5.49	4.47	4.52	4.43
Freeze-thaw Cycles	5.39	5.15	5.50	5.59	5.37	5.05	6.38	5.01	4.98	5.05
Heating demand	5.13	6.52	5.04	6.15	5.28	7.11	6.58	3.71	3.44	3.98
Increasing beneficial outcomes										
Summer tourism & recreation	5.79	5.43	5.59	4.61	5.77	5.35	6.58	5.58	4.24	6.93
Growing season	6.38	6.43	6.14	5.48	6.28	6.02	4.36	7.37	7.31	7.42
Decreasing beneficial outcomes										
Winter tourism & recreation	5.16	7.33	5.19	7.45	5.10	7.08	6.58	3.37	2.70	4.03

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 45: Total WRI scores for median projections (50th percentile) under RCP8.5 for Kings census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	9	7	9	8	8	7	10	9	8	12
Pluvial Flooding	3	13	6	13	7	13	2	1	1	9
Fluvial Flooding	7	11	10	12	10	12	7	3	3	9
Heat extreme - agriculture	1	4	1	5	1	4	1	4	2	13
Heat extreme - ecosystems	13	4	12	5	11	4	13	13	13	6
Heat extreme - human health	4	2	4	4	5	8	4	7	6	11
Heat extreme - transport infrastructure	10	10	7	7	6	6	9	8	9	3
Cooling demand	5	3	5	3	4	3	3	11	12	4
Agriculture pests and diseases	11	9	11	10	12	10	8	12	11	6
Shifting ecoregions	12	6	13	9	13	9	12	10	10	6
Vector-borne diseases	6	12	8	11	9	11	4	6	5	5
SLR and coastal flooding	2	1	3	1	3	1	11	2	4	1
Wildfire	8	8	2	2	2	2	6	5	7	1
Decreasing adverse outcomes										
Heavy snowfall	3	2	3	3	3	2	3	2	2	2
Freeze-thaw Cycles	1	3	1	2	1	3	2	1	1	1
Heating demand	2	1	2	1	2	1	1	3	3	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	1	2	2	2
Growing season	1	1	1	1	1	1	2	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 46: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Kings census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Kings Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Kings census division changes slightly. For 2015-2045 (2030s), the four top-ranked climate impacts for increasingl adverse outcomes under RCP4.5 are:

- **Heat extremes for agriculture** driven by exposure and sensitivity.
- **Sea level rise and coastal flooding** driven by low coping capacity and the extent of climatic change.
- **Wildfire** driven by low coping capacity and the extent of climatic change.
- **Heat extremes for human health** driven by exposure and vulnerability.

This pattern is projected to hold through mid century and towards the end of the century.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	10	10	10	8	11	11	10	9	8	12
Pluvial Flooding	7	13	7	13	5	13	2	1	1	9
Fluvial Flooding	9	12	9	12	8	12	7	3	3	9
Heat extreme - agriculture	1	5	1	5	1	5	1	4	2	13
Heat extreme - ecosystems	12	5	12	5	13	5	13	13	13	6
Heat extreme - human health	4	4	4	4	4	4	4	7	6	11
Heat extreme - transport infrastructure	8	7	8	7	9	8	9	8	9	3
Cooling demand	5	3	5	3	6	3	3	11	12	4
Agriculture pests and diseases	11	9	11	11	10	9	8	12	11	6
Shifting ecoregions	13	8	13	9	12	7	12	10	10	6
Vector-borne diseases	6	11	6	10	7	10	4	6	5	5
SLR and coastal flooding	2	1	2	1	2	1	11	2	4	1
Wildfire	3	2	3	2	3	2	6	5	7	1
Decreasing adverse outcomes										
Heavy snowfall	2	3	3	2	3	2	3	2	2	2
Freeze-thaw Cycles	1	1	1	3	1	3	2	1	1	1
Heating demand	3	2	2	1	2	1	1	3	3	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	1	2	2	2
Growing season	1	1	1	1	1	1	2	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 47: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Kings census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Kings Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Kings census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

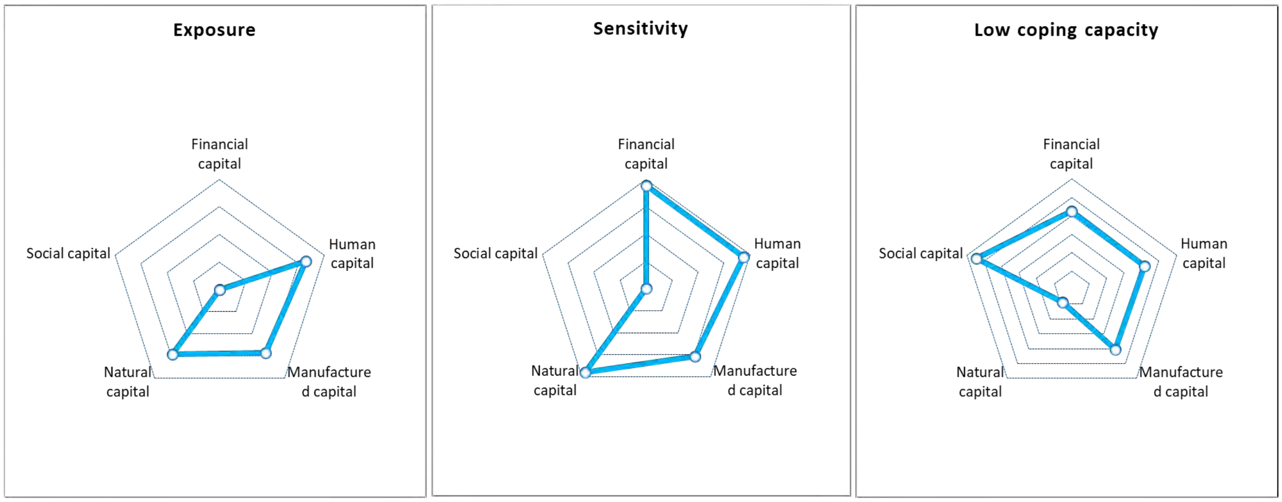

Figure 48: Influence of capital on each sub-index for Kings census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			
Drought	Human capital	Manufactured capital	Social capital

Pluvial Flooding	Natural capital	Natural capital	Social capital
Fluvial Flooding	Human capital	Natural capital	Social capital
Heat extreme - agriculture	Natural capital	Financial capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Social capital
Cooling demand	Manufactured capital	Human capital	Social capital
Agriculture pests and diseases	Natural capital	Financial capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Human capital	Natural capital	Social capital
Wildfire	Human capital	Manufactured capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Human capital	Financial capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Financial capital	Social capital
Heating demand	Manufactured capital	Human capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Manufactured capital
Growing season	Natural capital	Natural capital	Natural capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Human capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 11. Capital with most exposure to each climate-related impact in Kings census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.12 Lunenburg

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Lunenburg census division, the following four impacts are top-ranked for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Fluvial flooding** driven primarily by the extent of climatic change and sensitivity to the hazard.
- **Pluvial flooding** driven by a combination of the extent of climatic change, relatively high exposure, and high vulnerability.
- **Vector-borne diseases** driven by the extent of climatic change.
- **Heat extremes for agriculture** driven mostly by exposure.

Between 2035-2065 (mid century), wildfire emerges as the top hazard of concern, driven by the extent of climatic change, followed by fluvial flooding, pluvial flooding, and heat extremes for agriculture. By the end of the century, 2065-2095, the top four hazards negatively affecting wellbeing are:

- **Wildfire**
- **Fluvial flooding**
- **Heat extremes for agriculture**
- **Cooling demand for buildings**

The prevalence of top-ranked impacts driven by temperature is largely consistent with the pattern across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century, although this census division has a higher rank for flooding across all three time periods than many other census divisions.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. These are consistent over the century, with the reduced demand to heat buildings will have the most consequences for wellbeing, followed by reduced heavy snowfall and a reduction in freeze-thaw cycles.

The longer opportunity for a longer growing season offers opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.99	4.56	5.08	4.93	5.30	5.80	6.32	4.54	4.02	5.07
Pluvial Flooding	5.98	7.08	5.39	4.70	5.24	4.10	6.23	5.31	5.66	4.97
Fluvial Flooding	6.04	7.76	5.76	6.65	5.71	6.43	5.96	5.22	5.46	4.97
Heat extreme - agriculture	5.32	5.10	5.37	5.33	5.65	6.45	6.50	4.83	4.37	5.30
Heat extreme - ecosystems	4.76	5.10	4.82	5.33	5.09	6.45	4.62	4.66	3.83	5.48
Heat extreme - human health	5.27	6.33	5.34	6.63	5.41	6.90	5.91	4.42	4.15	4.68
Heat extreme - transport infrastructure	4.70	3.49	4.97	4.55	5.34	6.04	5.29	5.02	4.35	5.68
Cooling demand	5.29	5.70	5.36	5.97	5.55	6.75	6.18	4.64	4.39	4.90
Agriculture pests and diseases	4.86	4.65	5.00	5.23	5.02	5.31	5.06	4.86	4.24	5.48
Shifting ecoregions	4.95	6.96	4.69	5.91	4.69	5.91	4.64	4.11	2.73	5.48
Vector-borne diseases	5.34	6.80	4.99	5.41	5.07	5.72	5.91	4.33	3.80	4.85
SLR and coastal flooding	3.88	1.00	3.88	1.00	3.88	1.00	4.41	5.06	5.03	5.08
Wildfire	5.20	5.74	5.97	8.84	5.97	8.82	5.89	4.58	4.09	5.08
Decreasing adverse outcomes										
Heavy snowfall	5.04	4.03	5.13	4.39	5.28	4.99	6.26	4.94	4.98	4.90
Freeze-thaw Cycles	5.01	4.21	4.86	3.64	4.78	3.30	5.50	5.16	5.16	5.16
Heating demand	5.53	6.83	5.31	5.95	5.37	6.17	6.18	4.56	4.37	4.74
Increasing beneficial outcomes										
Summer tourism & recreation	5.17	4.04	4.88	2.91	4.95	3.19	5.91	5.36	5.22	5.50
Growing season	5.96	5.43	5.86	5.03	5.81	4.82	7.25	5.58	5.20	5.97
Decreasing beneficial outcomes										
Winter tourism & recreation	5.88	7.14	6.00	7.60	6.06	7.88	5.91	5.23	5.00	5.46

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 49: Total WRI scores for median projections (50th percentile) under RCP8.5 for Lunenburg census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	8	11	7	10	7	9	2	10	10	8
Pluvial Flooding	2	2	3	11	8	12	3	1	1	9
Fluvial Flooding	1	1	2	2	2	6	5	2	2	9
Heat extreme - agriculture	4	8	4	7	3	4	1	6	5	5
Heat extreme - ecosystems	11	8	11	7	9	4	12	7	11	2
Heat extreme - human health	6	5	6	3	5	2	6	11	8	13
Heat extreme - transport infrastructure	12	12	10	12	6	7	9	4	6	1
Cooling demand	5	7	5	4	4	3	4	8	4	11
Agriculture pests and diseases	10	10	8	9	11	11	10	5	7	2
Shifting ecoregions	9	3	12	5	12	8	11	13	13	2
Vector-borne diseases	3	4	9	6	10	10	6	12	12	12
SLR and coastal flooding	13	13	13	13	13	13	13	3	3	6
Wildfire	7	6	1	1	1	1	8	9	9	6
Decreasing adverse outcomes										
Heavy snowfall	2	3	2	2	2	2	1	2	2	2
Freeze-thaw Cycles	3	2	3	3	3	3	3	1	1	1
Heating demand	1	1	1	1	1	1	2	3	3	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	2	1	2
Growing season	1	1	1	1	1	1	1	1	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 50: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Lunenburg census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Lunenburg Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for Lunenburg census division changes only slightly compared with a high emissions scenario (RCP8.5) but is consistent with changes across the province under RCP4.5.

For 2015-2045 (2030s), the four higher ranked climate impacts with increasingly adverse outcomes under RCP4.5 are:

- **Fluvial flooding** driven by the extent of climatic change and sensitivity.
- **Pluvial flooding** driven by high sensitivity and somewhat by exposure.
- **Wildfire** driven by the extent of climatic change.
- **Heat extremes for human** health driven most by climatic impacts.

By mid-century (2050s), the four top-ranked climate impact drivers shift to **Fluvial flooding**, **Wildfire**, **Heat extremes for human health**, and **Cooling Demand for buildings**. By the end of the century (2065-2095), the four top-ranked climate impact drivers are:

- **Pluvial flooding.**

- **Fluvial flooding.**
- **Wildfire.**
- **Heat extremes for human health.**

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	10	12	7	8	9	11	2	10	10	8
Pluvial Flooding	2	5	5	11	1	5	3	1	1	9
Fluvial Flooding	1	2	1	3	2	2	5	2	2	9
Heat extreme - agriculture	6	8	6	9	6	9	1	6	5	5
Heat extreme - ecosystems	11	8	12	9	12	9	12	7	11	2
Heat extreme - human health	4	1	3	2	4	1	6	11	8	13
Heat extreme - transport infrastructure	9	11	10	12	11	12	9	4	6	1
Cooling demand	5	6	4	5	5	8	4	8	4	11
Agriculture pests and diseases	8	10	9	7	7	7	10	5	7	2
Shifting ecoregions	12	4	11	4	10	3	11	13	13	2
Vector-borne diseases	7	7	8	6	8	6	6	12	12	12
SLR and coastal flooding	13	13	13	13	13	13	13	3	3	6
Wildfire	3	3	2	1	3	4	8	9	9	6
Decreasing adverse outcomes										
Heavy snowfall	2	2	2	2	2	2	1	2	2	2
Freeze-thaw Cycles	3	3	3	3	3	3	3	1	1	1
Heating demand	1	1	1	1	1	1	2	3	3	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	2	1	2
Growing season	1	1	1	1	1	1	1	1	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 51: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Lunenburg census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Lunenburg Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Lunenburg census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

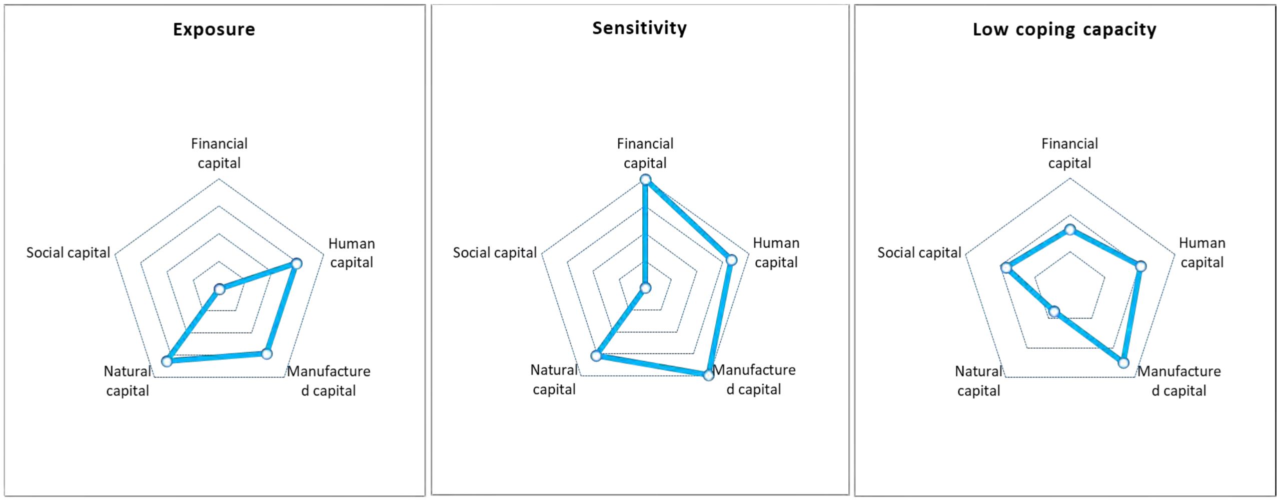

Figure 52: Influence of capital on each sub-index for Lunenburg census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to manufactured capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Financial capital	Manufactured capital
Pluvial Flooding	Natural capital	Natural capital	Manufactured capital
Fluvial Flooding	Natural capital	Natural capital	Manufactured capital
Heat extreme - agriculture	Natural capital	Financial capital	Manufactured capital
Heat extreme - ecosystems	Natural capital	Natural capital	Manufactured capital
Heat extreme - human health	Human capital	Human capital	Manufactured capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Manufactured capital
Agriculture pests and diseases	Natural capital	Financial capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Manufactured capital	Manufactured capital
SLR and coastal flooding	Manufactured capital	Manufactured capital	Manufactured capital
Wildfire	Natural capital	Manufactured capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Human capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Financial capital	Manufactured capital
Heating demand	Manufactured capital	Financial capital	Manufactured capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Financial capital
Growing season	Natural capital	Financial capital	Financial capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 12. Capital with most exposure to each climate-related impact in Lunenburg census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.13 Pictou

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Pictou census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Cooling demand for buildings** driven primarily by the extent of climatic change and exposure.
- **Heat extremes for human health** driven by a combination of the extent of climatic change and sensitivity.
- **Pluvial flooding** driven by exposure and somewhat by sensitivity.
- **Heat extremes for transportation infrastructure** (e.g., roads and rails), driven mostly by a combination of climatic change, exposure, and vulnerability.

Between 2035-2065 (mid century), the top two hazards of concern remain the same – cooling demand and heat extremes for human health. However, heat extremes for transportation infrastructure moves to the third ranked position and sea level rise and coastal flooding is in fourth place, driven by low coping capacity.

By the end of the century, 2065-2095, the top four hazards negatively affecting wellbeing are:

- **Heat extremes for transportation infrastructure**
- **Cooling demand**
- **Heat extremes for human health**
- **Heat extremes for agriculture**

The prevalence of top-ranked impacts driven by temperature is consistent with the pattern across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. These change a little over the course of the century, but by mid-century the pattern remains consistent. Reduced freeze-thaw cycles, followed by reduced need to heat buildings and reduced heavy snowfall will offer fewer negative impacts to wellbeing.

The longer growing season offers opportunities and will need to be balanced with other hazards, such as heat extremes for agriculture.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	5.22	5.28	5.16	5.05	5.60	6.80	4.61	5.49	5.62	5.35
Pluvial Flooding	5.88	5.51	5.03	2.10	5.36	3.43	6.85	5.58	5.86	5.31
Fluvial Flooding	5.54	6.11	5.32	5.24	5.17	4.62	5.34	5.36	5.41	5.31
Heat extreme - agriculture	5.35	6.32	5.41	6.53	5.86	8.35	5.21	4.94	4.54	5.34
Heat extreme - ecosystems	4.54	6.32	4.59	6.53	5.05	8.35	1.59	5.12	4.87	5.37
Heat extreme - human health	5.91	6.34	5.86	6.12	6.02	6.77	5.72	5.79	6.46	5.13
Heat extreme - transport infrastructure	5.73	5.69	5.86	6.19	6.51	8.83	6.10	5.57	5.73	5.40
Cooling demand	5.96	6.43	6.06	6.80	6.44	8.35	7.07	5.18	5.43	4.93
Agriculture pests and diseases	5.21	4.99	5.49	6.09	5.58	6.48	3.96	5.95	6.53	5.37
Shifting ecoregions	5.11	5.92	5.04	5.63	5.05	5.66	2.63	5.96	6.54	5.37
Vector-borne diseases	5.35	5.56	5.39	5.73	5.40	5.76	5.72	5.06	4.60	5.53
SLR and coastal flooding	5.64	5.42	5.64	5.42	5.64	5.42	6.25	5.44	4.99	5.88
Wildfire	5.01	3.63	5.35	4.99	5.61	6.04	5.36	5.53	5.17	5.88
Decreasing adverse outcomes										
Heavy snowfall	5.48	6.32	5.37	5.89	5.46	6.26	5.45	5.07	4.40	5.73
Freeze-thaw Cycles	6.01	7.80	6.18	8.48	6.13	8.31	5.92	5.15	4.82	5.48
Heating demand	6.32	7.64	6.09	6.72	5.94	6.12	7.07	5.29	5.68	4.91
Increasing beneficial outcomes										
Summer tourism & recreation	5.05	5.36	5.10	5.56	5.18	5.87	5.72	4.56	3.50	5.62
Growing season	5.37	5.50	5.24	5.01	5.37	5.51	5.03	5.47	5.19	5.74
Decreasing beneficial outcomes										
Winter tourism & recreation	5.72	7.87	5.72	7.87	5.76	8.03	5.72	4.65	3.95	5.35

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 53: Total WRI scores for median projections (50th percentile) under RCP8.5 for Pictou census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	9	11	10	11	7	5	10	7	6	8
Pluvial Flooding	3	9	12	13	10	13	2	4	4	10
Fluvial Flooding	6	5	9	10	11	12	8	9	8	10
Heat extreme - agriculture	7	3	6	2	4	2	9	13	13	9
Heat extreme - ecosystems	13	3	13	2	13	2	13	11	11	5
Heat extreme - human health	2	2	2	5	3	6	5	3	3	12
Heat extreme - transport infrastructure	4	7	3	4	1	1	4	5	5	4
Cooling demand	1	1	1	1	2	4	1	10	7	13
Agriculture pests and diseases	10	12	5	6	8	7	11	2	2	5
Shifting ecoregions	11	6	11	8	12	10	12	1	1	5
Vector-borne diseases	8	8	7	7	9	9	5	12	12	3
SLR and coastal flooding	5	10	4	9	5	11	3	8	10	1
Wildfire	12	13	8	12	6	8	7	6	9	1
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	3	2	3	3	3	1
Freeze-thaw Cycles	2	1	1	1	1	1	2	2	2	2
Heating demand	1	2	2	2	2	3	1	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	1	2	1	1	2	2	2
Growing season	1	1	1	2	1	2	2	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 54: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Pictou census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Pictou Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Pictou census division changes slightly. For 2015-2045 (2030s), the following four climate impacts rank higher for increasing adverse outcomes under RCP4.5 are:

- **Cooling demand for buildings** driven by exposure.
- **Heat extremes for human** health driven most by a combination of degree of climatic change and population sensitivity.
- **Heat extreme for transportation infrastructure** driven by a combination of exposure and sensitivity.
- **Sea level rise and coastal** flooding driven most exposure and low coping capacity.

The pattern is projected to remain consistent through mid century. Between 2065-2095, sea level rise and coastal flooding switches rank to third and heat extremes for transportation infrastructures moves to fourth.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	12	11	10	11	7	6	10	7	6	8
Pluvial Flooding	9	13	6	12	11	13	2	4	4	10
Fluvial Flooding	5	2	5	5	5	7	8	9	8	10
Heat extreme - agriculture	8	5	7	2	8	2	9	13	13	9
Heat extreme - ecosystems	13	5	13	2	13	2	13	11	11	5
Heat extreme - human health	2	3	2	4	2	4	5	3	3	12
Heat extreme - transport infrastructure	3	7	3	6	4	10	4	5	5	4
Cooling demand	1	4	1	1	1	1	1	10	7	13
Agriculture pests and diseases	10	10	9	10	9	11	11	2	2	5
Shifting ecoregions	6	1	11	7	10	5	12	1	1	5
Vector-borne diseases	7	9	8	8	6	9	5	12	12	3
SLR and coastal flooding	4	8	4	9	3	8	3	8	10	1
Wildfire	11	12	12	13	12	12	7	6	9	1
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	3	3	3	3	3	1
Freeze-thaw Cycles	2	1	2	2	2	1	2	2	2	2
Heating demand	1	2	1	1	1	2	1	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	1	2	2	2
Growing season	1	1	1	1	1	1	2	1	1	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 55: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Pictou Census Division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Pictou Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Pictou census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

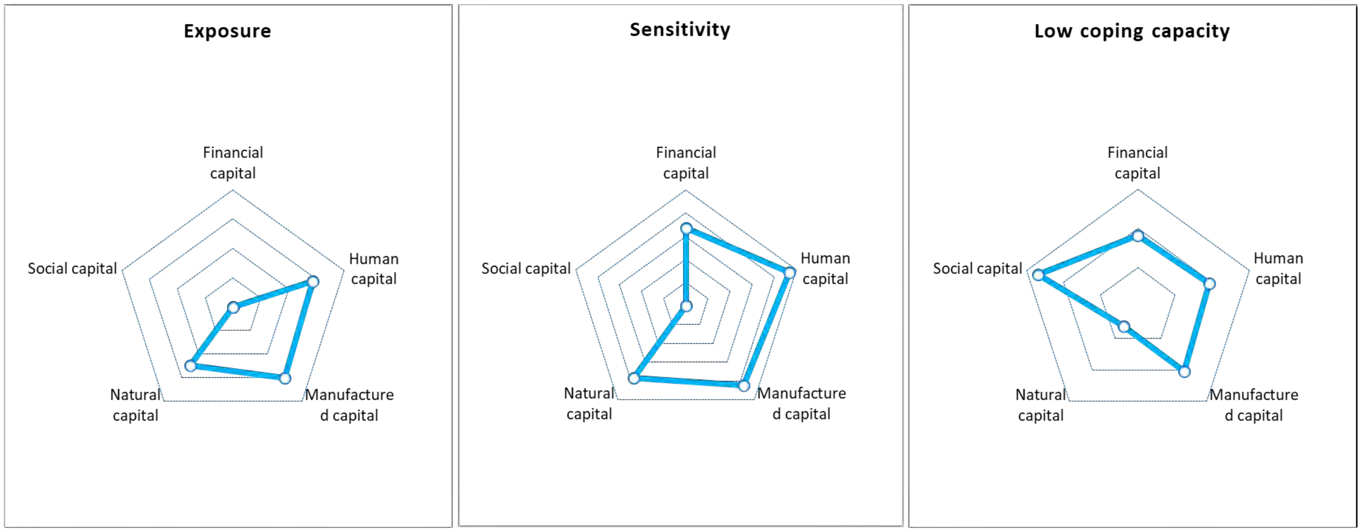

Figure 56: Influence of capital on each sub-index for Pictou census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to social capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Human capital	Human capital	Social capital
Pluvial Flooding	Natural capital	Natural capital	Social capital
Fluvial Flooding	Manufactured capital	Human capital	Social capital
Heat extreme - agriculture	Natural capital	Natural capital	Social capital
Heat extreme - ecosystems	Natural capital	Natural capital	Social capital
Heat extreme - human health	Human capital	Natural capital	Social capital
Heat extreme - transport infrastructure	Manufactured capital	Human capital	Social capital
Cooling demand	Manufactured capital	Human capital	Social capital
Agriculture pests and diseases	Natural capital	Manufactured capital	Social capital
Shifting ecoregions	Natural capital	Natural capital	Social capital
Vector-borne diseases	Human capital	Human capital	Social capital
SLR and coastal flooding	Human capital	Human capital	Social capital
Wildfire	Manufactured capital	Human capital	Social capital
Decreasing adverse outcomes			
Heavy snowfall	Human capital	Human capital	Social capital
Freeze-thaw Cycles	Manufactured capital	Human capital	Social capital
Heating demand	Manufactured capital	Human capital	Social capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Manufactured capital	Human capital
Growing season	Natural capital	Natural capital	Human capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Social capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 13. Capital with most exposure to each climate-related impact in Pictou census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.14 Queens

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Queens census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Heat extremes for ecosystems** driven primarily by exposure.
- **Shifting ecoregions** driven by the extent of climatic change and exposure.
- **Agricultural pests and diseases** driven by high exposure and vulnerability.
- **Fluvial flooding** driven by the extent of climatic change.

Between 2035-2065 (mid century), the top four hazards are the same, but in a slightly different rank: heat extremes for ecosystems, agricultural pests and diseases, fluvial flooding, and shifting ecoregions. This pattern continues to the end of the century (2065-2095).

The prevalence of top-ranked impacts driven by a mix of temperature and precipitation is a slightly different pattern than that across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasing adverse outcomes over the course of the century.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The pattern is projected to remain consistent over the century, with reduced heating demand for buildings, followed by reduced heavy snowfall, and reduction in the number of freeze-thaw cycles less negatively impacting wellbeing.

The longer growing season offers opportunities for Queens but will need to be balanced with increased conditions for agricultural pests and diseases. Similarly, summer tourism and recreation will offer opportunities, balanced with reduced winter tourism and recreational opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.83	5.02	4.79	4.85	4.93	5.40	3.58	5.37	4.23	6.51
Pluvial Flooding	4.46	5.39	5.16	8.19	4.58	5.89	2.88	4.79	3.77	5.81
Fluvial Flooding	5.27	6.85	5.34	7.10	5.30	6.95	4.06	5.09	4.38	5.81
Heat extreme - agriculture	4.55	4.25	4.50	4.05	4.75	5.07	2.75	5.59	4.69	6.49
Heat extreme - ecosystems	5.79	4.25	5.74	4.05	5.99	5.07	8.14	5.38	4.55	6.22
Heat extreme - human health	4.32	5.39	4.45	5.90	4.52	6.19	1.92	4.99	4.33	5.64
Heat extreme - transport infrastructure	4.17	2.57	4.38	3.43	4.70	4.71	2.56	5.77	5.30	6.25
Cooling demand	4.78	4.82	4.75	4.72	4.93	5.43	3.49	5.41	5.51	5.30
Agriculture pests and diseases	5.40	4.96	5.38	4.88	5.37	4.85	5.64	5.50	4.79	6.22
Shifting ecoregions	5.56	6.51	5.27	5.33	5.29	5.44	5.65	5.04	3.87	6.22
Vector-borne diseases	4.63	6.50	4.16	4.64	4.33	5.32	1.92	5.05	4.41	5.69
SLR and coastal flooding	4.33	2.46	4.33	2.46	4.33	2.46	4.76	5.05	4.15	5.95
Wildfire	4.66	5.68	5.25	8.06	5.15	7.65	3.27	4.84	3.73	5.95
Decreasing adverse outcomes										
Heavy snowfall	4.61	4.69	4.80	5.44	4.87	5.75	3.32	5.21	4.51	5.91
Freeze-thaw Cycles	3.41	1.00	3.41	1.00	3.45	1.12	2.57	5.05	4.56	5.53
Heating demand	5.19	5.51	5.18	5.46	5.26	5.76	3.49	5.89	6.49	5.28
Increasing beneficial outcomes										
Summer tourism & recreation	4.16	4.84	3.91	3.83	4.19	4.94	1.92	4.95	4.94	4.96
Growing season	5.24	7.10	5.23	7.04	5.31	7.37	5.28	4.30	3.88	4.72
Decreasing beneficial outcomes										
Winter tourism & recreation	4.51	6.30	4.67	6.92	4.67	6.93	1.92	4.92	3.55	6.28

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 57: Total WRI scores for median projections (50th percentile) under RCP8.5 for Queens census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	5	7	7	7	7	7	6	6	9	1
Pluvial Flooding	10	5	6	1	10	4	9	13	12	9
Fluvial Flooding	4	1	3	3	3	2	5	7	7	9
Heat extreme - agriculture	9	10	9	10	8	9	10	2	4	2
Heat extreme - ecosystems	1	10	1	10	1	9	1	5	5	4
Heat extreme - human health	12	6	10	4	11	3	12	11	8	12
Heat extreme - transport infrastructure	13	12	11	12	9	12	11	1	2	3
Cooling demand	6	9	8	8	6	6	7	4	1	13
Agriculture pests and diseases	3	8	2	6	2	11	3	3	3	4
Shifting ecoregions	2	2	4	5	4	5	2	10	11	4
Vector-borne diseases	8	3	13	9	12	8	12	9	6	11
SLR and coastal flooding	11	13	12	13	13	13	4	8	10	7
Wildfire	7	4	5	2	5	1	8	12	13	7
Decreasing adverse outcomes										
Heavy snowfall	2	2	2	2	2	2	2	2	3	1
Freeze-thaw Cycles	3	3	3	3	3	3	3	3	2	2
Heating demand	1	1	1	1	1	1	1	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	1
Growing season	1	1	1	1	1	1	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 58: Rankings of climate-related impacts for the median projections (50^{th} percentile) under RCP8.5 for the Queens census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Queens Under a Low Emissions Scenario (RCP4.5)

For 2015-2045 (2030s), the following four climate impacts ranked higher for increasing adverse outcomes under RCP4.5:

- **Heat extremes for ecosystems** driven most by exposure.
- **Agricultural pests and diseases** driven most by a combination of exposure and vulnerability of agricultural activity.
- **Shifting ecoregions** driven by a combination of the extent of climate change, exposure, and low coping capacity.
- **Fluvial flooding** driven by the extent of climatic change and somewhat by exposure.

Over the mid and latter half of the century, there are few changes. Between 2035-2065, the four top-ranked climate impact drivers are the same as in the earlier part of the century. Between 2065-2095, the climate impact drivers are the same, but the rank changes slightly, with shifting ecoregions in the second ranked position and agricultural pests and diseases in the third.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	9	12	5	6	7	11	6	6	9	1
Pluvial Flooding	5	1	13	9	5	1	9	13	12	9
Fluvial Flooding	4	2	4	3	4	3	5	7	7	9
Heat extreme - agriculture	10	9	9	10	8	9	10	2	4	2
Heat extreme - ecosystems	1	9	1	10	1	9	1	5	5	4
Heat extreme - human health	8	3	8	1	9	4	12	11	8	12
Heat extreme - transport infrastructure	11	11	10	12	11	12	11	1	2	3
Cooling demand	6	8	6	8	6	7	7	4	1	13
Agriculture pests and diseases	2	6	2	5	3	6	3	3	3	4
Shifting ecoregions	3	5	3	2	2	2	2	10	11	4
Vector-borne diseases	13	7	12	7	12	5	12	9	6	11
SLR and coastal flooding	12	13	11	13	10	13	4	8	10	7
Wildfire	7	4	7	4	13	8	8	12	13	7
Decreasing adverse outcomes										
Heavy snowfall	2	1	2	1	2	1	2	2	3	1
Freeze-thaw Cycles	3	3	3	3	3	3	3	3	2	2
Heating demand	1	2	1	2	1	2	1	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	1
Growing season	1	1	1	1	1	1	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 59: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Queens census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Queens Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Queens census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

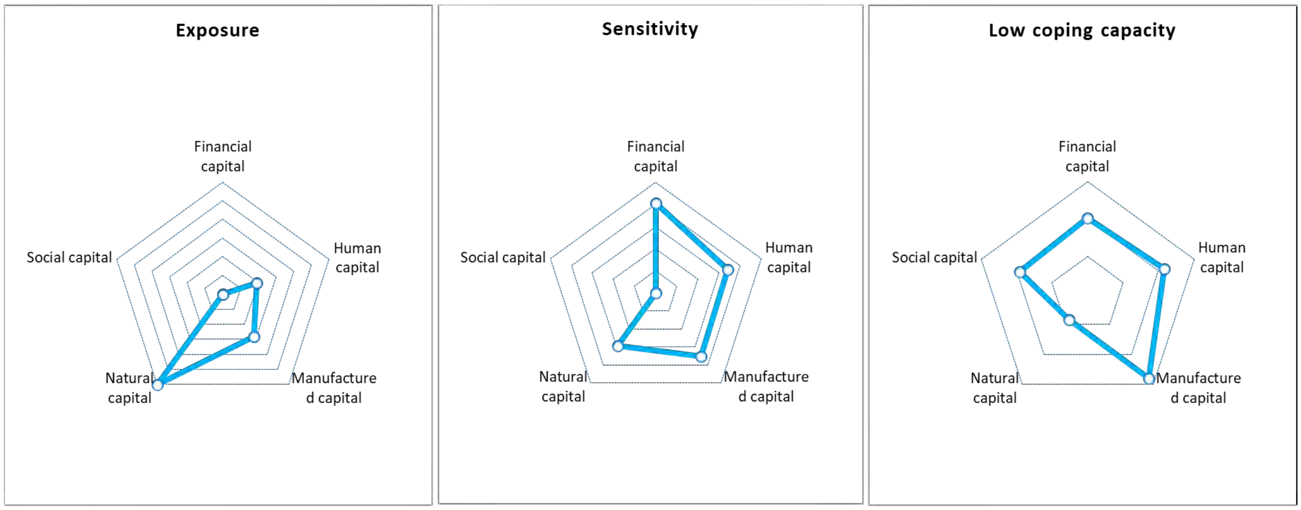

Figure 60: Influence of capital on each sub-index for Queens census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to manufactured capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			
Drought	Natural capital	Financial capital	Manufactured capital

Pluvial Flooding	Natural capital	Manufactured capital	Manufactured capital
Fluvial Flooding	Natural capital	Natural capital	Manufactured capital
Heat extreme - agriculture	Natural capital	Financial capital	Manufactured capital
Heat extreme - ecosystems	Natural capital	Natural capital	Manufactured capital
Heat extreme - human health	Human capital	Manufactured capital	Manufactured capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Manufactured capital
Agriculture pests and diseases	Natural capital	Financial capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Natural capital	Manufactured capital
SLR and coastal flooding	Natural capital	Human capital	Manufactured capital
Wildfire	Natural capital	Human capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Human capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Manufactured capital	Manufactured capital
Heating demand	Manufactured capital	Manufactured capital	Manufactured capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Natural capital	Financial capital
Growing season	Natural capital	Financial capital	Social capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 14. Capital with most exposure to each climate-related impact in Queens census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.15 Richmond

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Richmond census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Sea level rise and coastal flooding** driven by the extent of climatic change and high exposure.
- **Pluvial flooding** driven by the extent of climatic change.
- **Fluvial flooding** driven by the extent of climatic change.
- **Vector-borne diseases** driven by sensitivity to the hazard.

Between 2035-2065 (mid century), the top four hazards are the same, but in a slightly different rank: pluvial and fluvial flooding switch relative ranks due to changes in projected climate conditions.

The prevalence of top-ranked climate impacts driven by a mix of temperature and precipitation is a slightly different pattern than that across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The pattern is projected to remain consistent over the century, with reduced heating demand for buildings, followed by a projected reduction in the number of freeze-thaw cycles, and reduced heavy snowfall less negatively impacting wellbeing.

For increasingly beneficial outcomes, the pattern is projected to fluctuate between whether a longer growing season or improved conditions for summer tourism and recreation will offer the most relative benefit for Richmond.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.11	4.18	3.85	3.15	3.79	2.91	3.36	4.46	3.40	5.51
Pluvial Flooding	4.81	7.75	4.62	7.00	4.45	6.30	2.14	4.67	4.38	4.97
Fluvial Flooding	4.55	6.33	4.82	7.42	4.69	6.92	2.70	4.57	4.18	4.97
Heat extreme - agriculture	3.49	2.95	3.55	3.20	3.61	3.43	1.11	4.95	4.08	5.81
Heat extreme - ecosystems	3.65	2.95	3.71	3.20	3.77	3.43	2.93	4.35	3.39	5.32
Heat extreme - human health	3.70	3.81	3.80	4.21	3.77	4.11	1.54	4.72	4.40	5.05
Heat extreme - transport infrastructure	3.75	3.24	3.82	3.52	3.78	3.34	2.02	4.88	4.59	5.17
Cooling demand	4.17	2.80	4.26	3.18	4.35	3.51	4.30	4.79	4.98	4.59
Agriculture pests and diseases	3.76	5.04	3.41	3.65	3.20	2.82	1.42	4.28	3.24	5.32
Shifting ecoregions	3.75	5.00	3.97	5.91	4.03	6.12	1.43	4.28	3.24	5.32
Vector-borne diseases	4.36	5.66	4.28	5.37	4.17	4.90	1.54	5.12	5.23	5.00
SLR and coastal flooding	5.65	9.95	5.65	9.95	5.65	9.95	4.08	4.28	3.47	5.09
Wildfire	3.66	3.09	3.71	3.29	3.53	2.57	2.37	4.59	4.08	5.09
Decreasing adverse outcomes										
Heavy snowfall	4.24	5.66	4.05	4.90	4.15	5.29	1.84	4.72	4.24	5.21
Freeze-thaw Cycles	4.90	8.49	5.12	9.37	5.02	8.98	2.50	4.30	4.01	4.60
Heating demand	4.91	5.02	5.13	5.92	5.29	6.57	4.30	5.15	5.60	4.71
Increasing beneficial outcomes										
Summer tourism & recreation	4.17	4.90	4.44	5.96	4.32	5.47	1.54	5.13	4.65	5.61
Growing season	4.19	5.20	4.38	5.99	4.40	6.04	2.53	4.51	3.37	5.65
Decreasing beneficial outcomes										
Winter tourism & recreation	3.59	3.75	3.56	3.61	3.85	4.79	1.54	4.54	3.75	5.33

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 61: Total WRI scores for median projections (50th percentile) under RCP8.5 for Richmond census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	6	7	7	13	7	11	3	9	10	2
Pluvial Flooding	2	2	3	3	3	3	7	6	5	11
Fluvial Flooding	3	3	2	2	2	2	5	8	6	11
Heat extreme - agriculture	13	11	12	10	11	8	13	2	7	1
Heat extreme - ecosystems	12	11	10	10	10	8	4	10	11	3
Heat extreme - human health	10	8	9	6	9	6	9	5	4	9
Heat extreme - transport infrastructure	8	9	8	8	8	10	8	3	3	6
Cooling demand	5	13	5	12	4	7	1	4	2	13
Agriculture pests and diseases	7	5	13	7	13	12	12	12	12	3
Shifting ecoregions	9	6	6	4	6	4	11	13	13	3
Vector-borne diseases	4	4	4	5	5	5	9	1	1	10
SLR and coastal flooding	1	1	1	1	1	1	2	11	9	7
Wildfire	11	10	11	9	12	13	6	7	8	7
Decreasing adverse outcomes										
Heavy snowfall	3	2	3	3	3	3	3	2	2	1
Freeze-thaw Cycles	2	1	2	1	2	1	2	3	3	3
Heating demand	1	3	1	2	1	2	1	1	1	2
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	1	2	2	2	2	1	1	2
Growing season	1	1	2	1	1	1	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 62: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Richmond census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Richmond Under a Low Emissions Scenario (RCP4.5)

For 2015-2045 (2030s), the following four climate impacts rank higher for increasingly adverse outcomes under RCP4.5:

- **Sea level rise and coastal flooding** driven most by climatic impacts and exposure.
- **Cooling demand for buildings** driven by exposure and sensitivity.
- **Drought** driven by extent of climatic change, exposure, and low coping capacity.
- **Wildfire** driven by the extent of projected climatic changes.

Between 2035-2065, the story for Richmond changes:

- **Sea level rise and coastal flooding** remains the top-ranked climate impact driver.
- **Fluvial flooding** driven by the extent of climatic change
- **Vector-borne diseases** driven by the extent of climatic change and high sensitivity.
- **Pluvial flooding** driven by the extent of climatic change.

By the end of the century, the climate impact drivers in the top four ranks are a mix: sea level rise and coastal flooding, cooling demand for buildings, fluvial flooding, and drought.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	3	3	6	6	4	7	3	9	10	2
Pluvial Flooding	9	8	4	3	5	3	7	6	5	11
Fluvial Flooding	6	5	2	2	3	2	5	8	6	11
Heat extreme - agriculture	10	9	13	12	11	10	13	2	7	1
Heat extreme - ecosystems	8	9	10	12	9	10	4	10	11	3
Heat extreme - human health	11	11	8	9	8	4	9	5	4	9
Heat extreme - transport infrastructure	7	7	9	10	7	6	8	3	3	6
Cooling demand	2	12	5	11	2	12	1	4	2	13
Agriculture pests and diseases	12	6	12	8	13	13	12	12	12	3
Shifting ecoregions	13	13	11	7	12	8	11	13	13	3
Vector-borne diseases	5	4	3	4	6	5	9	1	1	10
SLR and coastal flooding	1	1	1	1	1	1	2	11	9	7
Wildfire	4	2	7	5	10	9	6	7	8	7
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	3	3	3	2	2	1
Freeze-thaw Cycles	1	1	1	1	1	1	2	3	3	3
Heating demand	2	2	2	2	2	2	1	1	1	2
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	2
Growing season	2	2	2	2	2	2	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 63: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Richmond census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Richmond Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Richmond census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

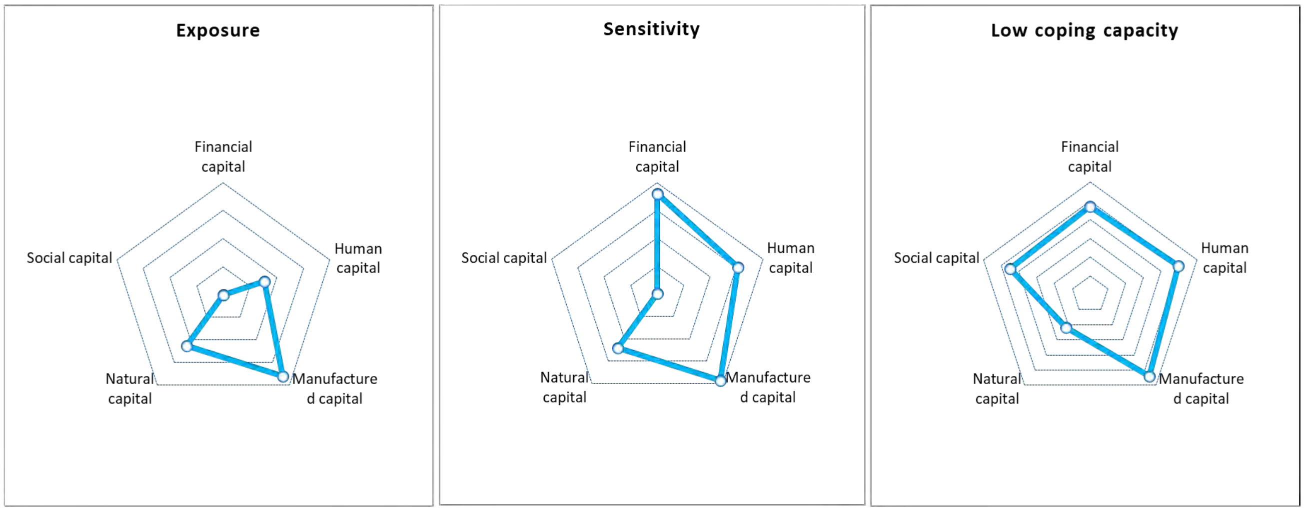

Figure 64: Influence of capital on each sub-index for Richmond census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to natural capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Manufactured capital	Financial capital	Natural capital
Pluvial Flooding	Manufactured capital	Manufactured capital	Natural capital
Fluvial Flooding	Manufactured capital	Manufactured capital	Natural capital
Heat extreme - agriculture	Natural capital	Financial capital	Natural capital
Heat extreme - ecosystems	Natural capital	Natural capital	Manufactured capital
Heat extreme - human health	Human capital	Manufactured capital	Manufactured capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Human capital
Agriculture pests and diseases	Natural capital	Financial capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Manufactured capital	Manufactured capital
SLR and coastal flooding	Manufactured capital	Manufactured capital	Manufactured capital
Wildfire	Manufactured capital	Human capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Manufactured capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Manufactured capital	Human capital
Heating demand	Manufactured capital	Manufactured capital	Financial capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Social capital
Growing season	Natural capital	Financial capital	Manufactured capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 15. Capital with most exposure to each climate-related impact in Richmond census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.16 Shelburne

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Shelburne census division, the following four impacts are ranked higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Shifting ecoregions** due to a mix of exposure and projected climatic changes.
- **Drought** through projected climatic changes and low coping capacity.
- **Sea level rise and coastal flooding** primarily through exposure.
- **Fluvial flooding** through a combination of projected conditions for flooding and lower coping capacity.

Between 2035-2065 (mid century), the top four hazards of concern shift with sea level rise moving to the second rank, followed by drought. Wildfire becomes the fourth ranked hazard of concern through the extent of projected climatic conditions favourable for wildfires and high vulnerability.

By the end of the century (2065-2095), sea level rise and coastal flooding and shifting ecoregions remain the top two hazards of concern, followed by fluvial flooding (due to projected climatic conditions and low coping capacity), and drought.

The prevalence of top-ranked climate impacts driven by a mix of precipitation and temperature is a slightly different pattern than that across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century. However, this is not necessarily unusual, where changing precipitation patterns can bring both drought and flooding, along with seasonal shifts.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The pattern is projected to remain consistent over the century, with a reduction in heavy snowfall, followed by a reduced demand to heat buildings, and a reduction in the number of freeze-thaw cycles will less negatively impacting wellbeing.

For increasingly beneficial outcomes, the longer growing season may offer benefits for Shelburne.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4.99	6.09	4.81	5.34	4.77	5.21	3.02	5.43	4.65	6.22
Pluvial Flooding	4.44	5.31	4.59	5.87	4.68	6.27	2.00	5.24	4.57	5.91
Fluvial Flooding	4.84	5.48	4.74	5.06	4.94	5.87	3.33	5.28	4.66	5.91
Heat extreme - agriculture	3.72	3.38	3.49	2.47	3.45	2.32	1.01	5.24	4.70	5.78
Heat extreme - ecosystems	4.72	3.38	4.50	2.47	4.46	2.32	7.17	4.18	2.80	5.55
Heat extreme - human health	4.01	2.52	4.14	3.04	4.15	3.09	2.71	5.40	5.81	4.99
Heat extreme - transport infrastructure	4.35	2.74	4.43	3.09	4.38	2.89	2.55	6.05	6.12	5.97
Cooling demand	4.04	2.98	3.85	2.22	3.82	2.10	2.66	5.26	5.43	5.08
Agriculture pests and diseases	4.51	4.41	4.46	4.21	4.46	4.22	4.29	4.67	3.78	5.55
Shifting ecoregions	5.34	5.55	5.11	4.64	5.09	4.57	6.02	4.90	4.24	5.55
Vector-borne diseases	4.81	5.67	4.26	3.44	4.43	4.11	2.71	5.44	5.70	5.18
SLR and coastal flooding	4.95	3.18	4.95	3.18	4.95	3.18	6.59	5.01	4.25	5.76
Wildfire	4.52	3.84	4.78	4.86	4.67	4.41	3.09	5.59	5.41	5.76
Decreasing adverse outcomes										
Heavy snowfall	5.19	7.38	5.13	7.15	5.18	7.37	3.26	5.05	4.68	5.42
Freeze-thaw Cycles	3.56	1.43	3.53	1.31	3.47	1.07	2.61	5.11	4.70	5.51
Heating demand	4.40	4.07	4.41	4.08	4.44	4.22	2.66	5.44	6.14	4.74
Increasing beneficial outcomes										
Summer tourism & recreation	4.13	4.72	3.68	2.89	3.72	3.08	2.71	4.55	3.70	5.41
Growing season	5.05	8.48	5.06	8.53	5.08	8.60	4.47	3.62	2.38	4.86
Decreasing beneficial outcomes										
Winter tourism & recreation	4.82	7.10	4.87	7.33	5.02	7.92	2.71	4.73	3.82	5.64

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 65: Total WRI scores for median projections (50th percentile) under RCP8.5 for Shelburne census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	2	1	3	2	4	3	7	4	8	1
Pluvial Flooding	9	5	6	1	5	1	12	9	9	3
Fluvial Flooding	4	4	5	3	3	2	5	6	7	3
Heat extreme - agriculture	13	8	13	11	13	11	13	8	6	5
Heat extreme - ecosystems	6	8	7	11	8	11	1	13	13	8
Heat extreme - human health	12	13	11	10	11	9	8	5	2	13
Heat extreme - transport infrastructure	10	12	9	9	10	10	11	1	1	2
Cooling demand	11	11	12	13	12	13	10	7	4	12
Agriculture pests and diseases	8	6	8	6	7	6	4	12	12	8
Shifting ecoregions	1	3	1	5	1	4	3	11	11	8
Vector-borne diseases	5	2	10	7	9	7	8	3	3	11
SLR and coastal flooding	3	10	2	8	2	8	2	10	10	6
Wildfire	7	7	4	4	6	5	6	2	5	6
Decreasing adverse outcomes										
Heavy snowfall	1	1	1	1	1	1	1	3	3	2
Freeze-thaw Cycles	3	3	3	3	3	3	3	2	2	1
Heating demand	2	2	2	2	2	2	2	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	1
Growing season	1	1	1	1	1	1	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 66: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Shelburne census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Shelburne Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story for the Shelburne census division changes over the century. Between 2015-2045, the following four climate impacts rank higher for increasingly adverse outcomes under RCP4.5:

- **Shifting ecoregions** driven by exposure.
- **Sea level rise and coastal flooding** driven by exposure.
- **Pluvial flooding** driven by the extent of climatic change
- **Fluvial flooding** driven by extent of climatic change.

Between 2035-2065, the climate impact drivers in the top four ranks change:

- **Shifting ecoregions.**
- **Sea level rise and coastal flooding**
- **Drought** through the extent of projected climatic change and low coping capacity.
- **Agricultural pests and disease** through exposure and extent of climatic change.

By the end of the century, the top four are: Shifting ecoregions, sea level rise and coastal flooding, agricultural pests and disease, and pluvial flooding.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	7	6	3	2	6	5	7	4	8	1
Pluvial Flooding	3	1	6	1	4	1	12	9	9	3
Fluvial Flooding	4	2	8	6	7	6	5	6	7	3
Heat extreme - agriculture	13	10	13	10	13	11	13	8	6	5
Heat extreme - ecosystems	8	10	7	10	8	11	1	13	13	8
Heat extreme - human health	11	9	10	9	11	10	8	5	2	13
Heat extreme - transport infrastructure	9	8	9	8	10	9	11	1	1	2
Cooling demand	12	12	12	12	12	13	10	7	4	12
Agriculture pests and diseases	6	4	4	3	3	2	4	12	12	8
Shifting ecoregions	1	5	1	5	1	3	3	11	11	8
Vector-borne diseases	5	3	5	4	5	4	8	3	3	11
SLR and coastal flooding	2	7	2	7	2	7	2	10	10	6
Wildfire	10	13	11	13	9	8	6	2	5	6
Decreasing adverse outcomes										
Heavy snowfall	1	1	1	1	1	1	1	3	3	2
Freeze-thaw Cycles	3	3	3	3	3	3	3	2	2	1
Heating demand	2	2	2	2	2	2	2	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	1
Growing season	1	1	1	1	1	1	1	2	2	2
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 67: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Shelburne Census Division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Shelburne Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Shelburne census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under "Exposure." The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

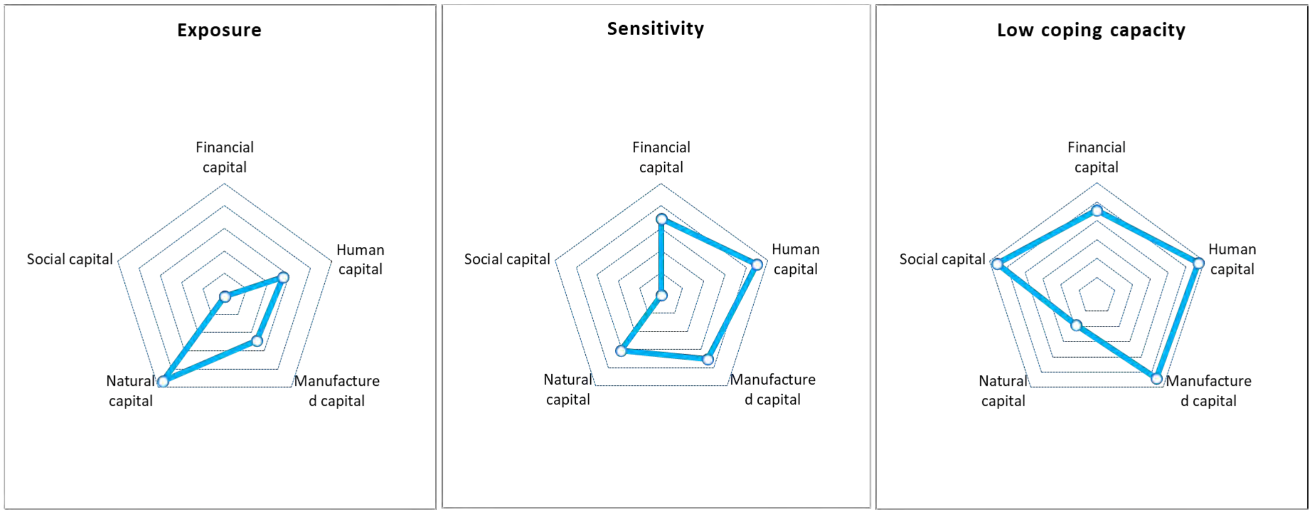

Figure 68: Influence of capital on each sub-index for Shelburne census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to manufactured capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			

Drought	Natural capital	Human capital	Manufactured capital
Pluvial Flooding	Human capital	Human capital	Manufactured capital
Fluvial Flooding	Natural capital	Human capital	Manufactured capital
Heat extreme - agriculture	Natural capital	Natural capital	Natural capital
Heat extreme - ecosystems	Natural capital	Natural capital	Manufactured capital
Heat extreme - human health	Human capital	Financial capital	Human capital
Heat extreme - transport infrastructure	Manufactured capital	Human capital	Manufactured capital
Cooling demand	Manufactured capital	Human capital	Human capital
Agriculture pests and diseases	Natural capital	Human capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Financial capital	Social capital
SLR and coastal flooding	Natural capital	Human capital	Human capital
Wildfire	Natural capital	Human capital	Human capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Human capital	Human capital
Freeze-thaw Cycles	Manufactured capital	Human capital	Human capital
Heating demand	Manufactured capital	Human capital	Human capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Natural capital	Financial capital
Growing season	Natural capital	Financial capital	Financial capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Manufactured capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 16. Capital with most exposure to each climate-related impact in Shelburne census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.17 Victoria

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Victoria census division, the following four impacts rank higher for increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Agricultural pests and diseases** through a mix of the extent of projected climatic changes, exposure, and low coping capacity.
- **Shifting ecoregions** through exposure and low coping capacity.
- **Heat extremes for ecosystems** driven by high vulnerability and to a lesser extent exposure.
- **Sea level rise and coastal flooding** driven mostly through a combination of projected climatic changes.

Between 2035-2065 (mid century), the top three hazards of concern are the same as early century, but vector-borne diseases move to the fourth rank due to a combination of relative changes in climatic conditions and sensitivity.

By the end of the century (2065-2095), the top four hazards of concern are:

- **Heat extremes for ecosystems**
- **Agricultural pests and diseases**
- **Shifting ecoregions**
- **Heat extremes for agriculture**

The prevalence of top-ranked climate impacts driven by temperature is consistent with the pattern across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The projected pattern varies over time, but by around mid-century, the reduction in freeze-thaw cycles negatively affects wellbeing the least.

For increasingly beneficial outcomes, projected conditions for longer summer tourism and recreation offer opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	3.92	4.51	3.63	3.36	4.03	4.94	1.97	4.60	3.27	5.94
Pluvial Flooding	3.99	5.36	4.02	5.47	4.20	6.20	2.49	4.06	3.06	5.06
Fluvial Flooding	3.36	3.60	3.64	4.73	3.71	5.02	1.68	4.08	3.11	5.06
Heat extreme - agriculture	4.54	2.80	4.58	3.00	5.24	5.61	3.93	5.70	4.85	6.56
Heat extreme - ecosystems	4.85	2.80	4.90	3.00	5.55	5.61	3.73	6.44	6.75	6.13
Heat extreme - human health	2.99	2.93	2.99	2.95	3.45	4.76	1.00	4.01	3.38	4.64
Heat extreme - transport infrastructure	3.54	2.81	3.46	2.50	4.45	6.43	2.29	4.53	3.18	5.88
Cooling demand	3.42	2.53	3.48	2.79	4.06	5.10	1.66	4.74	5.19	4.30
Agriculture pests and diseases	5.46	6.62	5.39	6.32	5.38	6.29	5.85	4.69	3.25	6.13
Shifting ecoregions	4.91	3.49	5.12	4.33	5.32	5.12	5.64	5.26	4.39	6.13
Vector-borne diseases	4.57	5.30	4.82	6.29	4.91	6.68	1.00	5.99	6.91	5.07
SLR and coastal flooding	4.75	6.35	4.75	6.35	4.75	6.35	3.27	4.70	4.27	5.12
Wildfire	4.69	6.63	4.56	6.14	4.17	4.57	2.52	4.79	4.47	5.12
Decreasing adverse outcomes										
Heavy snowfall	3.94	3.17	3.96	3.25	3.96	3.25	2.86	4.87	4.53	5.21
Freeze-thaw Cycles	4.07	4.56	4.37	5.73	4.87	7.74	3.30	4.22	3.67	4.76
Heating demand	4.29	4.78	4.08	3.94	3.93	3.35	1.66	5.36	6.24	4.49
Increasing beneficial outcomes										
Summer tourism & recreation	4.25	3.59	4.50	4.62	5.08	6.91	1.00	6.20	7.70	4.69
Growing season	3.60	1.43	3.55	1.23	4.00	3.03	4.28	4.35	3.35	5.34
Decreasing beneficial outcomes										
Winter tourism & recreation	4.45	3.00	4.36	2.61	4.06	1.42	1.00	6.90	7.71	6.10

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 69: Total WRI scores for median projections (50th percentile) under RCP8.5 for Victoria census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	9	6	10	8	11	11	9	9	9	5
Pluvial Flooding	8	4	8	5	8	5	7	12	13	10
Fluvial Flooding	12	7	9	6	12	10	10	11	12	10
Heat extreme - agriculture	7	11	6	9	4	6	3	3	4	1
Heat extreme - ecosystems	3	11	3	9	1	6	4	1	2	2
Heat extreme - human health	13	9	13	11	13	12	12	13	8	12
Heat extreme - transport infrastructure	10	10	12	13	7	2	8	10	11	6
Cooling demand	11	13	11	12	10	9	11	6	3	13
Agriculture pests and diseases	1	2	1	2	2	4	1	8	10	2
Shifting ecoregions	2	8	2	7	3	8	2	4	6	2
Vector-borne diseases	6	5	4	3	5	1	12	2	1	9
SLR and coastal flooding	4	3	5	1	6	3	5	7	7	7
Wildfire	5	1	7	4	9	13	6	5	5	7
Decreasing adverse outcomes										
Heavy snowfall	3	3	3	3	2	3	2	2	2	1
Freeze-thaw Cycles	2	2	1	1	1	1	1	3	3	2
Heating demand	1	1	2	2	3	2	3	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	2
Growing season	2	2	2	2	2	2	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 70: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Victoria census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Victoria Under a Low Emissions Scenario (RCP4.5)

Between 2015-2045, the top-ranked climate impacts with increasingly adverse outcomes under RCP4.5 are:

- **Agricultural pests and diseases** through the extent of climatic change, exposure, and low coping capacity relating to agricultural activity.
- **Heat extremes for ecosystems** through exposure and high vulnerability.
- **Shifting ecoregions** through exposure and low coping capacity.
- **Heat extremes for agriculture** through exposure and high vulnerability.

Between 2035-2065, the picture changes slightly for Victoria:

- **Shifting ecoregions.**
- **Heat extremes for ecosystems.**
- **Agricultural pests and diseases.**
- **Sea level rise and coastal flooding.**

By the end of the century, the picture reflects a combination of drivers: heat extremes for ecosystems, agricultural pests and diseases, shifting ecoregions, and heat extremes for agriculture.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	8	4	10	8	9	6	9	9	9	5
Pluvial Flooding	9	3	7	1	7	2	7	12	13	10
Fluvial Flooding	12	6	11	4	12	11	10	11	12	10
Heat extreme - agriculture	4	9	5	11	4	8	3	3	4	1
Heat extreme - ecosystems	2	9	2	11	1	8	4	1	2	2
Heat extreme - human health	13	12	13	10	13	12	12	13	8	12
Heat extreme - transport infrastructure	10	7	9	9	8	5	8	10	11	6
Cooling demand	11	11	12	13	10	10	11	6	3	13
Agriculture pests and diseases	1	2	3	7	2	3	1	8	10	2
Shifting ecoregions	3	13	1	6	3	7	2	4	6	2
Vector-borne diseases	6	8	6	3	6	4	12	2	1	9
SLR and coastal flooding	5	1	4	2	5	1	5	7	7	7
Wildfire	7	5	8	5	11	13	6	5	5	7
Decreasing adverse outcomes										
Heavy snowfall	3	3	2	3	3	3	2	2	2	1
Freeze-thaw Cycles	2	2	3	2	2	1	1	3	3	2
Heating demand	1	1	1	1	1	2	3	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	1	1	1	1	1	1	2	1	1	2
Growing season	2	2	2	2	2	2	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 71: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Victoria Census Division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Victoria Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Victoria census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

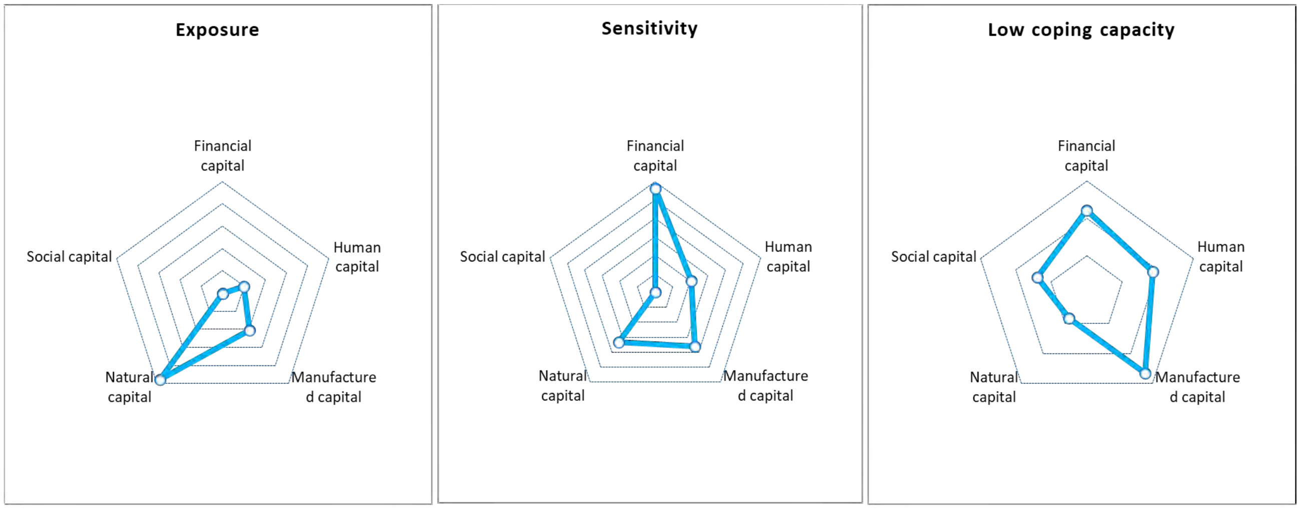

Figure 72: Influence of capital on each sub-index for Victoria census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to natural capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*
Increasing adverse outcomes:			
Drought	Natural capital	Financial capital	Natural capital

Pluvial Flooding	Natural capital	Manufactured capital	Natural capital
Fluvial Flooding	Natural capital	Manufactured capital	Natural capital
Heat extreme - agriculture	Natural capital	Financial capital	Manufactured capital
Heat extreme - ecosystems	Natural capital	Financial capital	Manufactured capital
Heat extreme - human health	Human capital	Financial capital	Manufactured capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Financial capital
Agriculture pests and diseases	Natural capital	Financial capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Manufactured capital	Manufactured capital
SLR and coastal flooding	Natural capital	Financial capital	Manufactured capital
Wildfire	Natural capital	Natural capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Natural capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Financial capital	Financial capital
Heating demand	Manufactured capital	Financial capital	Financial capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Financial capital	Social capital
Growing season	Natural capital	Financial capital	Social capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Financial capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 17. Capital with most exposure to each climate-related impact in Victoria census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

E.18 Yarmouth

Climate Risk Under a High Emissions Scenario (RCP8.5)

In the near term (between 2015-2045 or 2030s), under a high emissions scenario and relative to other climate hazards within this impact category for Yarmouth census division, the following four impacts are ranked higher increasing adverse outcomes (worsening wellbeing, without adaptation interventions), in order of highest to lowest:

- **Drought** driven by the extent of projected climatic changes.
- **Vector-borne diseases** driven by high sensitivity.
- **Pluvial flooding** driven primarily by the extent of projected climatic changes.
- **Fluvial flooding** also driven by projected climatic changes.

Between 2035-2065 (mid century), the top four hazards of concern change slightly. Drought remains a top concern, followed by heat extremes for transportation infrastructure (driven by a combination of the extent of climatic changes and high vulnerability). Fluvial flooding and pluvial flooding are in the third and fourth ranked position.

By the end of the century (2065-2095), the top four hazards of concern are the same, although drought and vector-borne diseases move to the third and fourth ranked positions.

- **Fluvial flooding**
- **Pluvial flooding**
- **Drought**
- **Vector-borne diseases**

In Yarmouth, the top-ranked climate impacts are driven by a mix of precipitation and temperature-related hazards. This is slightly different from the prevalence of top-ranked impacts across Nova Scotia, where projected higher and extreme high temperatures increasingly drive the highest rankings of increasingly adverse outcomes over the course of the century.

As climate conditions change, there are a few hazards that will negatively impact wellbeing **less** as time goes by. The projected pattern is consistent over the century, with reductions in heavy snowfall, followed by reduced heating demand, and reduction in the number of freeze-thaw cycles less negatively affecting wellbeing.

For increasingly beneficial outcomes, projected conditions for longer growing seasons offer opportunities.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	3.92	4.51	3.63	3.36	4.03	4.94	1.97	4.60	3.27	5.94
Pluvial Flooding	3.99	5.36	4.02	5.47	4.20	6.20	2.49	4.06	3.06	5.06
Fluvial Flooding	3.36	3.60	3.64	4.73	3.71	5.02	1.68	4.08	3.11	5.06
Heat extreme - agriculture	4.54	2.80	4.58	3.00	5.24	5.61	3.93	5.70	4.85	6.56
Heat extreme - ecosystems	4.85	2.80	4.90	3.00	5.55	5.61	3.73	6.44	6.75	6.13
Heat extreme - human health	2.99	2.93	2.99	2.95	3.45	4.76	1.00	4.01	3.38	4.64
Heat extreme - transport infrastructure	3.54	2.81	3.46	2.50	4.45	6.43	2.29	4.53	3.18	5.88
Cooling demand	3.42	2.53	3.48	2.79	4.06	5.10	1.66	4.74	5.19	4.30
Agriculture pests and diseases	5.46	6.62	5.39	6.32	5.38	6.29	5.85	4.69	3.25	6.13
Shifting ecoregions	4.91	3.49	5.12	4.33	5.32	5.12	5.64	5.26	4.39	6.13
Vector-borne diseases	4.57	5.30	4.82	6.29	4.91	6.68	1.00	5.99	6.91	5.07
SLR and coastal flooding	4.75	6.35	4.75	6.35	4.75	6.35	3.27	4.70	4.27	5.12
Wildfire	4.69	6.63	4.56	6.14	4.17	4.57	2.52	4.79	4.47	5.12
Decreasing adverse outcomes										
Heavy snowfall	3.94	3.17	3.96	3.25	3.96	3.25	2.86	4.87	4.53	5.21
Freeze-thaw Cycles	4.07	4.56	4.37	5.73	4.87	7.74	3.30	4.22	3.67	4.76
Heating demand	4.29	4.78	4.08	3.94	3.93	3.35	1.66	5.36	6.24	4.49
Increasing beneficial outcomes										
Summer tourism & recreation	4.25	3.59	4.50	4.62	5.08	6.91	1.00	6.20	7.70	4.69
Growing season	3.60	1.43	3.55	1.23	4.00	3.03	4.28	4.35	3.35	5.34
Decreasing beneficial outcomes										
Winter tourism & recreation	4.45	3.00	4.36	2.61	4.06	1.42	1.00	6.90	7.71	6.10

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 73: Total WRI scores for median projections (50th percentile) under RCP8.5 for Yarmouth census division.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	1	1	1	1	3	1	9	10	8	8
Pluvial Flooding	3	2	4	4	2	3	10	6	6	6
Fluvial Flooding	4	3	3	5	1	2	5	5	5	6
Heat extreme - agriculture	12	8	13	10	13	11	12	8	9	2
Heat extreme - ecosystems	5	8	5	10	9	11	1	12	12	9
Heat extreme - human health	13	13	11	8	10	9	7	7	4	12
Heat extreme - transport infrastructure	6	6	2	3	11	10	11	2	3	1
Cooling demand	10	11	12	13	12	13	13	3	2	5
Agriculture pests and diseases	9	7	8	6	8	6	2	13	13	9
Shifting ecoregions	7	4	7	2	5	4	3	11	11	9
Vector-borne diseases	2	5	6	12	4	8	7	1	1	13
SLR and coastal flooding	8	10	9	7	6	5	4	9	10	3
Wildfire	11	12	10	9	7	7	6	4	7	3
Decreasing adverse outcomes										
Heavy snowfall	1	1	1	1	1	1	1	3	3	3
Freeze-thaw Cycles	3	3	3	3	3	3	2	2	2	1
Heating demand	2	2	2	2	2	2	3	1	1	2
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	2
Growing season	1	1	1	1	1	1	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 74: Rankings of climate-related impacts for the median projections (50th percentile) under RCP8.5 for the Yarmouth census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Climate Risks in Yarmouth Under a Low Emissions Scenario (RCP4.5)

Under a lower emissions scenario (RCP4.5), the story Yarmouth census division is quite different than that under RCP8.5. For 2015-2045 (2030s), the following four climate impacts ranked higher for increasing adverse outcomes under RCP4.5:

- **Agricultural pests and diseases** driven by the extent of climatic change, exposure, and low coping capacity.
- **Heat extremes for ecosystems** through exposure and relatively high vulnerability.
- **Shifting ecoregions** through exposure and low coping capacity.
- **Heat extremes for agriculture** through exposure and vulnerability of agricultural activity.

By mid-century (2050s), the picture change slightly with shifting ecoregions having the highest ranked score, followed by heat extremes for ecosystems, agricultural pests and diseases, and sea level rise and coastal flooding through the extent of projected changes. Between 2065-2095, the top four ranked scores for increasingly adverse climate impact drivers are:

- **Heat extremes for ecosystems.**
- **Agricultural pests and diseases.**
- **Shifting ecoregions.**
- **Heat extremes for agriculture.**

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	4	1	2	1	7	2	9	10	8	8
Pluvial Flooding	1	2	10	11	2	1	10	6	6	6
Fluvial Flooding	7	5	11	12	11	12	5	5	5	6
Heat extreme - agriculture	12	9	12	6	13	9	12	8	9	2
Heat extreme - ecosystems	6	9	5	6	5	9	1	12	12	9
Heat extreme - human health	10	12	8	9	10	11	7	7	4	12
Heat extreme - transport infrastructure	2	3	3	3	3	3	11	2	3	1
Cooling demand	11	11	9	10	12	13	13	3	2	5
Agriculture pests and diseases	5	4	4	2	4	5	2	13	13	9
Shifting ecoregions	9	6	6	5	6	4	3	11	11	9
Vector-borne diseases	3	7	1	4	1	6	7	1	1	13
SLR and coastal flooding	8	8	7	8	8	7	4	9	10	3
Wildfire	13	13	13	13	9	8	6	4	7	3
Decreasing adverse outcomes										
Heavy snowfall	1	1	1	1	1	1	1	3	3	3
Freeze-thaw Cycles	3	3	3	2	3	3	2	2	2	1
Heating demand	2	2	2	3	2	2	3	1	1	2
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	2
Growing season	1	1	1	1	1	1	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Figure 75: Rankings of climate-related impacts for the median projections (50th percentile) under RCP4.5 for the Yarmouth census division. [1=highest Wellbeing-at-Risk Index score for corresponding climate impact category]

Understanding Exposure, Sensitivity, and (Low) Coping Capacity in Yarmouth Census Division

This section presents information on the relationship between the five wellbeing capitals on Exposure, Sensitivity and Low Coping Capacity for Yarmouth census division. It is important to note that not all capitals are equally represented in each sub-index. For example, there are no indicators of social capital under “Exposure.” The series of figures below illustrate the influence of each capital on the sub-index when summed across all climate impact drivers.

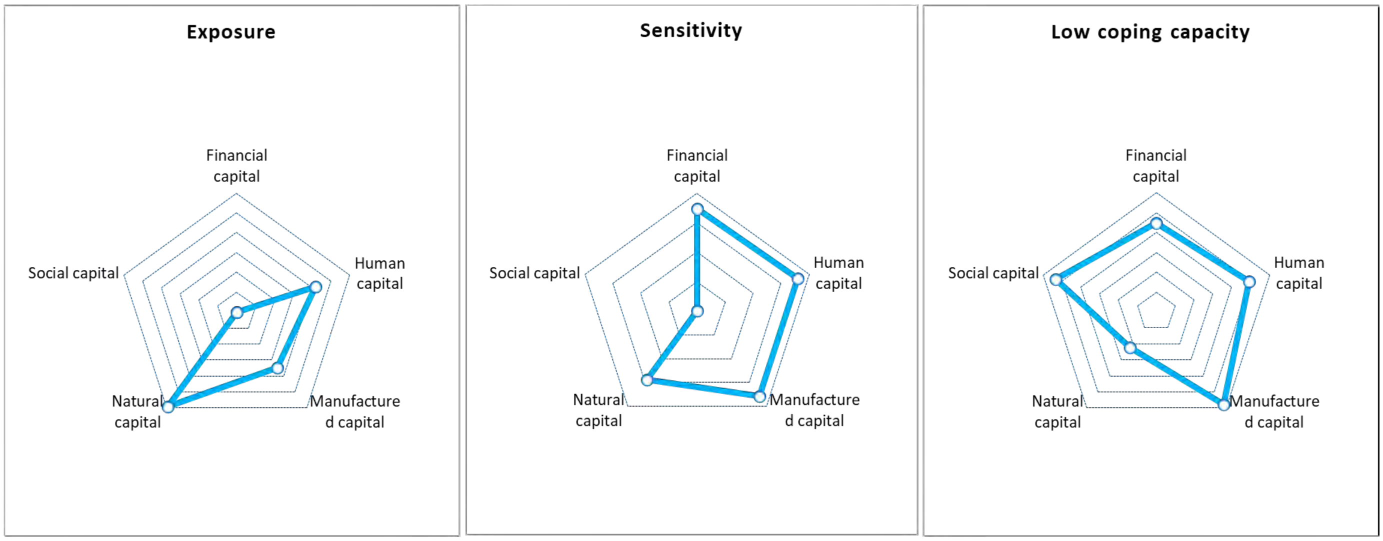

Figure 76: Influence of capital on each sub-index for Yarmouth census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Please refer to Figures 5-6 and 5-7 in the main report for a detailed map of sub-pillars to dimensions of wellbeing and aggregated sub-pillars to the five capitals. For quick reference, here is a list of the aggregated sub-pillars in relation to each capital.

- **Natural**: Regulating, provisioning, habitat & biodiversity, cultural services
- **Human**: Health, population & demographics, knowledge & skills
- **Social**: Civic engagement & governance, personal safety & security, relationships
- **Manufactured**: Buildings, infrastructure
- **Financial**: Economy, financial security

The following table highlights which of the five wellbeing capitals (natural, human, social, financial, manufactured) most influences the sub-index of the Wellbeing-at-Risk Index for each climate impact driver for this census division. For example, indicators relating to natural capital have the most influence on low coping capacity in relation to drought.

	Most influential capital on sub-index		
	Exposure	Sensitivity	Low coping capacity*

Increasing adverse outcomes:			
Drought	Natural capital	Natural capital	Natural capital
Pluvial Flooding	Natural capital	Manufactured capital	Financial capital
Fluvial Flooding	Natural capital	Manufactured capital	Financial capital
Heat extreme - agriculture	Natural capital	Natural capital	Natural capital
Heat extreme - ecosystems	Natural capital	Natural capital	Manufactured capital
Heat extreme - human health	Human capital	Financial capital	Manufactured capital
Heat extreme - transport infrastructure	Manufactured capital	Manufactured capital	Manufactured capital
Cooling demand	Manufactured capital	Financial capital	Manufactured capital
Agriculture pests and diseases	Natural capital	Human capital	Manufactured capital
Shifting ecoregions	Natural capital	Natural capital	Manufactured capital
Vector-borne diseases	Human capital	Manufactured capital	Social capital
SLR and coastal flooding	Natural capital	Human capital	Manufactured capital
Wildfire	Natural capital	Human capital	Manufactured capital
Decreasing adverse outcomes			
Heavy snowfall	Natural capital	Human capital	Manufactured capital
Freeze-thaw Cycles	Manufactured capital	Manufactured capital	Manufactured capital
Heating demand	Manufactured capital	Financial capital	Manufactured capital
Increasing beneficial outcomes			
Summer tourism & recreation	Human capital	Human capital	Financial capital
Growing season	Natural capital	Financial capital	Financial capital
Decreasing beneficial outcomes			
Winter tourism & recreation	Human capital	Human capital	Manufactured capital

* for "increasing beneficial outcomes" the value measures coping capacity (to seize benefits) as opposed to low coping capacity

Table 18. Capital with most exposure to each climate-related impact in Yarmouth census division and capital exerting the greatest influence on sensitivity and (low) coping capacity.

Potential Opportunities to Adapt

As discussed, the Wellbeing-at-Risk Index (WRI) is comprised of four sub-indices: Climate Impact Sub-Index, Exposure Sub-Index, Sensitivity Sub-Index, and (Low) Coping Capacity Sub-Index. The data for the Climate Impact Sub-Index (climate change projections) changes over time. By contrast, the indicators in the other three sub-indices do not vary over time. In essence, the WRI explores climate risks of tomorrow in relation to Nova Scotia today, as we do not know what Nova Scotia will look like in the future (e.g., social, economic, or biophysical conditions). This means that understanding exposure, sensitivity and low coping capacity can help illuminate current adaptation needs and opportunities, identify what to monitor for changes in risk profiles, and support further investigation of adaptation options.

Natural, human, social, manufactured, and financial capital are not all equally represented in the Exposure, Sensitivity, and (Low) Coping Capacity Sub-Indices.

While there are differences between census divisions, the results are often very similar when exploring which wellbeing dimensions have the most exposure to climate-related impacts in a specific census division and which wellbeing dimensions exert the greatest influence on overall sensitivity and (low) coping capacity across all 19 climate hazards/impacts.

The following series of diagrams for Inverness census division serves as an example of how to identify potential opportunities for adaptation. The unweighted lines represent the values used in the WRI, while the weighted lines incorporate the survey results on wellbeing priorities for Nova Scotians.

Across most census divisions:

- Provisioning services, buildings, and other infrastructure, and to a lesser extent population, are the wellbeing dimensions with the most exposure to the climate impact drivers. Reducing exposure for natural, manufactured, and human capital can aid in reducing risk.
- Enhancing economic opportunities / diversity, improving financial security, and improving building quality (e.g., age, etc.) could reduce sensitivity. It is common to see improvements to health in the weighted results, based on its importance to the wellbeing of Nova Scotians.
- Improvements to civic engagement and governance, economic opportunities / diversity, improving knowledge and skills, and isolation has the potential to improve coping capacity. The weighted results show that improvements to financial security are also important for wellbeing.

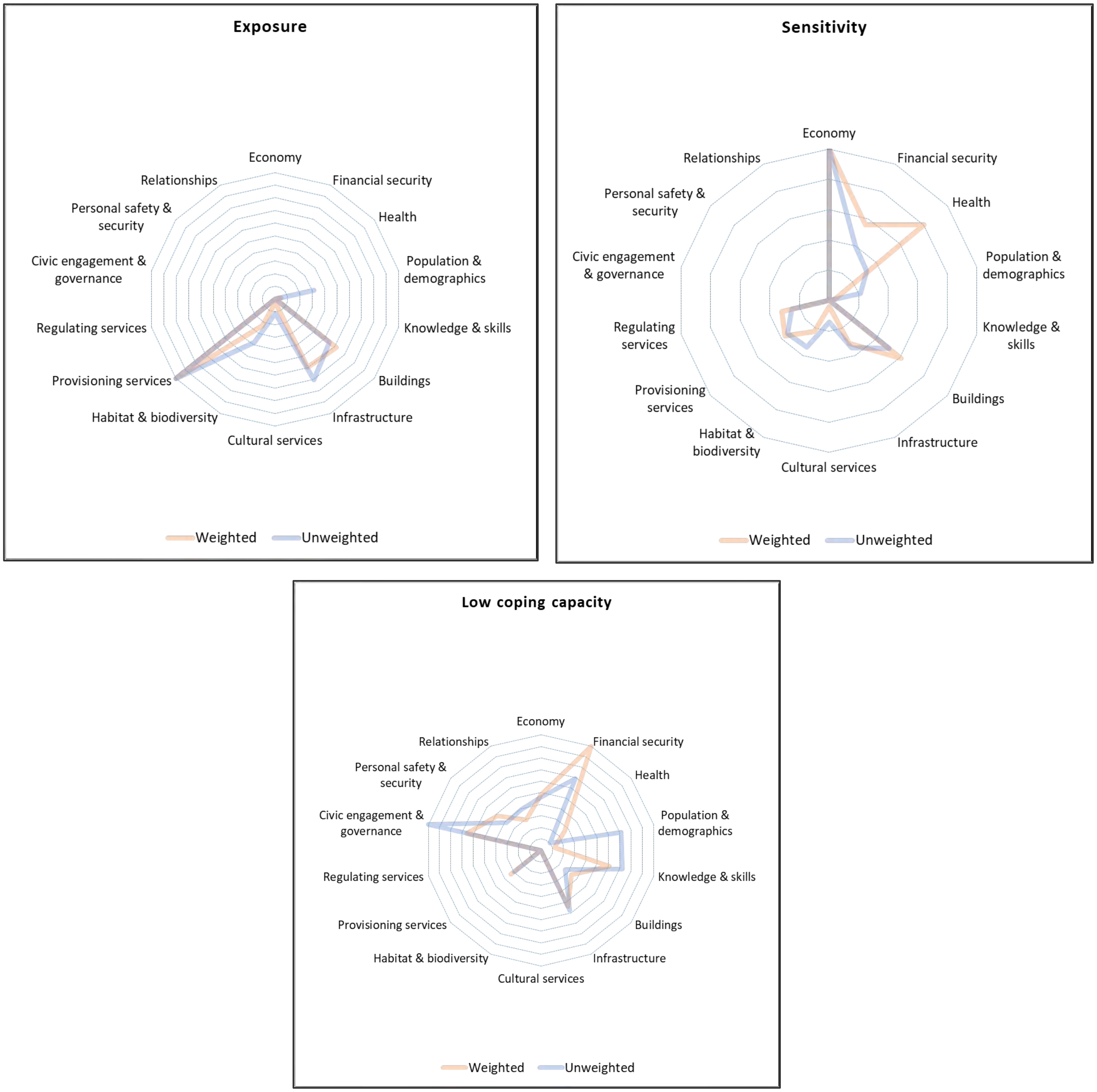

Figure 77: Wellbeing dimension with most exposure to climate-related impacts in Inverness census division and wellbeing dimensions exerting the greatest influence on overall sensitivity and (low) coping capacity (totals across all 19 climate hazards/impacts). Outermost points reflect higher influence.

Appendix F – Cross-Cutting Themes

Section 6 in the main synthesis report presented WRI results by (i) by climate-related impact (aggregated over all census divisions) and (ii) by Census Division (aggregated over each category of climate-related impact—e.g., increasing adverse consequences for wellbeing). The analysis and conclusions drawn in Section 6 are based on the general view across all impacts and all regions of the province – i.e., taking a top-down perspective considering the full distribution of estimated WRI results. This appendix presents disaggregated WRI results for each Census Division, broken down by climate-related impact. The conclusions presented below are based the analysis of similarities across individual census divisions – specifically, the number of times the same result is found across all census divisions. It thus provides an alternative (bottom-up) perspective to the results in Section 6.

The table below shows the list of top ranked CDs by category of climate-related impact. The CDs identified is almost identical to that derived from the top-down approach. The one exception is that Cape Breton (in the bottom-up approach) is included under predominantly beneficial impacts instead of Pictou (in the top-down approach).

Increasing	Cumberland Halifax Digby Pictou Annapolis	Halifax Kings Cape Breton Cumberland Colchester
Decreasing	Cumberland Halifax Pictou Cape Breton Colchester	Halifax Hants Lunenburg Cumberland Cape Breton
	Predominantly Adverse	Predominantly Beneficial

Table 19 presents the results of the bottom-up assessment by focusing on the climate impacts most frequently ranked highest by a CD across all 18 CDs. Key messages from this analysis are as follows:

- In the earlier part of the century, several CDs will experience heat extremes affecting agriculture more than other impacts. This pattern holds to the end of the century. Second and third-ranked impacts shift between time periods, however. Shifting ecoregions and pluvial flooding will be replaced by agriculture pests & diseases, fluvial flooding and heat extremes affecting human health.

- In the earlier part of the century, more CDs will experience less heating demand and freeze-thaw cycles than heavy snow. By the 2080s reduced heating demand will be less important than reduced freeze thaw cycles for more CDs.
- A lengthened growing season is more important than summer tourism & recreation in providing increasing beneficial impacts to wellbeing for more CDs.

Table 19: Climate impacts most frequently ranked highest by a Census Division, across all 18 census divisions.

Increasing adverse climate impacts most frequently ranked 1st, 2nd, and 3rd highest by a Census Division (across all 18 CDs)				
Impact Rank	Impacts in 2030s (#CDs)	Associated Census Divisions	Impacts in 2080s (#CDs)	Associated Census Divisions
1st	Heat extreme – agriculture (4)	Annapolis, Cumberland, Hants, Kings	Heat extreme – agriculture (4)	Annapolis, Antigonish, Cumberland, Kings
2nd	Shifting ecoregions (5)	Annapolis, Guysborough, Halifax, Queens, Victoria	Agriculture pests & diseases (3)	Digby, Queens, Victoria
			Fluvial flooding (3)	Halifax, Lunenburg, Richmond
3rd	Pluvial flooding (4)	Colchester, Kings, Pictou, Yarmouth	Heat extreme – human health (3)	Colchester, Hants, Pictou
Decreasing adverse climate impacts most frequently ranked highest by a Census Division (across all 18 CDs)				
Impact Rank	Impacts in 2030s (#CDs)	Associated Census Divisions	Impacts in 2080s (#CDs)	Associated Census Divisions
1st	Heating demand (8)	Digby, Guysborough, Lunenburg, Pictou, Queens, Richmond, Victoria	Freeze-thaw cycles (9)	Antigonish, Cape Breton, Cumberland, Halifax, Hants, Inverness, Kings, Pictou, Victoria
	Freeze-thaw cycles (6)	Antigonish, Cape Breton, Cumberland, Halifax, Hants, Kings	Heating demand (6)	Annapolis, Colchester, Digby, Lunenburg, Queens, Richmond
Increasing beneficial climate impacts most frequently ranked highest by a Census Division (across all 18 CDs)				
Impact Rank*	Impacts in 2030s (#CDs)	Associated Census Divisions	Impacts in 2080s (#CDs)	Associated Census Divisions
1st	Growing season (11)	Annapolis, Cumberland, Digby, Guysborough, Kings, Lunenburg, Pictou, Queens, Richmond, Shelburne, Yarmouth	Growing season (11)	Annapolis, Cumberland, Digby, Guysborough, Kings, Lunenburg, Pictou, Queens, Richmond, Shelburne, Yarmouth
Decreasing beneficial climate impacts most frequently ranked highest by a Census Division (across all 18 CDs)				
Impact Rank*	Impacts in 2030s (#CDs)	Associated Census Divisions	Impacts in 2080s (#CDs)	Associated Census Divisions
1st	Winter tourism & recreation (18)	All	Winter tourism & recreation (18)	All

Results of our exploration of the most influential capitals associated with climate impacts most frequently ranked first by a CD are shown in Table 20 and those associated with the most influential wellbeing dimensions by sub-pillar are shown in Table 21. These results show that:

- Natural Capital, particularly Provisioning Services, is most exposed to the top climate impacts in both the early part of the century and the latter part. Manufactured Capital, particularly Buildings, is most exposed to cooling demand in the early part of the century, although cooling demand is no longer a top climate impact by the 2080s. Provisioning and Regulating

Services as well as Habitat & Biodiversity are the types of Natural Capital that will also become associated with top climate impacts in the latter part of the century.

- Financial and Human Capital contribute more sensitivity than other capitals to the top climate impacts in the early part of the century, through the Economy, Financial Security, and Health. In the latter part of the century, Natural Capital's contribution to sensitivity increases, linked to Habitat & Biodiversity and Regulating Services.
- Social Capital, via Personal Safety & Security and Relationships, will be a top contributor to low coping capacity to heat extremes-agriculture across both periods. Manufactured and Natural Capital will also play a role in the first part of the century and Manufactured Capital will become a more frequent top contributor to low coping capacity in the last part of the century.
- Lack of capacity to deal with cooling demand in the early part of the century will be driven by Personal Safety & Security and Provisioning Services. Lack of capacity to cope with extreme heat affecting ecosystems by 2080s will be driven by weaknesses in Manufactured Capital and Financial Capital (not shown in tables), via Infrastructure and Economy sub-pillars. Lack of capacity to cope with shifting ecoregions by 2080s will be driven by the Economy, Knowledge & Skills, and Personal Safety & Security., corresponding to Financial and Social Capitals.

Table 20: Most influential wellbeing capitals associated with climate impacts most frequently ranked highest by a census division, across all 18 census divisions, focused on the *increasing adverse* climate impacts category.

Impact Rank*	Impacts in 2045 (#CDs)	Most influential Capital (#CDs)	Impacts in 2095 (#CDs)	Most influential Capital (#CDs)
1st	Heat extreme – agriculture (4)	**Exposure:** Natural Capital (4) **Sensitivity:** Financial Capital (3); Natural Capital (1) **Lack of Coping Capacity:** Manufactured Capital (1); Social Capital (3)	Heat extreme – agriculture (4)	**Exposure:** Natural Capital (4) **Sensitivity:** Financial Capital (3); Natural Capital (1) **Lack of Coping Capacity:** Manufactured Capital (1); Natural Capital (1); Social Capital (2)
	Cooling demand (3)	**Exposure:** Manufactured Capital (3) **Sensitivity:** Financial Capital (1); Human Capital (2) **Lack of Coping Capacity:** Natural Capital (2); Social Capital (1)	Heat extreme – ecosystems (3)	**Exposure:** Natural Capital (3) **Sensitivity:** Financial Capital (2); Natural Capital (1) **Lack of Coping Capacity:** Manufactured Capital (3)
			Shifting ecoregions (3)	**Exposure:** Natural Capital (3) **Sensitivity:** Natural Capital (3) **Lack of Coping Capacity:** Manufactured Capital (2); Social Capital (1)

Table 21: Most influential wellbeing dimensions by sub-pillar associated with climate impacts most frequently ranked highest by a census division, across all 18 census divisions, focused on the *increasing adverse* climate impacts category.

<table>
<tr><th colspan="5">Most influential wellbeing-dimensions by sub-pillar associated with increasing adverse impacts most frequently ranked 1st by a CD (unweighted)</th></tr>
<tr><th>Impact Rank*</th><th>Impacts in 2030s (#CDs)</th><th>Most influential Sub-pillar (#CDs)</th><th>Impacts in 2080s (#CDs)</th><th>Most influential Sub-pillar (#CDs)</th></tr>
<tr><td rowspan="3">1st</td><td>Heat extreme – agriculture (4)</td><td>Exposure: Provisioning Services (4)
Sensitivity: Economy (3); Financial Security (1)
Lack of Coping Capacity: Infrastructure (1); Personal Safety & Security (1); Relationships (2)</td><td>Heat extreme – agriculture (4)</td><td>Exposure: Provisioning Services (4)
Sensitivity: Economy (3); Financial Security (1)
Lack of Coping Capacity: Infrastructure (1); Personal Safety & Security (2); Relationships (1)</td></tr>
<tr><td rowspan="2">Cooling demand (3)</td><td rowspan="2">Exposure: Buildings (3)
Sensitivity: Financial Security (1); Health (2)
Lack of Coping Capacity: Personal Safety & Security (3); Provisioning Services (1)</td><td>Heat extreme – ecosystems (3)</td><td>Exposure: Provisioning Services (2); Habitat & Biodiversity (1)
Sensitivity: Economy (2); Habitat & Biodiversity (1)
Lack of Coping Capacity: Infrastructure (3); Economy (1)</td></tr>
<tr><td>Shifting ecoregions (3)</td><td>Exposure: Provisioning Services (2); Habitat & Biodiversity (1)
Sensitivity: Regulating Services (2); Habitat & Biodiversity (1)
Lack of Coping Capacity: Economy (1); Knowledge & Skills (1); Personal Safety & Security (1)</td></tr>
</table>

Weighted vs. Unweighted Results (Sub-pillars only)

- Weighting of sub-pillars based on priority issues identified by Nova Scotians during the MQO survey resulted in no changes in exposure sub-pillars.
- For sensitivity to cooling demand, Financial Security is no longer among the top ranked drivers after weighting is applied (only Health).
- For sensitivity to heat extremes affecting ecosystems, Habitat & Biodiversity is replaced by Regulating Services as a top ranked driver.
- For lack of coping capacity associated with heat extremes that affect agriculture in the both the early and latter part of the century, Financial Security & Personal Safety & Security increase in importance and supersede Infrastructure and Relationships after the weighting is applied.
- Similarly for cooling demand in the early part of the century, Provisioning Services is no longer among the top ranked drivers of low coping capacity after weighting is applied (just Personal Safety & Security).
- For extreme heat affecting ecosystems in the latter part of the century, Financial Security increases in importance after weighting is applied and Infrastructure reduces.

Appendix G – Climate Impact Sub-indices

Increasing adverse outcomes with climate change

Drought

Sub-index: Climate Impact				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Accumulated moisture	am	mm	1	-
Consecutive dry days	cdd	days	1	+
Consecutive hot days	chd	days	1	+
Heat wave magnitude	hwm	degrees C	1	+
Heat wave number	hwn	number	1	+
Mean of maximum daily temperature (summer)	txmean_sum	degrees C	1	+
Mean temperature (summer)	tgmean_sum	degrees C	1	+
Standardized Precipitation Evapotranspiration Index (SPEI)	spei	index	1	-
Total precipitation - summer	prcptot_sum	mm	1	-

Pluvial flooding

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Maximum 1-day precipitation	rx1day	mm	1	+
Rain days (winter)	dwr_win	days	1	+
Rainfall (short duration, high intensity) (24-hour total; 1-50 years)	sdhi_24hr	mm	1	+
Rainfall (short duration, high intensity) (15-minute intensity; 1-10 years)	sdhi_15min	mm / hour	1	+

Fluvial flooding

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Maximum 1-day precipitation	rx1day	mm	1	+
Maximum 5-day precipitation	rx5day	mm	1	+
Rainfall (short duration, high intensity) (24-hour total; 1-50 years)	sdhi_24hr	mm	1	+
Snow water equivalent	swe_ann	mm	1	+
Total precipitation - spring	prcptot_spr	mm	1	+
Total precipitation - fall	prcptot_fal	mm	1	+
Wet days (with precipitation above 20mm)	r20mm_ann	days	1	+

Heat extreme (agriculture)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Consecutive hot days	chd	days	1	+
Heat wave magnitude	hwm	degrees C	1	+
Heat wave number	hwn	number	1	+
Maximum daily temperature (hottest day)	txmax_ann	degrees C	1	+
Mean of maximum daily temperature (summer)	txmean_sum	degrees C	1	+
Maximum daily temperature above 29C (heat warning)	txgt29	days	1	+

Heat extreme (ecosystems)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Consecutive hot days	chd	days	1	+
Heat wave magnitude	hwm	degrees C	1	+
Heat wave number	hwn	number	1	+
Maximum daily temperature (hottest day)	txmax_ann	degrees C	1	+
Mean of maximum daily temperature (summer)	txmean_sum	degrees C	1	+
Maximum daily temperature above 29C (heat warning)	txgt29	days	1	+

Heat extreme (human health)

Sub-index: Climate impact				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Consecutive hot days	chd	days	1	+
Heat wave magnitude	hwm	degrees C	1	+
Heat wave number	hwn	number	1	+
Maximum daily temperature (hottest day)	txmax_ann	degrees C	1	+
Maximum daily temperature above 24.7C (heat mortality)	txg_hh	days	1	+
Maximum daily temperature above 26.7C (labour productivity)	txg_lp	days	1	+
Maximum daily temperature above 29C (heat warning)	txgt29	days	1	+
Tropical nights (minimum temp > 16C)	tr16	days	1	+

Heat extreme (transport infrastructure)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Consecutive hot days	chd	days	1	+
Heat wave magnitude	hwm	degrees C	1	+
Heat wave number	hwn	number	1	+
Maximum daily temperature (hottest day)	txmax_ann	degrees C	1	+

Cooling demand (buildings)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Consecutive hot days	chd	days	1	+
Cooling degree days	cdd18_ann	degree days	1	+
Heat wave magnitude	hwm	degrees C	1	+
Heat wave number	hwn	number	1	+
Maximum daily temperature (hottest day)	txmax_ann	degrees C	1	+
Mean of maximum daily temperature (summer)	txmean_sum	degrees C	1	+
Maximum daily temperature above 29C (heat warning)	txgt29	days	1	+

Agricultural pests and disease

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Coldwave magnitude	cwm	degrees C	1	-
Coldwave number	cwn	number of events	1	-
Mean temperature (annual)	tgmean_ann	degrees C	1	+
Minimum daily temperature below 15C (days with)	tnlt15_ann	days	1	-

Shifting ecoregions

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Growing degree days (5C)	gddgrow5	degree days	1	+
Growing degree days (10C)	gddgrow10	degree days	1	+
Growing season length	gsl	days	1	+
Maximum daily temperature (hottest day)	txmax_ann	degrees C	1	+
Maximum daily temperature (mean winter)	txmax_win	degrees C	1	+
Mean temperature (annual)	tgmean_ann	degrees C	1	+
Total precipitation - spring	prcptot_spr	mm	1	+
Total precipitation - summer	prcptot_sum	mm	1	+
Total precipitation - fall	prcptot_fal	mm	1	+
Total precipitation - winter	prcptot_win	mm	1	+

Vector-borne diseases

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Coldwave magnitude	cwm	degrees C	1	-
Coldwave number	cwn	number of events	1	-
Mean of maximum daily temperature (summer)	txmean_sum	degrees C	1	+
Mean temperature (annual)	tgmean_ann	degrees C	1	+
Mean temperature (summer)	tgmean_sum	degrees C	1	+
Minimum daily temperature (coldest day)	tnmin_ann	degrees C	1	-
Minimum daily temperature below 15C (days with)	tnlt15_ann	days	1	-
Total precipitation - annual	prcptot_ann	mm	1	+
Total precipitation - spring	prcptot_spr	mm	1	+
Total precipitation - summer	prcptot_sum	mm	1	+

SLR & coastal flooding

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Sea-level rise	slr	Index	1	+

Wildfire

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Wildfire (amplitude)	fwia	index	1	+
Wildfire (duration)	fwid	days	1	+
Wildfire (frequency)	fwif	days	1	+

Decreasing adverse outcomes with climate change

Heavy snowfall

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Rain days (winter)	dwr_win	days	1	+
Snow days (accumlation >15cm) (annual)	sd15_ann	days	1	+
Snow days (accumlation >15cm) (shoulder seasons)	sd15_shoulder	days	1	+
Snow water equivalent	swe_ann	mm	1	+

Freeze-thaw cycles

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Freeze-thaw cycles	ft_ann	events	1	+

Heating demand (buildings)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Coldwave magnitude	cwm	degrees C	1	+
Coldwave number	cwn	number of events	1	+
Heating degree days	hdd18_ann	degree days	1	+
Minimum daily temperature (coldest day)	tnmin_ann	degrees C	1	+

Increasing beneficial outcomes with climate change

Summer recreation & tourism (extended)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Freeze-free season length	ff	days	1	+
Frost days	frostdays	days	1	-
Mean temperature (annual)	tgmean_ann	degrees C	1	+
Mean temperature (summer)	tgmean_sum	degrees C	1	+

Growing season (longer)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Freeze-free season length	ff	days	1	+
Growing degree days (5C)	gddgrow5	degree days	1	+
Growing degree days (10C)	gddgrow10	degree days	1	+
Growing season length	gsl	days	1	+

Decreasing beneficial outcomes with climate change

Winter recreation & tourism (traditional activities)

Sub-index: Climate hazard				
Indicator	ID	Units	IN = 1; OUT = 0	Direction of impact on Sub-index
Freeze-free season length	ff	days	1	-
Frost days	frostdays	days	1	+
Minimum daily temperature below 5C (days with)	tnlt5_win	days	1	+
Rain days (winter)	dwr_win	days	1	-
Snow days (days with snow) (winter extended)	dws_win_ext	days	1	+
Snow days (accumlation >15cm) (annual)	sd15_ann	days	1	+
Snow water equivalent	swe_ann	mm	1	+

Appendix H – WRI Result Tables and Figures for RCP4.5 for Nova Scotia

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	86.9	92.8	88.0	97.3	86.6	91.9	82.8	85.9	78.7	93.2
Pluvial Flooding	89.3	82.3	90.5	86.9	90.4	86.7	90.5	92.2	90.5	94.0
Fluvial Flooding	91.5	100.3	90.9	98.1	90.3	95.3	83.5	91.1	88.2	94.0
Heat extreme - agriculture	90.2	95.4	89.9	94.2	90.2	95.4	86.8	89.3	84.9	93.8
Heat extreme - ecosystems	88.4	95.4	88.1	94.2	88.4	95.4	85.6	86.3	81.3	91.4
Heat extreme - human health	89.6	103.0	89.7	103.2	89.7	103.0	78.8	88.4	86.1	90.7
Heat extreme - transport infrastructure	89.4	99.2	88.2	94.1	88.4	94.9	78.6	90.0	87.0	92.9
Cooling demand	89.5	98.1	88.9	95.9	89.6	98.7	85.9	86.9	83.9	90.0
Agriculture pests and diseases	87.7	92.2	87.1	89.8	87.5	91.6	90.7	83.9	76.3	91.4
Shifting ecoregions	89.7	96.8	90.3	99.1	90.6	100.5	86.8	87.6	83.7	91.4
Vector-borne diseases	88.5	89.9	90.3	97.1	89.7	94.8	78.8	92.7	95.8	89.5
SLR and costal flooding	89.7	97.8	89.7	97.8	89.7	97.8	80.6	90.1	85.8	94.4
Wildfire	85.3	78.4	85.7	79.8	83.2	69.7	83.4	89.8	85.1	94.4
Decreasing adverse outcomes										
Heavy snowfall	88.5	94.9	89.1	97.2	90.0	101.0	84.8	87.2	82.1	92.3
Freeze-thaw Cycles	89.2	99.2	87.1	90.7	88.9	98.0	85.2	86.2	80.8	91.5
Heating demand	91.7	101.4	92.0	102.9	92.3	104.1	85.9	89.7	90.6	88.8
Increasing beneficial outcomes										
Summer tourism & recreation	89.4	81.9	92.1	92.8	92.1	92.8	78.8	98.4	90.3	106.6
Growing season	95.7	98.5	98.5	109.6	98.4	109.3	93.7	95.3	84.1	106.6
Decreasing beneficial outcomes										
Winter tourism & recreation	92.1	111.9	91.2	108.6	92.1	112.2	78.8	88.8	86.0	91.6

* for "increasing beneficial outcomes" the value measures coping capacity (to sieze benefits) as opposed to low coping capacity

Table 22. Total WRI scores Nova Scotia for the median projections (50th percentile) under RCP4.5.

	Impact of climate change by 2015-45		Impact of climate change by 2035-65		Impact of climate change by 2065-95		Today			
	WRI	Climate impact	WRI	Climate impact	WRI	Climate impact	Exposure	Vulnerability	Sensitivity	Low coping capacity *
Increasing adverse outcomes:										
Drought	12	9	11	5	12	10	9	12	12	6
Pluvial Flooding	8	12	2	12	2	12	2	2	2	3
Fluvial Flooding	1	2	1	3	3	7	7	3	3	3
Heat extreme - agriculture	2	7	5	8	4	5	4	7	8	5
Heat extreme - ecosystems	10	7	10	8	9	5	6	11	11	8
Heat extreme - human health	5	1	6	1	7	1	11	8	5	11
Heat extreme - transport infrastructure	7	3	9	10	10	8	13	5	4	7
Cooling demand	6	4	8	7	8	3	5	10	9	12
Agriculture pests and diseases	11	10	12	11	11	11	1	13	13	8
Shifting ecoregions	3	6	4	2	1	2	3	9	10	8
Vector-borne diseases	9	11	3	6	5	9	11	1	1	13
SLR and costal flooding	4	5	7	4	6	4	10	4	6	1
Wildfire	13	13	13	13	13	13	8	6	7	1
Decreasing adverse outcomes										
Heavy snowfall	3	3	2	2	2	2	3	2	2	1
Freeze-thaw Cycles	2	2	3	3	3	3	2	3	3	2
Heating demand	1	1	1	1	1	1	1	1	1	3
Increasing beneficial outcomes										
Summer tourism & recreation	2	2	2	2	2	2	2	1	1	2
Growing season	1	1	1	1	1	1	1	2	2	1
Decreasing beneficial outcomes										
Winter tourism & recreation	1	1	1	1	1	1	1	1	1	1

* for "increasing beneficial outcomes" the value measures coping capacity (to sieze benefits) as opposed to low coping capacity

Table 23. Rankings of climate-related impacts for Nova Scotia for the median projections (50th percentile) under RCP4.5. [1=highest Index score for corresponding impact category]

	Increasing climate-related adverse outcomes									
	Impact climate change by 2015-45		Impact climate change by 2035-65		Impact climate change by 2065-95		Today			
	WRI	Climate hazard	WRI	Climate hazard	WRI	Climate hazard	Exposure	Vulnerability	Sensitivity	Low coping capacity
Annapolis	4	4	4	4	4	3	10	4	5	3
Antigonish	18	11	17	8	18	11	15	18	18	17
Cape Breton	8	13	8	17	8	13	2	12	9	13
Colchester	5	5	6	3	5	5	6	8	4	14
Cumberland	1	1	1	1	1	1	3	2	1	12
Digby	3	6	2	6	2	6	9	1	2	1
Guysborough	14	9	14	9	14	9	16	7	12	5
Halifax	2	10	3	16	3	14	1	14	6	15
Hants	10	3	10	5	10	4	8	17	16	18
Inverness	13	16	13	12	13	16	12	11	10	9
Kings	6	2	7	2	6	2	4	16	8	16
Lunenburg	9	12	9	11	9	10	5	13	14	11
Pictou	7	8	5	7	7	8	7	3	3	7
Queens	11	15	11	13	12	17	13	5	11	2
Richmond	17	7	18	10	17	7	18	15	17	10
Shelburne	15	18	15	18	15	18	14	6	7	4
Victoria	16	14	16	15	16	12	17	10	15	6
Yarmouth	12	17	12	14	11	15	11	9	13	8

Table 24. Increasing adverse outcomes: Most impacted census divisions for the median projections (50th percentile) under RCP4.5. [1=highest aggregate Index score for impact category = most impacted]

	Decreasing climate-related beneficial outcomes									
	Impact climate change by 2015-45		Impact climate change by 2035-65		Impact climate change by 2065-95		Today			
	WRI	Climate hazard	WRI	Climate hazard	WRI	Climate hazard	Exposure	Vulnerability	Sensitivity	Low coping capacity
Annapolis	8	12	8	11	8	11	10	4	5	5
Antigonish	15	11	12	10	13	10	11	16	8	18
Cape Breton	7	18	7	18	7	17	2	2	3	14
Colchester	6	3	5	3	6	4	4	15	11	13
Cumberland	4	1	4	1	4	1	8	7	7	12
Digby	16	14	15	14	15	14	12	14	16	4
Guysborough	13	13	13	12	14	13	17	5	10	1
Halifax	1	5	1	6	1	5	1	8	4	16
Hants	2	2	2	2	2	2	7	3	1	17
Inverness	17	15	17	15	17	15	13	10	9	11
Kings	9	8	9	7	9	7	3	18	17	15
Lunenburg	3	7	3	4	3	3	5	6	6	7
Pictou	5	4	6	5	5	6	6	12	12	8
Queens	12	9	11	9	11	9	15	9	15	2
Richmond	18	16	18	16	18	16	16	13	14	9
Shelburne	10	6	10	8	10	8	14	11	13	6
Victoria	14	17	16	17	16	18	18	1	2	3
Yarmouth	11	10	14	13	12	12	9	17	18	10

Table 25. Decreasing beneficial outcomes: Most impacted census divisions for the median projections (50th percentile) under RCP4.5. [1=highest aggregate Index score for impact category = most impacted]

	Decreasing climate-related adverse outcomes									
	Impact climate change by 2015-45		Impact climate change by 2035-65		Impact climate change by 2065-95		Today			
	WRI	Climate hazard	WRI	Climate hazard	WRI	Climate hazard	Exposure	Vulnerability	Sensitivity	Low coping capacity
Annapolis	9	12	9	11	9	11	10	4	5	3
Antigonish	16	2	17	5	16	3	13	18	18	17
Cape Breton	4	3	3	2	4	6	2	11	12	9
Colchester	5	9	6	8	5	5	6	10	11	10
Cumberland	2	4	1	1	1	1	7	2	1	5
Digby	6	16	5	14	6	14	9	1	2	1
Guysborough	12	6	15	10	15	9	17	13	17	8
Halifax	1	10	2	9	2	10	1	14	14	11
Hants	11	7	10	6	10	7	8	17	16	18
Inverness	13	11	14	13	13	12	12	15	15	12
Kings	7	8	7	7	7	8	3	16	13	16
Lunenburg	8	13	8	12	8	13	5	8	7	13
Pictou	3	1	4	3	3	2	4	6	6	4
Queens	14	15	12	16	12	16	14	3	3	2
Richmond	10	5	11	4	11	4	15	12	9	14
Shelburne	17	18	16	18	17	18	16	5	4	7
Victoria	18	14	18	15	18	15	18	9	8	15
Yarmouth	15	17	13	17	14	17	11	7	10	6

Table 26. Decreasing adverse outcomes: Most impacted census divisions for the median projections (50th percentile) under RCP4.5. [1=highest aggregate Index score for impact category = most impacted]

	Increasing climate-related beneficial outcomes									
	Impact climate change by 2015-45		Impact climate change by 2035-65		Impact climate change by 2065-95		Today			
	WRI	Climate hazard	WRI	Climate hazard	WRI	Climate hazard	Exposure	Vulnerability	Sensitivity	Coping capacity
Annapolis	10	8	11	9	8	8	9	7	2	13
Antigonish	12	14	10	8	12	12	13	3	11	1
Cape Breton	5	15	3	12	2	6	2	8	13	6
Colchester	3	1	5	4	5	2	11	2	5	4
Cumberland	2	2	2	3	3	3	7	5	4	7
Digby	11	4	12	2	11	1	10	15	10	17
Guysborough	13	9	14	10	14	10	16	12	9	15
Halifax	1	12	1	15	1	15	1	4	7	5
Hants	6	11	7	13	6	14	6	6	12	3
Inverness	14	17	13	16	13	16	12	9	6	11
Kings	4	10	4	14	4	11	4	1	1	2
Lunenburg	8	16	9	17	9	18	3	10	8	9
Pictou	9	7	8	5	10	7	5	13	15	10
Queens	16	13	15	11	16	13	14	17	14	18
Richmond	15	5	17	7	15	5	18	16	16	12
Shelburne	17	6	16	6	18	9	15	18	18	14
Victoria	18	18	18	18	17	17	17	11	3	16
Yarmouth	7	3	6	1	7	4	8	14	17	8

Table 27. Increasing beneficial outcomes: Most impacted census divisions for the median projections (50th percentile) under RCP .5. [1=highest aggregate Index score for impact category = most impacted]

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