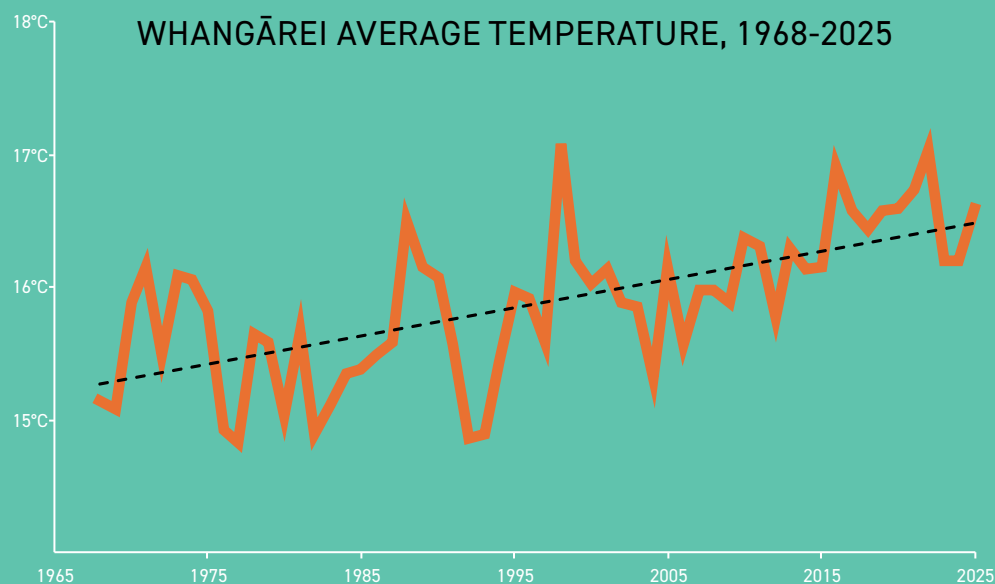


NORTHLAND'S FUTURE CLIMATE

As temperatures rise due to global warming, our wind, rainfall, and seasonal patterns will change. Sea levels will continue to rise and we will experience more floods, droughts and heatwaves.

Climate change is already happening. For example, Whangārei's current average temperature is about 1 degree higher than 50 years ago. As we head into the future it is critical to understand how our environment might change so we can prepare, find opportunities, adapt, and continue to prosper.



Updated climate projections, developed by Earth Sciences New Zealand, draw on global climate models that underpin the IPCC's Sixth Assessment Report. They provide a clearer picture of the climate-related risks facing Northland to help guide decision-making for adaptation and resilience.

How our future climate will change depends strongly on greenhouse gas concentrations in the atmosphere. Shared Socio-economic Pathways (SSPs) are scenarios of greenhouse gas concentrations from 2015-2100. The following two scenarios represent a plausible range for investigating future global climate change:

MODERATE INTENSITY SCENARIO (SSP2-4.5)

SSP2-4.5 is an intermediate concentration scenario that could be a realistic outcome if moderate global action is taken towards reducing greenhouse gas emissions.

HIGH INTENSITY SCENARIO (SSP3-7.0)

SSP3-7.0 is a high concentration scenario where little global action is taken towards reducing greenhouse gas emissions.

In this summary report, annual climate change projections for two future time periods are shown: 2050 (data averaged over 2041-2060), and 2090 (2081-2099). Changes are relative to the historic average (data averaged over 1995-2014).

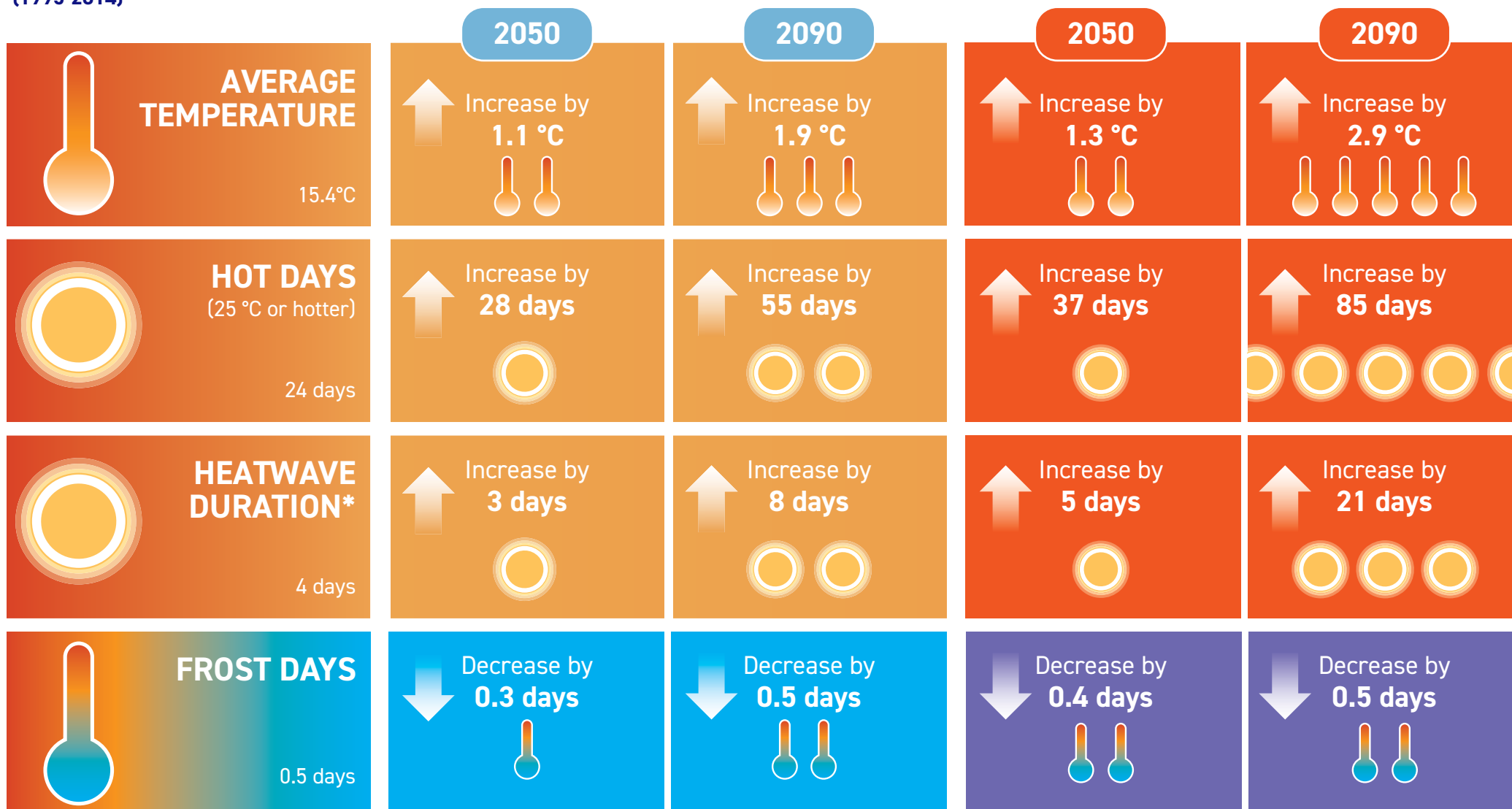
TEMPERATURE

Northland's future climate

**HISTORIC REGIONAL AVERAGE
(1995-2014)**

MODERATE INTENSITY SCENARIO

HIGH INTENSITY SCENARIO

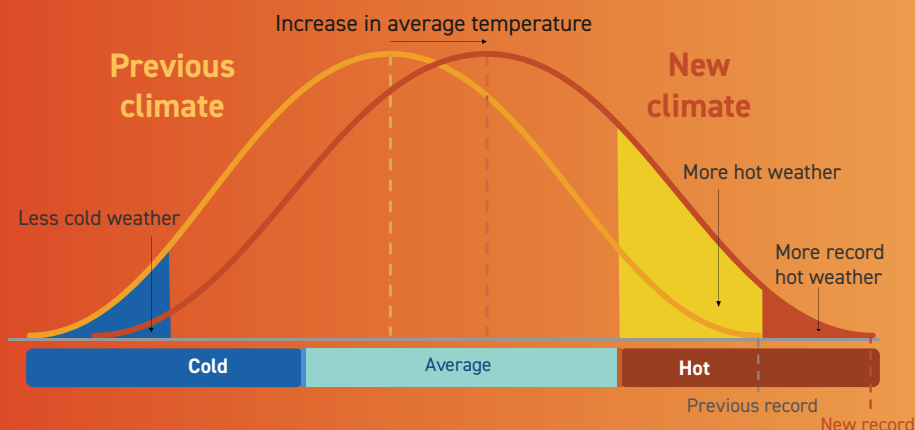


* At least 3 consecutive days that are exceptionally warm for the time of year.

TEMPERATURE

Northland's future climate

Average temperatures in Northland by the end of the century are expected to be 1.9°C higher under the moderate scenario and 2.9°C higher under the high scenario. While the change in average temperature may appear small, it shifts the climate system and leads to more extreme weather.



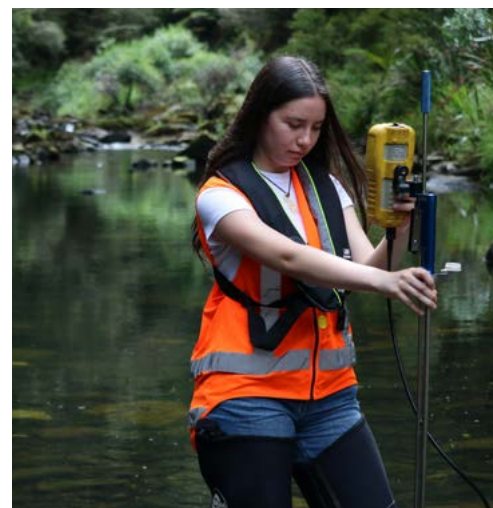
FROSTS

While frosts are already rare, as temperatures rise, frosts will become even less common. This will be most noticeable in Kaipara and high elevation areas. Northland is expected to be frost free by the end of the century.

EXTREME HEAT

Northland will experience more frequent extreme heat as the climate warms. Hot summer days (days above 25°C) that are already common are expected to more than double in frequency by mid-century. Heatwaves will also become a bigger feature of summer — not just a single hot afternoon, but runs of hot days that last longer and happen more often, particularly in the Far North.

HOW WILL CHANGING TEMPERATURES AFFECT THE REGION?



More extreme heat will change how land is used and what grows best. Hot spells and heatwaves can put stress on crops, pasture, and livestock, disrupt flowering and harvest timing, and increase fire risk. At the same time, warmer conditions can create opportunities, supporting the growth of high-value horticulture in Northland, including the expanding avocado and kiwifruit industries.

WHAT THIS COULD MEAN FOR YOU

Managing heat may require more shade and shelter, heat-tolerant crop varieties, and changes to on-farm practices. Consider new opportunities as warmer conditions suit different crops and land uses.

Warmer conditions can allow some pests and plant diseases to survive longer and spread more easily. This includes pests already present in Northland, such as fall armyworm and diseases like myrtle rust. This will bring increased pressure on forests, rivers, lakes, marine and coastal areas from invasive species.

WHAT THIS COULD MEAN FOR YOU

more pest and disease problems in gardens, farms, and forests, added pressure on lakes, rivers, and dune-lake systems, and growing biosecurity risks along the coast that can affect fishing, recreation, and local ecosystems.



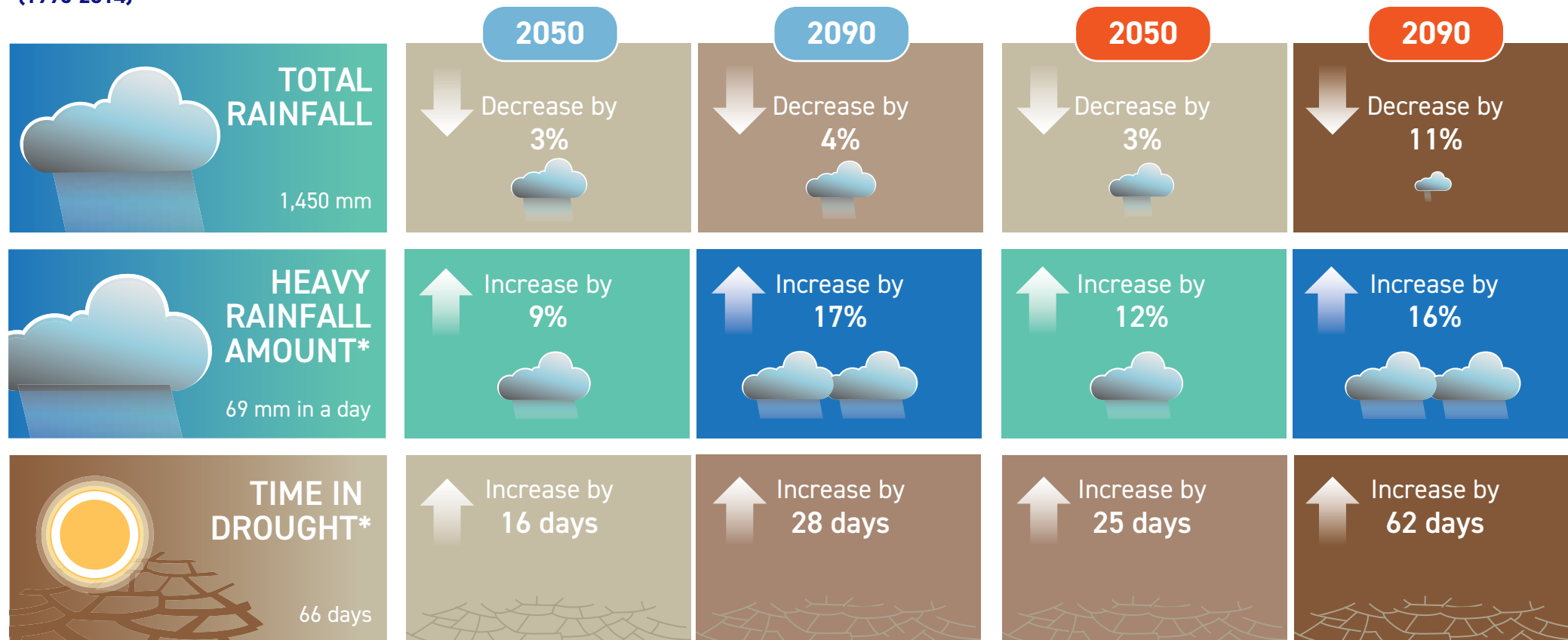
RAINFALL

Northland's future climate

HISTORIC REGIONAL AVERAGE (1995-2014)

MODERATE INTENSITY SCENARIO

HIGH INTENSITY SCENARIO

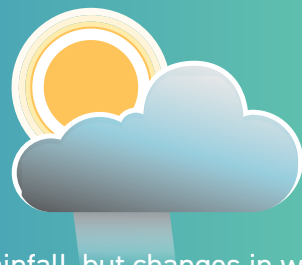


* Heavy rainfall amount defined here as the annual daily rainfall total that exceeds the 99th percentile. It is equivalent to the magnitude of rainfall on the 1-2 wettest days of the year.

* Drought is defined here by unusually low rainfall over a period of at least 3 consecutive months.

RAINFALL

Northland's future climate



Northland may see a small reduction in annual rainfall, but changes in when and how rain falls may be more noticeable. Spring and winter may be drier, while summers may be wetter, with longer dry periods and more intense rainfall. These shifts may balance annual and seasonal totals, but increase impacts on communities.

INCREASED INTENSITY OF EXTREME EVENTS



HEAVY RAINFALL

As the air warms, it can hold more moisture. A simple way to explain the science is that there is more water available in the atmosphere during big rain events, which can increase the intensity of downpours when conditions line up.

Rainfall on the 1-2 wettest days of the year could be 16% higher than present. More intense downpours can increase flash flooding, and can also trigger slips/landslides in steep or unstable areas because soils saturate faster.



EX-TROPICAL CYCLONES & ATMOSPHERIC RIVERS

Ex-tropical cyclones and atmospheric rivers are occasional features of Northland's weather and can cause damaging, costly impacts when they intersect with built and natural environments.

Ex-tropical cyclones are not projected to change markedly in frequency, but may bring more intense rainfall and potentially stronger winds. Atmospheric rivers are projected to become more intense, and possibly more frequent, contributing to heavier rainfall and periods of strong winds.



DROUGHTS

Higher temperatures increase the rate at which the land dries out. As a result, drought severity is expected to increase (i.e. more frequent and longer duration droughts).

Historically, Northland experiences 66 days of meteorological drought each year. By the end of the century, under the high intensity scenario, this could increase by an additional 62 days.

HOW WILL CHANGING RAINFALL PATTERNS AFFECT THE REGION?



Flooding will continue to be an issue in Northland. Heavier downpours will worsen surface flooding, river flooding, slips and landslides (especially in steep or erosion prone terrain). Heavy rain can also wash more soil into rivers and harbours, leading to muddy runoff and sediment that affects waterways and the coast.

WHAT THIS COULD MEAN FOR YOU

Roads and bridges can be blocked by floodwater or slips, and it can take longer to restore access because of debris and damage.

Increasing drought frequency and duration will affect water-sensitive activities and industries. Lower rainfall, reduced stream flows and groundwater recharge, and increased evaporation from rivers, lakes and dams may reduce water availability and place greater pressure on freshwater resources, particularly during prolonged dry periods. Northland's drought conditions have also highlighted the vulnerability of communities that rely on rain tanks and have limited storage, and the pressure this places on health, wellbeing, and household budgets.

WHAT THIS COULD MEAN FOR YOU

More frequent water restrictions, higher costs for water deliveries in some areas, and tougher growing conditions for gardens and farms during long dry periods.



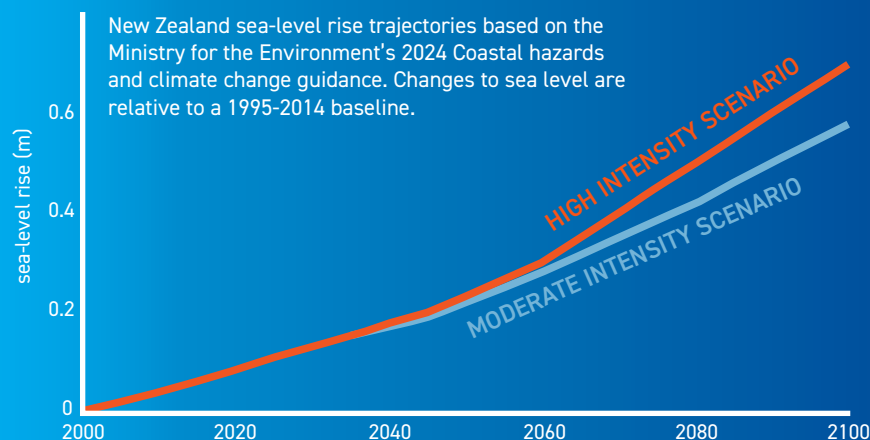
COASTAL IMPACTS

Northland's future climate

SEA-LEVEL RISE

Sea-level rise is driven by melting polar ice and the expansion of warming ocean water. In Northland, sea levels have already risen by about 20 cm over the past century and are expected to continue rising. A further increase of at least 20 cm is likely by 2050, regardless of emissions. By 2100, sea levels may rise by around 50–70 cm, depending on global emissions.

As sea levels rise, coastal communities will increasingly experience higher water levels. Gradual increases will be accompanied by more frequent and intense extreme sea-level events, including storm surges and coastal flooding.



HOW WILL SEA LEVEL RISE AFFECT OUR REGION?



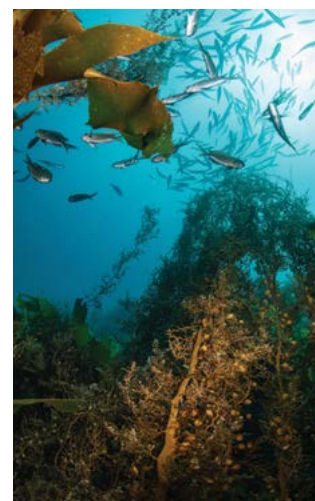
Sea-level rise will amplify storm surge, coastal inundation and erosion from severe storms such as ex-tropical cyclones and very high tides. This may affect homes, roads, and access to beaches, boat ramps, and coastal tracks in the short-term. In the long-term communities will need to consider how coastal settlements respond to a changing coastline.

Rising sea levels will also increase the risk of saltwater penetrating further underground and inland (intrusion) reaching groundwater supplies in some coastal areas. This may reduce the amount of freshwater available in some coastal communities that rely on these aquifers.

WHAT THIS COULD MEAN FOR YOU

More frequent coastal flooding, gradual loss of beaches and access, disruption to coastal roads and infrastructure, and reduced freshwater availability in some coastal areas.

ADDITIONAL COASTAL IMPACTS



Alongside sea-level rise, coastal waters around Northland are warming, increasing the chance of marine heatwaves. These can disrupt ecosystems, cause die-offs of and reduce the abundance of key species that support fisheries and aquaculture, although some warmer-water species may become more common.

The ocean is also gradually becoming more acidic as it absorbs carbon dioxide from the atmosphere, making it harder for shell-forming species like mussels, pāua, and some plankton to grow and survive.

WHAT THIS COULD MEAN FOR YOU

Shifts in the types and timing of seafood available, greater uncertainty for fisheries and aquaculture, and occasional impacts on coastal activities and ecosystems during unusually warm marine conditions, alongside some opportunities for new species or practices better suited to warmer waters.

ADDITIONAL IMPACTS

Northland's future climate



SOCIAL & COMMUNITY IMPACTS

These projected changes are likely to disrupt daily life, damage homes and community facilities, isolate communities, and place pressure on health and emergency services. Communities that rely on rainwater, coastal access, or vulnerable transport routes may be particularly affected, with cumulative impacts on affordability, health, safety, and quality of life.



MĀORI & CULTURAL

Climate change will increasingly compromise marae, Māori land holdings, urupā, wāhi tapu, and papakāinga. Indigenous species and ecosystems are vulnerable to a changing climate, which is likely to disturb the relationships Māori have with these taonga, including impacts on mahinga kai. Ocean acidification and increasing sea-surface temperatures will impact marine ecosystems, affecting fisheries and access to kai moana. For Māori, these impacts are compounding and enduring, and are exacerbated by land tenure arrangements, historical context, legal constraints, and cultural relationships to place—resulting in disproportionate impacts over time.



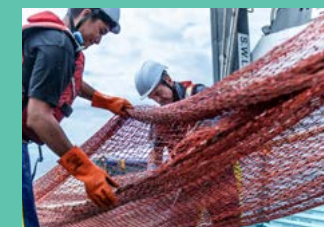
ENVIRONMENTAL

Climate change presents both challenges and opportunities for Northland's natural environment. More frequent and intense rainfall events are likely to accelerate soil erosion, washing sediment into waterways like the Kaipara and Hokianga Harbours and affecting the mudflat and seagrass habitats that support fish and birdlife. Kauri forests of the Waipoua and Omahuta face added stress alongside the existing pressure of kauri dieback disease. With proactive management, community-led restoration, and careful land stewardship, Northland has a real chance to protect and even strengthen its natural environment in the face of a changing climate.



ECONOMIC

Climate impacts are expected to increase the costs of maintaining infrastructure, protecting assets, insuring property, and delivering services. Primary industries, tourism, fisheries, and coastal economies may face increased disruption, while households may experience rising costs related to water supply, repairs, and adaptation.



HOW ARE COUNCILS RESPONDING?

The impacts of climate change are likely to be complex and wide ranging with the potential to impacted many aspects of life in Northland. The Northland Regional Council, and it's local and national partners will continue to understand the risks of a changing climate on local communities through specific risk assessment and adaptation planning work.



For more information about what we are doing visit our website.