

# WHERE TO GO FOR WATER DATA?

*How quickly is the sea level changing on my coastline?*



*Where do I find information about flooding in my neighbourhood?*



*How could our river flows change because of climate?*



*Our community needs local rainfall data, where do we begin?*

Climate change will affect water in Aotearoa in many different ways, from the amount of snowpack making it into our rivers in the springtime, to increased risk of flooding due to sea-level rise on the coasts, to impacts to groundwater levels and surface flooding during storms. Because of the complexity of modelling the water cycle, these climate change impacts are, for the most part, researched and modelled in different ways. There are a range of research groups who have modelled or are working to model these impacts, and this infosheet outlines what information is available and where you can find it

The majority of this work is funded through short term contestable research funding, and as such, the timing of updates is unknown.

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## WATER DATA

### High intensity rainfall

Data for design rainfall under climate change can be found through NIWA's [High Intensity Rainfall Design System](#) (HIRDS). HIRDS offers planners and engineers a tool to estimate rainfall depths for “designed” storms of different recurrence frequencies. It can be used to estimate rainfall of a given rarity and for hydrological design purposes, enabling planners and engineers better design local drainage systems and other structures. Currently, the climate change signal applied to the data in HIRDS is uniform across the country. Work is currently being completed within the Deep South Challenge to [model extreme weather](#) and understand regional climate change signals, in order to offer guidance on refined regional interpretations of HIRDS data.

### Fluvial flooding

Fluvial flooding – this is surface flooding caused by overtopping of river or stream banks. Due to the complexity of the modelling and the non-climate data required (such as information on stopbanks service levels and local river bathymetry) modelling of these events is generally commissioned locally. Though there is work underway in Mā te Haumarū o te Wai, there is no national pluvial flooding mapping currently available in New Zealand.

### Pluvial flooding

Pluvial flooding – this is surface flooding initiated by heavy rainfall. Like for fluvial flooding, the best available data for this has been commissioned and is held by council authorities. Though there is work underway in Mā te Haumarū o te Wai, there is no national pluvial flooding mapping currently available in New Zealand.

#### MĀ TE HAUMARU O TE WAI

Mā te Haumarū o te Wai (2020—2025) – [this project](#), lead by NIWA, is developing a modelling chain to simulate design storms (e.g. 1% AEP) and map the resultant surface flooding (pluvial and fluvial) consistently at a national level and to undertake a risk assessment base on those results. Due to the complexity of this task, we are working on a philosophy of iterative improvements and so the outputs from the first phase of the project will not be perfect, and will be most appropriate for regional or national scale assessments, or for regions

where bespoke modelling has not yet been conducted. This phase will, however, implement the basic framework on which improvements can be made. The first phase of the project will not produce maps that incorporate climate change, but the second phase (due at the end of June 2025) will include climate change. Intermediary products, such as hydraulically conditioned DEMs and consistent design storms based on HIRDS for current and future climates will also be made available.

## WATER DATA

### River flow projections

A national dataset is available on request for riverine hydrological fluxes, such as seasonal flows, mean annual flood, and seven-day mean annual low flow, amongst others, based on downscaled CMIP5 projections that have been input into TopNet, the national surface hydrology model. These were produced through the Deep South Challenge project [Climate impacts on the national water cycle](#), in 2020. A data infosheet detailing these data can be found [here](#). There is no cost to the data, but there may be costs associated with required analysis or post-processing. There is currently no funded update planned for this dataset (based on the most recent CMIP6 (2022) downscaled projections). A data infosheet detailing these data can be found [here](#).

### Sea level rise

[Sea level rise projections](#), including vertical land movement (local uplift or subsidence) are available and downloadable from the NZ SeaRise programme. These projections are based on shared socioeconomic pathways that represent potential global emissions and economic futures and provide decadal sea level rise projections and associated vertical land movement at a 1km resolution along the coastline. Work is ongoing to refine the vertical land movement data to higher spatial resolution, as well as incorporate the impacts of possible future earthquake events.

### Coastal flooding

[Maps and data of extreme coastal flooding due to sea level rise](#) are now freely available to download by NIWA. These flood maps represent a current-climate 1% "annual exceedance probability"\* flooding event, as well as what this event would look like with relative sea level rise increments of 0.1m, up to 2m. These maps use a "bathtub" model approach, rather than hydrodynamic modelling. Guidance is offered on how to use these maps together with the sea level rise projections above. Additional AEP scenarios have also been modelled, and though not available online, are available on request via license. See the link above for more information.

\* Annual exceedance probability, or AEP, is the probability that an event will occur in any one year. A "1% AEP" event is equivalent to an event that, with a stationary climate (no climate change), would occur, on average, every 100 years. Even without climate change there would not be 100 years between 1% AEP events.

### Groundwater

Though there is currently no national picture of the effect of sea level rise on groundwater levels, there is an understanding of the impact of climate change (precipitation and temperature) on steady-state groundwater levels under natural conditions (Mourot et al., 2022). [Future Coasts Aotearoa](#) is a research programme exploring the impacts of sea level rise on groundwater and the freshwater-saltwater interface in the coastal lowlands and has published a storyboard outlining the relevant data layers when considering groundwater and where to access them. The project is aiming to produce a national scale guidance on groundwater change (driven by climate change such as sea-level rise) to support groundwater planning by March 2024. "

*Where to go for more information?*

In the first instance we recommend reaching out to the organisations hosting the data. Some organisations are not funded or resourced to answer public questions so a response may take some time, or be only partial.

Many other kinds of research can also support proactive decision-making and help us work for the futures we want in the face of climate change. To have a look at some of the adaptation research from the Deep South Challenge: Changing with our Climate, visit <https://deepsouthchallenge.co.nz/our-research/> and explore the Vision Mātauranga and Impacts & Implications pages.

#### REFERENCES:

Mourot, F.M., Westerhoff, R., White, P.A., & Cameron, S.G. (2022). Climate change and New Zealand's groundwater resources: A methodology to support adaptation. *Journal of Hydrology: Regional Studies*.

*We hope this infosheet is useful to you on your journey towards climate resilience. We know that our changing climate is one of many factors in decision-making and planning, and though not all of these data will be relevant to your situation, we hope you find what you need to get started.*

*The future is uncertain, whether due to climate change or otherwise, and we know we can still act despite less-than-perfect information.*

IF YOU HAVE QUESTIONS OR COMMENTS ABOUT THIS INFOSHEET, PLEASE CONTACT OUR CLIMATE CHANGE KNOWLEDGE BROKER: [KATE.TURNER@NIWA.CO.NZ](mailto:kate.turner@niwa.co.nz)

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