Information topic	Details
Indicator name	**Number of days with extreme rainfall**
Domain and topic	Climate change: Extreme rainfall and drought
Indicator definition and units	**Extreme rainfall days** are defined as days with rainfall amounts exceeding the 95th percentile, which was calculated from daily rainfall amounts across the climate normal period from 1991-2020. **Annual rainfall anomaly** is defined as the difference between he quantity of rainfall received in a given year, and the average annual rainfall across the climate normal period from 1991-2020.
Data source	- CliFlo. NIWA's National Climate Database. URL: https://cliflo.niwa.co.nz/
Numerator	• Annual number of days with extreme rainfall by Territorial Authority (TA)
Methodology	Climate stations were selected based on their proximity to the population-weighted centroid for a TA as well as completeness of data for the period 1991-2023. One weather station per TA was selected. Using the population-weighted centroid coordinates for each TA, we looked at weather stations within a 25km radius. The weather station closest to the centroid was selected, provided it was currently operating and had a long record of data (i.e., minimum of 10 years of data). Where there was insufficiently complete data or the station was closed, we then examined the next closest weather station, and so on until the 'best fit' was found. *For rainfall:* In three cases, a climate station is used for two TAs (Hamilton/Waikato, Lower Hutt/Porirua, Tauranga/Western Bay of Plenty). In two cases, the only suitable climate station was currently closed and an exception was made (Kaipara, Opotiki). If a climate station's data had over 25% missing data in 2023, it was excluded from the analysis. In publications **before 2023**, the cutoff was set at 10%. The wider margin will apply only to data for 2023 (i.e. to the Surveillance Report published in 2024), to allow for disruption to data collection due to Cyclone Gabrielle. The population-weighted centroid of a TA was calculated from 2018 Census data, using the geographic centroid of statistical area 1 (SA1, small Census area description) weighted by their usual resident population. The selection of stations for this indicator will be reviewed once population data from the 2023 Census becomes available. The most recent Climate Normal for New Zealand was calculated as

	an average over the 30-year period 1991-2020 (all available data from all TAs was included). This average number acted as a benchmark against which current or recent observations were compared (i.e., anomalies).
Time period and time scale	Annual; from 1991 onwards Three-year moving averages, from 2000–2002 onwards
Spatial Coverage	National and by TA
Measures of frequency	- Average number of days per year with extreme rainfall - Number of days per year with extreme rainfall, by TA - 1991-2020 baseline average number of days with extreme rainfall - Annual rainfall anomaly, by TA
Limitations of indicator	- There will be geographic variation across a TA that is not represented for these indicators because we have used one weather station per TA.
Limitations of data source	Some of the selected weather stations have missing data, usually due to starting collection after the year 1991.
Created by	Environmental Health Intelligence New Zealand, Massey University
Related indicators	- Number of days below 0°C - Number of days over 25°C - Notifications of salmonellosis, cryptosporidiosis, campylobacteriosis and giardiasis
For more information	- https://www.niwa.co.nz/climate/nz-drought-monitor/droughtindicatormaps - Ministry for the Environment & Stats NZ. 2020. New Zealand's Environmental Reporting Series: Our atmosphere and climate 2020. Wellington: Ministry for the Environment & Stats NZ.
References	