

# The history of high intensity rainfall estimation methods in New Zealand and the latest High Intensity Rainfall Design System (HIRDS.V3)

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**Abstract**

Statistics of extreme rainfall play a vital role in engineering practice from the perspective of mitigation and protection of infrastructure and human life from flooding. While flood frequency assessments, based on river flood flow data are preferred, the analysis of rainfall data is often more convenient due to the finer spatial nature of rainfall recording networks, often with longer records, and potentially more easily transferable from site to site.

The rainfall frequency analysis as a design tool has developed over the years in New Zealand from Seelye's daily rainfall frequency maps in 1947 to Thompson's web based tool in 2010. This paper will present a history of the development of New Zealand rainfall frequency analysis methods, and the details of the latest method, so that comparisons may in future be made with the development of Korean methods.

One of the main findings in the development of methods was new knowledge on the distribution of New Zealand rainfall extremes.

The High Intensity Rainfall Design System (HIRDS.V3) method (Thompson, 2011) is based upon a regional rainfall frequency analysis with the following assumptions:

- An "index flood" rainfall regional frequency method, using the median annual maximum rainfall as the indexing variable.
- A regional dimensionless growth curve based on the Generalised Extreme Value (GEV), and using goodness of fit test for the GEV, Gumbel (EV1), and Generalised Logistic (GLO) distributions.
- Mapping of median annual maximum rainfall and parameters of the regional growth curves, using thin-plate smoothing splines, a 2km x 2km grid, L moments statistics, 10 durations from 10 minutes to 72 hours, and a maximum Average Recurrence Interval of 100 years.

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**REFERENCE:**

Thompson, C. 2011. HIRDS. V3: High Intensity Rainfall Design System – The method underpinning the development of regional frequency analysis of extreme rainfalls for New Zealand. Revision 1, March 2011. 27 pages. Available at [http://www.niwa.co.nz/\\_\\_data/assets/pdf\\_file/0018/104481/niwa\\_Hirdsv3\\_method-rev1.pdf](http://www.niwa.co.nz/__data/assets/pdf_file/0018/104481/niwa_Hirdsv3_method-rev1.pdf).

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