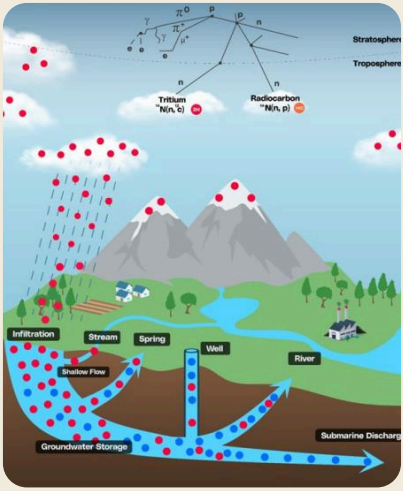
Factsheet 06

Te Whakaheke o Te Wai

Groundwater Age

Groundwater age refers to the length of time that groundwater has spent in the aquifer since being recharged (e.g., from rainfall or surface water). To estimate the age of a groundwater sample, we typically measure tritium and dissolved compounds known as groundwater age tracers (also referred to as groundwater dating). A better understanding of groundwater age at local, regional, and national scales enables improved management tools and information. This will inform sustainable management and protection of New Zealand's groundwater resources.



Red dots are tritium & blue dots are decayed tritium (older water).

Groundwater age tracers:

- natural elements in a water molecule (e.g., Tritium (3H), deuterium (2H))
- sulphur hexafluoride (SF6)
- Halon-1301
- chlorofluorocarbons (CFCs)

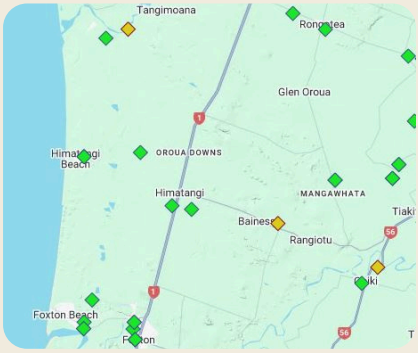
Tracers allow us to estimate groundwater age and gain other insights into flowpaths within an aquifer system.

Groundwater Age

Groundwater age provides a useful way to distinguish between “young” and “old” groundwater. When combined with other data, groundwater age helps identify recharge sources, outflow boundaries of an aquifer system, potential contamination sources, and the lag time between contamination entering the aquifer and discharging (via wells or connected surface waters).

We have generated a new national groundwater age dataset. This dataset is being used to inform the conceptualisation of groundwater systems and to manage the contaminant and water allocation associated risks to these systems. We have:

- collected 1,000 new samples in a national groundwater sampling campaign (see Figure)
- developed a national groundwater age map based on new samples (to augment the existing dataset)
- written regional reports that summarise the conceptual understanding of groundwater systems.



groundwater: green; surface water: yellow

When incorporated into models, groundwater age information can assist decision-makers to better manage groundwater resources, such as: identifing where groundwater may be susceptible to contamination, evaluate the sustainability of groundwater abstractions, and guide selection of appropriate management strategies.

Morgenstern, U.; et al., 2023 Groundwater and surface water conceptual flow from environmental tracer signatures in the Pukekohe and Bombay area. GNS Science report 2022/63. 97 p.; doi: 10.21420/VNBF-3X96