

## What lives in Runanga Lake?

Water samples were collected from Rūnanga Lake in December 2023 using sampling kits provided by the Environmental Protection Agency and examined for environmental DNA (eDNA) by Wilderlab in Wellington.

eDNA provides a snapshot of organisms recently in contact with water, identified from fragments of their DNA. The method identifies organisms to either the species, genus, family, order, class or phylum level but does not measure abundance and may not detect all the organisms present. eDNA findings of presence and absence can be compared with results from HBRC and NIWA surveys in 2001-2016.

Interesting findings were:

- a. Numerous species of phytoplankton and zooplankton were identified by eDNA many of which are associated with poor water quality. No species of toxic, bloom-forming cyanobacteria (blue-green algae) were detected.
- b. As expected, three previously reported aquatic macrophytes (water weeds) were detected by eDNA. However, a 2016 diver survey classified Rūnanga as '...devoid of vegetation...' (meaning <10% of the lakebed contained healthy macrophytes). It appears that macrophytes are less abundant than in the 1990s but eDNA sampling shows that patches remain. Shallow lakes like Rūnanga are known to switch from clear with macrophytes (as in the 1990s) to turbid with phytoplankton (as at present).
- c. The macrophyte *Ceratophyllum demersum* which causes problems in some other lakes was detected.
- d. Wilderlab classified Rūnanga Lake as 'very poor'. This is consistent with previous classifications based on low clarity, high nutrient concentrations and sparse macrophytes.
- e. There were strong eDNA detects for the bullies, eels and goldfish known from previous surveys.
- f. A new fish detect was the common smelt (*Retropinna*). Juvenile smelt migrate from the sea with the Galaxiid 'whitebait' and also occur in some land-locked lakes (e.g. Taupō). Smelt were an important food source for some Māori communities although much less important than eels (tuna) and galaxiid whitebait.
- g. Another new fish detect was mosquito fish (*Gambusia*).
- h. There was no eDNA evidence of koi carp – previous reported sightings of koi may have been goldfish which look similar.
- i. A jellyfish that arrived from China in the 1950s was detected for the first time. It is tiny and is not thought to pose a threat to ecosystem health.
- j. Few macroinvertebrates were detected apart from previously reported midges. Surprisingly eDNA from water boatmen and snails was not detected although they are likely to be present.
- k. An unexpected detect (albeit weak) was a caddisfly which normally inhabits clean flowing streams.

l. eDNA from the family containing koura and shrimp was detected but they could not be identified to species or genus level.

m. Similarly eDNA from the family containing frogs was detected but again they could not be identified to species or genus level.

n. No eDNA for bivalves (e.g., Kakahi) was detected although they were previously reported as present.

o. Surprisingly only 6-8 species of water birds were identified from eDNA compared with 26-28 from previous observations.

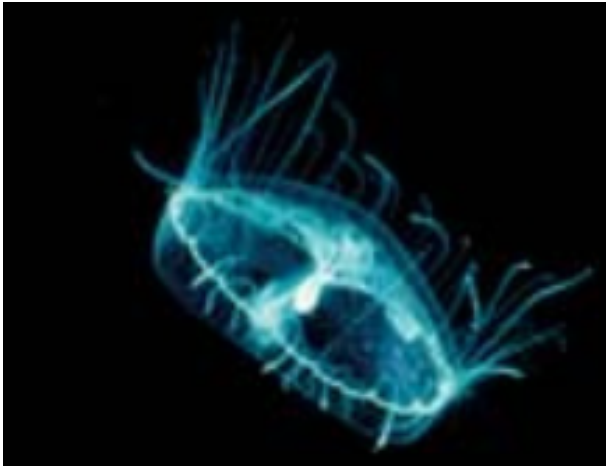
Because the lake was not well mixed, sampling may have missed some organisms. High turbidity meant that less water could be filtered than is ideal. Consequently it is planned to repeat sampling by collecting water from more places around the lake, and filtering a larger volume for eDNA analysis.

For further information contact our science guru, Kit Rutherford!

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	2001-2006	2016	eDNA 2023
Water birds	23-24 species		6-8 species
Rat, mouse	√		X
Mustelid, possum	√		X
Invertebrates			
Midge	√		√
Water boatmen	√		X
Caddis	X		weak
Snail	√		X
Koura	√		?
Shrimp	?		?
Jellyfish	X		√
Frogs	√		?
Kakahi	√?		X
Fish			
Bully	√		√
Eel	√		√
Goldfish	√		√
Mosquitofish	X		√
Smelt	X		√
Koi	?		X
Aquatic macrophytes			
Potamogeton spp	√	X	√
Elodea	√	X	√
Myriophyllum	√	X	√
Ceratophyllum	X	X	√



Left: The freshwater jellyfish *Craspedacusta sowerbyi*. Source: <https://niwa.co.nz/publications/water-and-atmosphere/vol10-no2-june-2002/alien-predator-freshwater-jellyfish-in-new-zealand>. Right: The common smelt *Retropinna retropinna*. Source: <https://www.doc.govt.nz/nature/native-animals/freshwater-fish/smelt/>