National Wastewater Surveillance Programme - COVID-19

Week 33 (Week Ending 21 August 2022)

Report prepared on 24 August 2022

100%	72%	Omicron BA.4/5 (~98%)
of sites tested had SARS-CoV-2 detected (95/95 sites)	of the NZ population covered by wastewater testing	is most prevalent variant detected BA.2/BA.1/BA.2.75 (~2%)

Overall, after several weeks of decreases, SARS-CoV-2 levels in wastewater have levelled off nationally

Omicron BA.4/5 is the dominant variant detected in wastewater

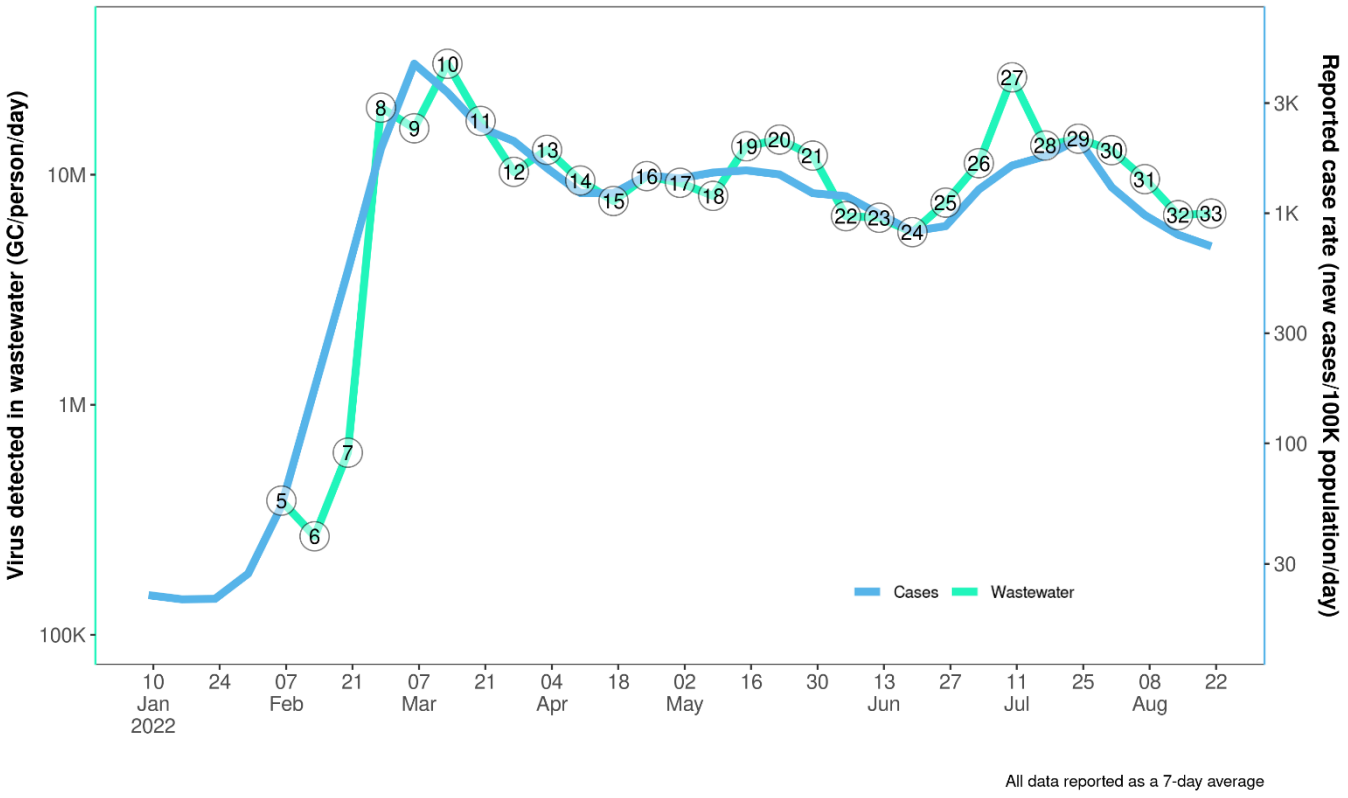


Figure 1. National timeseries of estimated SARS-CoV-2 genome copies (GC) in wastewater rate (GC/person/day) and reported case rate (new cases per 100,000 population per day). Numbers in the points are the week of the year. The most recently reported weeks are highlighted in green. Log_{10} scale.

Results For Week 33 2022

In the week ending 21 August 2022, 142 samples were collected from 95 locations in New Zealand.

SARS CoV-2 RNA was quantifiably **detected** in all 142 samples from 95 (100%) sites tested this week (Figure 2, Figure 3 and Table 1).

Figure 2 below gives the proportion of sites with positive results for this and previous weeks.

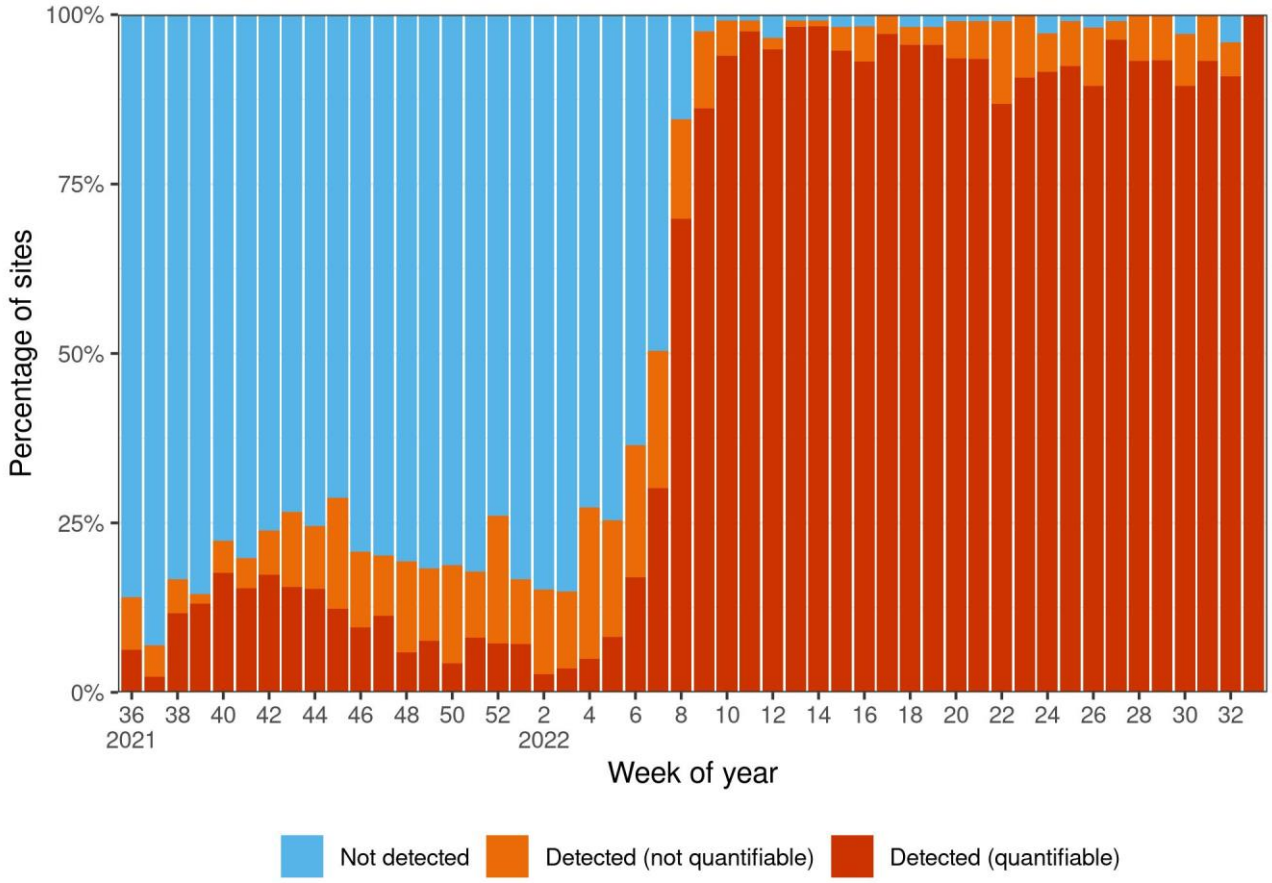


Figure 2. Results for SARS-CoV-2 RNA in wastewater collected across New Zealand

For the week ending 21 August 2022, 32% of sites have increased SARS-CoV-2 levels compared to the previous week and 35% have decreased levels and 34% had no change. Compared to a month ago, 19% of sites show an increase and 61% of sites show a decrease and 20% showed no change (Figure 3).

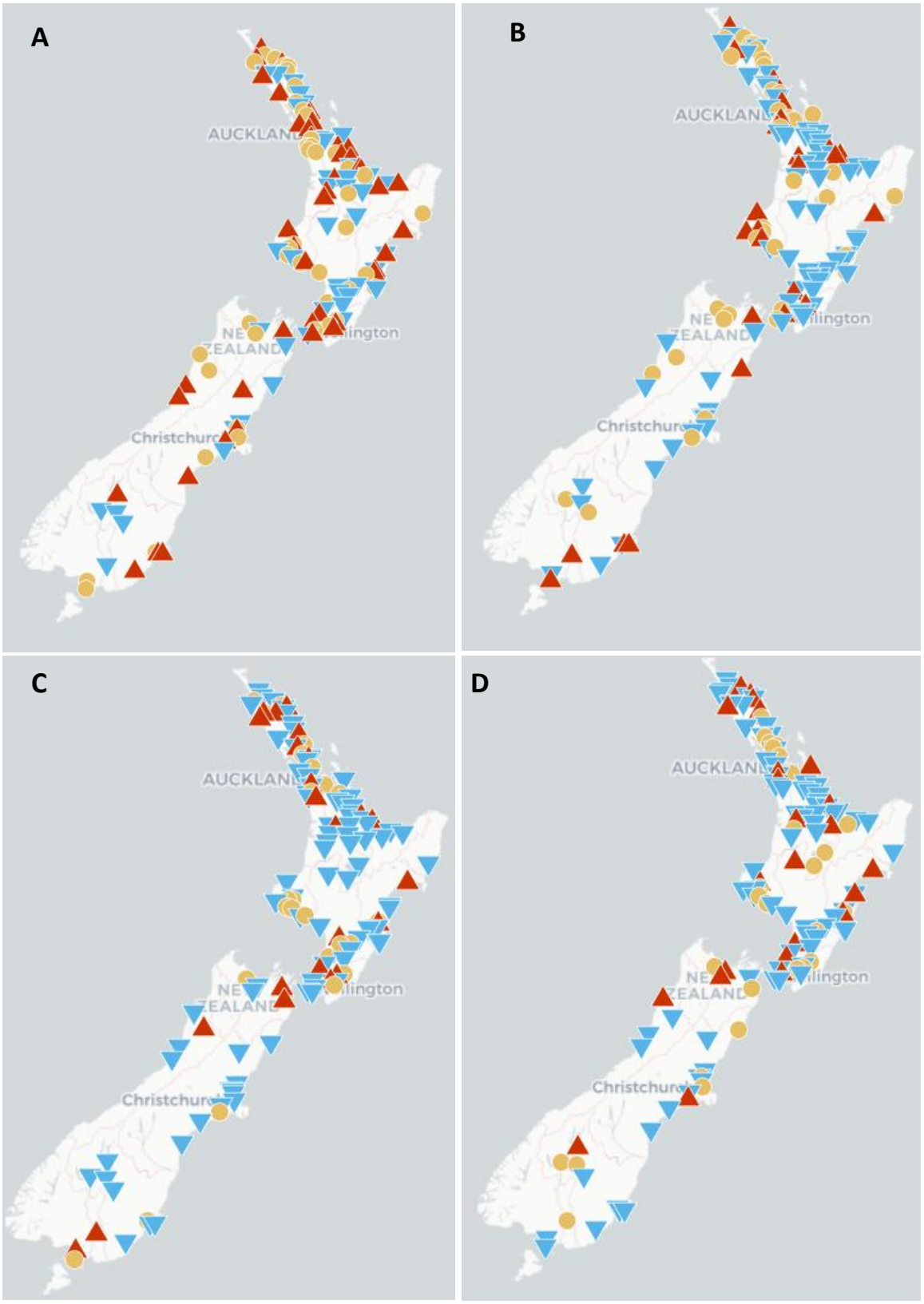


Figure 3. Comparison of SARS-CoV-2 levels for the week ending 21 August 2022, compared with the levels measured: A) 1 week ago; B) 2 weeks ago; C) 4 weeks ago; D) 12 weeks ago. Only sites with results for both time points are included. When the viral quantity is 30% or more higher this is labelled as increased (red up arrow on map). When the viral quantity is 30% or more lower this is labelled as decreased (blue down arrow on map). If viral levels have changed less than this in the compared weeks, this is labelled as no change (yellow circle on map). Interactive map of weekly results available publicly at https://www.esr.cri.nz/our-expertise/covid-19-response/wastewater-testing-results

Regional Trends

Regional summaries (Figure 4) also indicate levelling viral levels (genome copies per person per day) across all regions except Northern, which continues to decline, compared with the previous week.

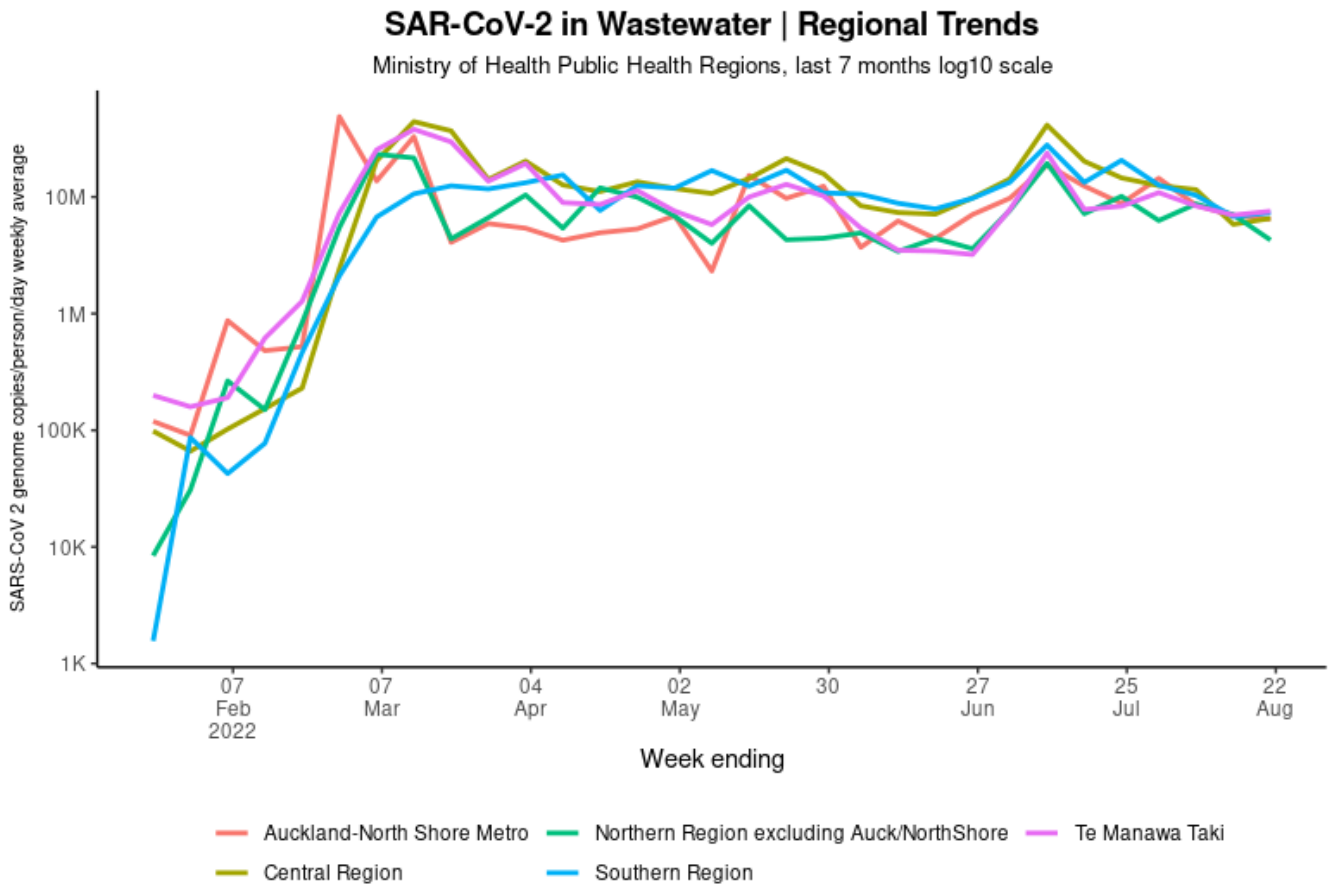


Figure 4. Average SARS-CoV-2 genome copies detected per person per day in the five Ministry of Health regions. Weighted by population tested that week in each region.

Wastewater Variant Analysis

Consistent with whole genome sequencing (WGS) of clinical cases, the BA.4 and BA.5 variants are the dominant circulating variants across Aotearoa (national average of ~98%). This week, 16/20 sites were 100% BA.4/5 (i.e., BA.2 could not be detected) (Figure 5).

The displacement of BA.2 by BA.4/5 has been rapid - over the past 10 weeks nationally (aggregated across all sentinel sites,) BA.4/5 was 6%, 10.5%, 33%, 53%, 73%, 81%, 90%, 93%, 98% and again **98% this week** (Figure 6).

There is a possible low detection of BA.2.75 in Porirua, but it could be BA.1 as the assay used the detection of BA.2.75 cannot distinguish between these two variants. This result has been represented as a nominal 5% prevalence in Figure 5.

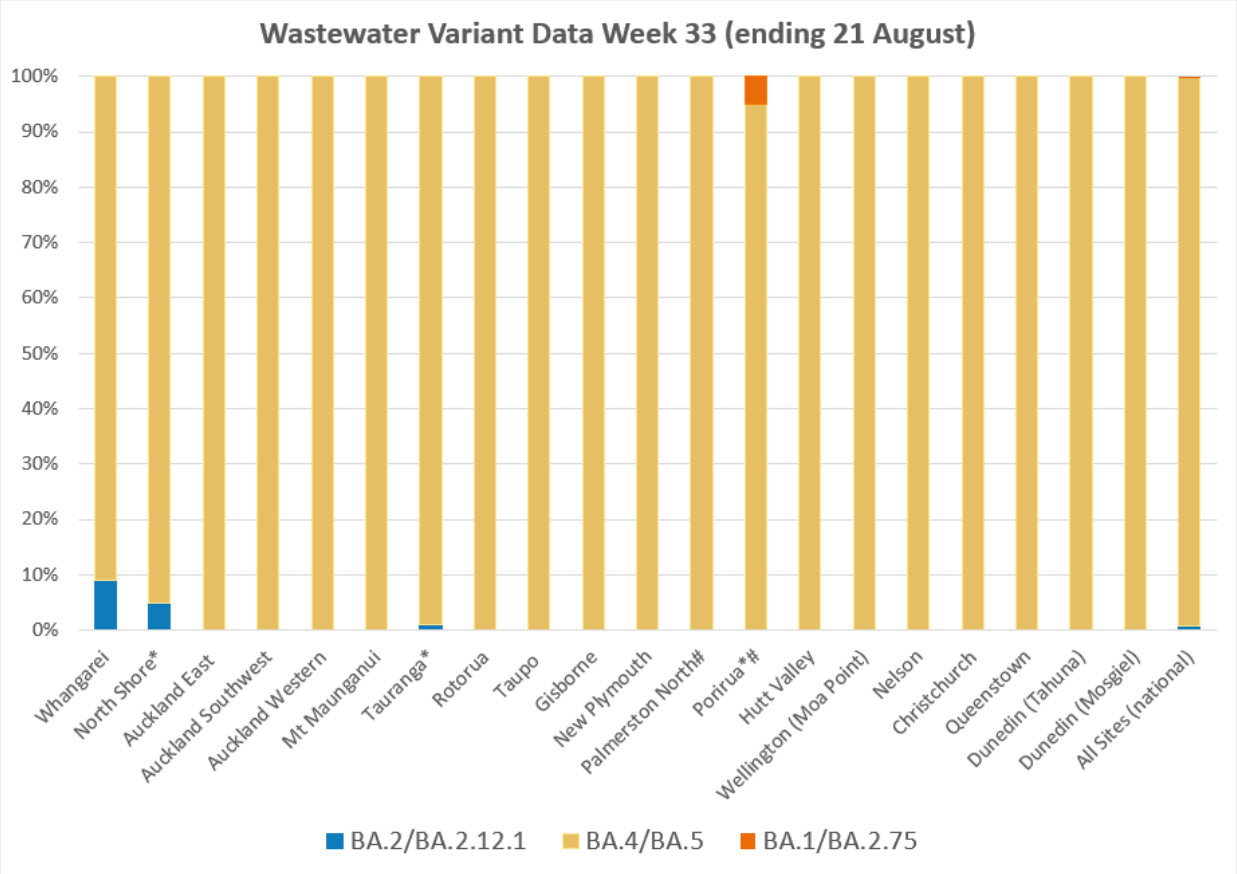


Figure 5. Variants present in New Zealand wastewater from 20 sentinel sites during week 33

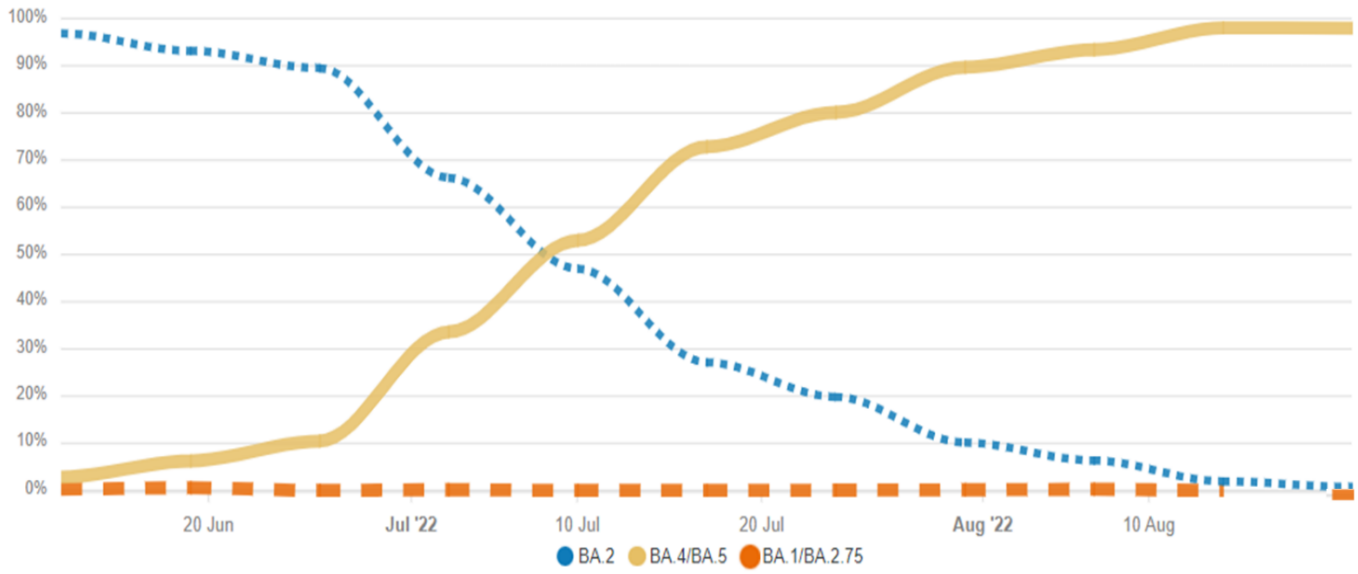
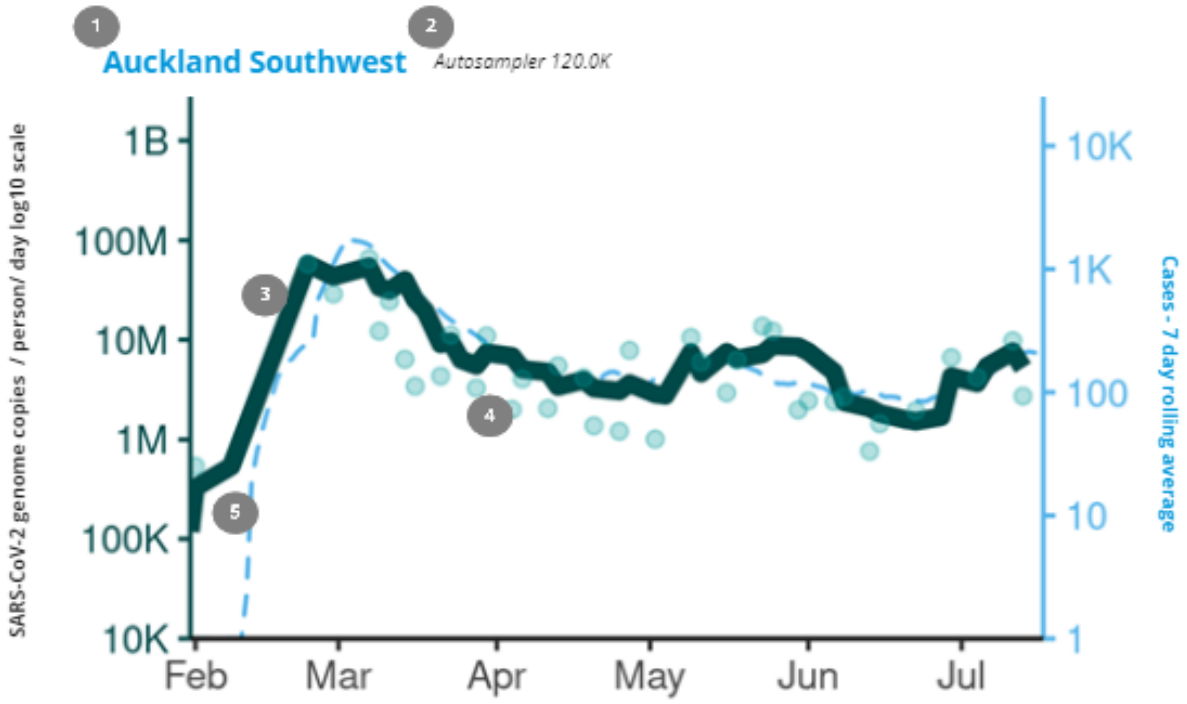


Figure 6. Change in variant prevalence over time at a national scale. Data are collected from up to 21 sentinel sites each week.

Interpreting site graphs



1 **Site Name**

2 **Sample Collection method and population. Results based on autosampler may be more representative than grab sample-based results.**

3 **Wastewater Results Shown as Solid Line** | Rolling 14-day average of genome copies/person/day on a log10 scale.

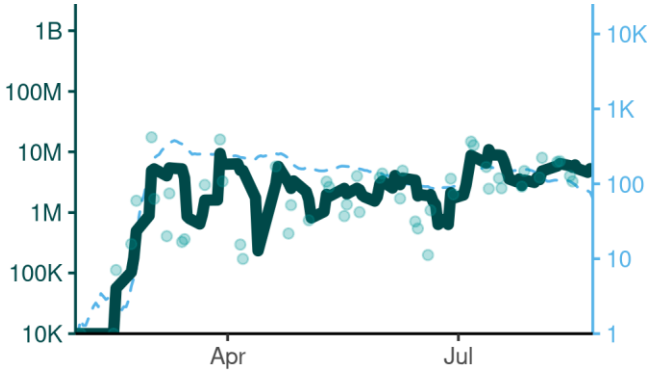
4 **Individual Results Samples Shown as Circles** | Rolling 14-day average of genome copies/person/day on a log10 scale.

5 **Rolling 7-day average new cases shown as dashed line** | New cases reported in a catchment based on reported date of illness on a log10 scale. This data is not available for all sites & subject to change.

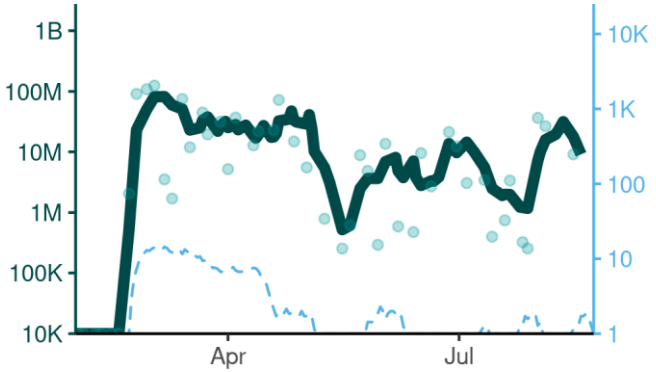
Note: Wastewater and cases data are on a log10 scale. Scales on all graphs have been normalised to cover the same scale on every graph. Care should be taken when interpreting the data.

Northland

Whangarei *Autosampler 65.0K*

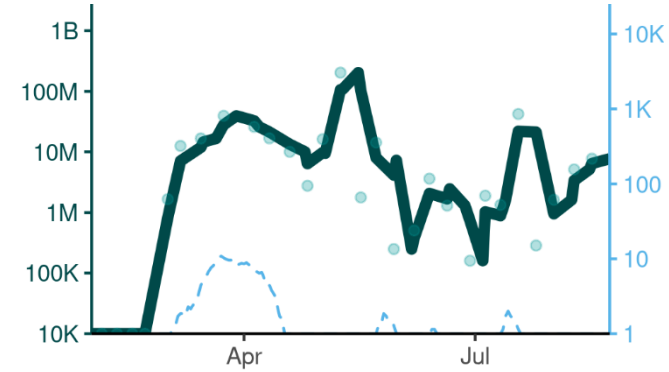


Dargaville *Grab 5.0K*

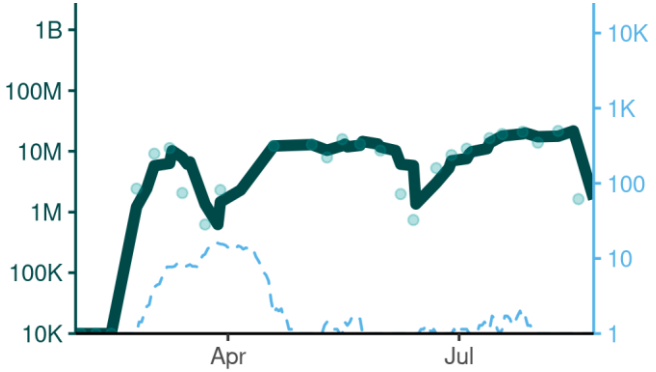


SARS-CoV-2 genome copies / day / person

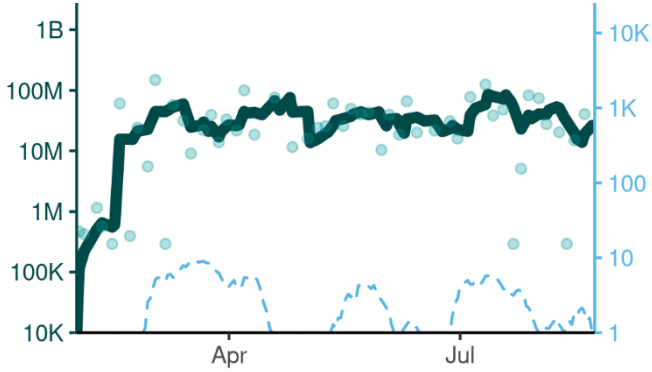
Hikurangi *Grab 1.7K*



Ruakaka *Grab 4.5K*



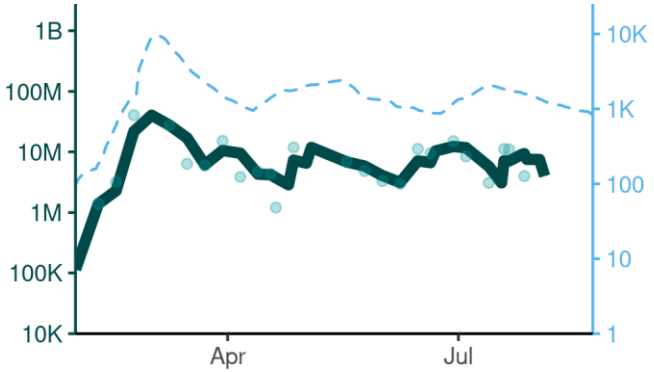
Mangawhai *Grab 1.1K*



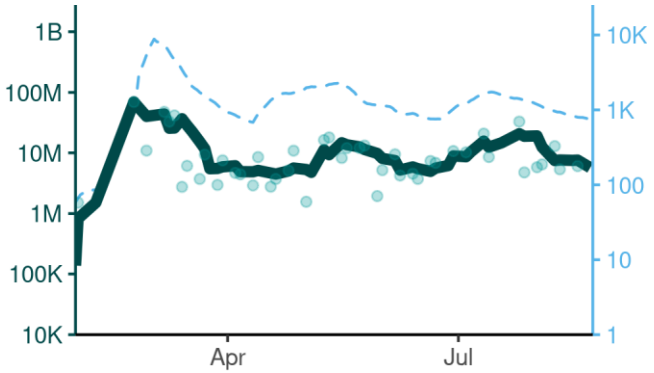
Status Detected Not detected

Auckland

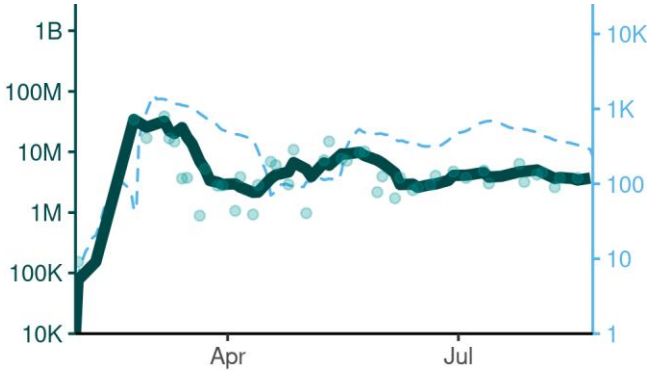
Auckland (Combined) *Autosampler 1.1M*



Auckland East *Autosampler 680.0K*

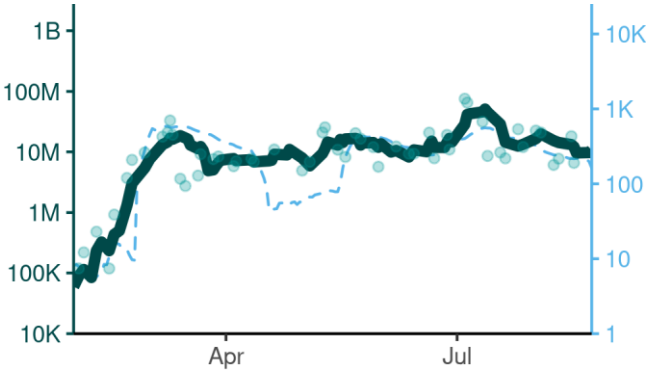


Auckland West *Autosampler 315.0K*

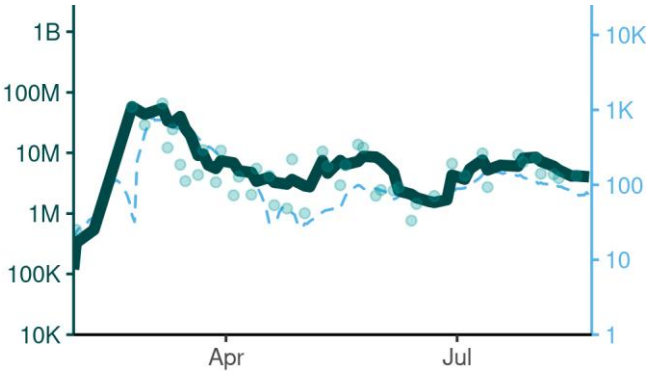


SARS-CoV-2 genome copies / day / person

North Shore *Autosampler 240.0K*

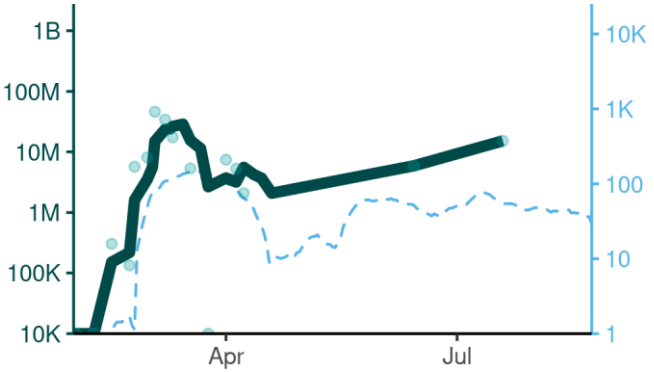


Auckland Southwest *Autosampler 120.0K*

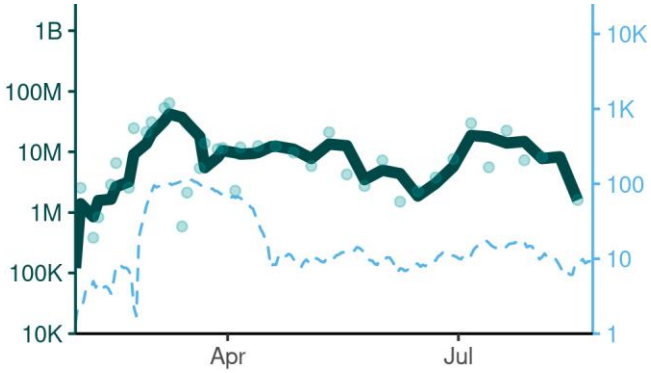


Cases - 7 day rolling average

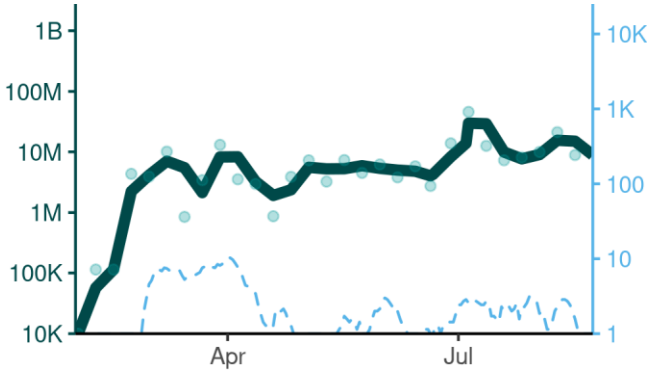
Army Bay *Autosampler 42.0K*



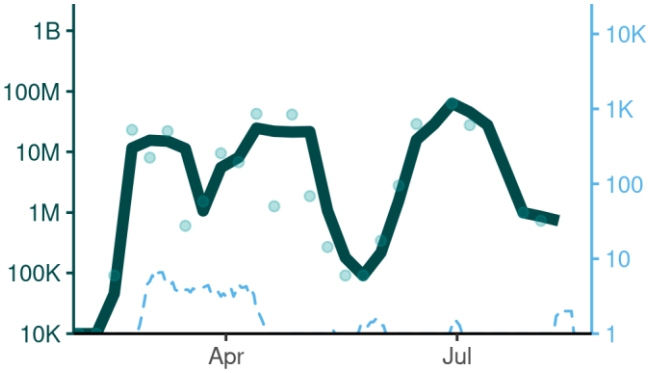
Pukekohe *Grab 20.9K*



Snells/Algies *Autosampler 4.0K*

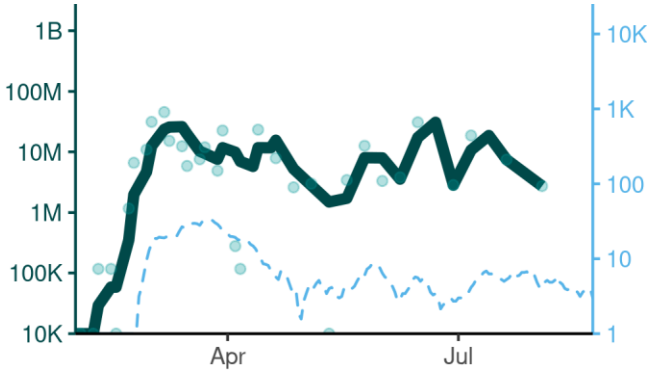


Clarks Beach *Grab 2.0K*

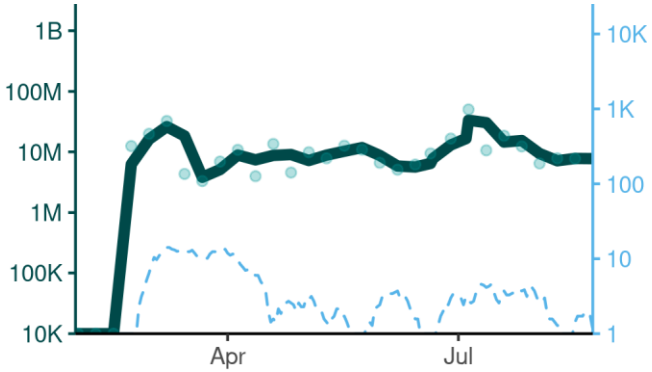


SARS-CoV-2 genome copies / day / person

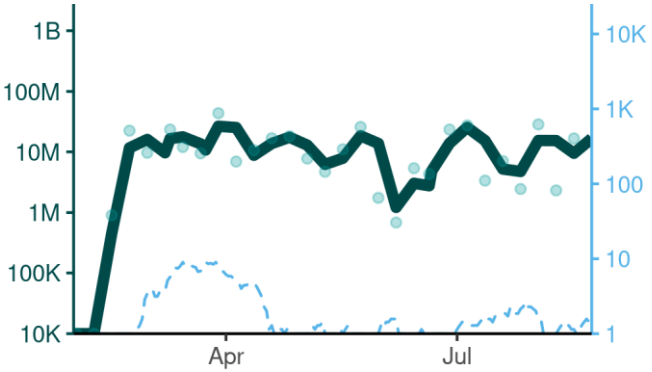
Waiuku *Grab 7.9K*



Warkworth *Autosampler 3.5K*

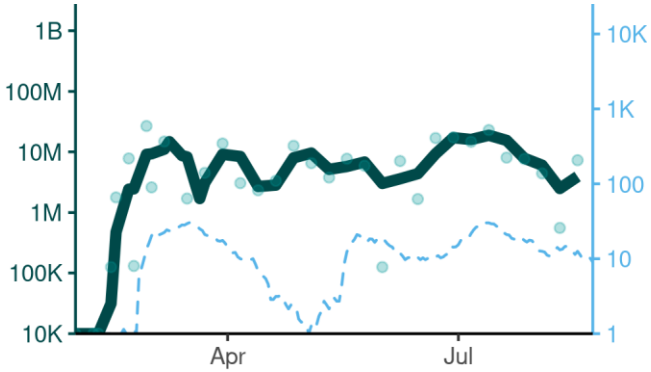


Wellsford *Autosampler 1.7K*

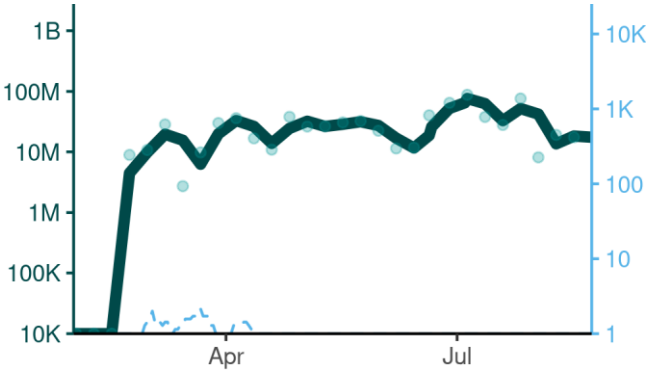


Cases - 7 day rolling average

Beachlands *Grab 6.8K*

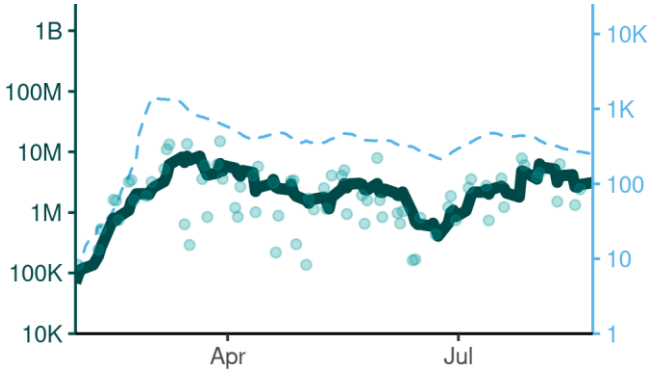


Omaha *Autosampler 1000*

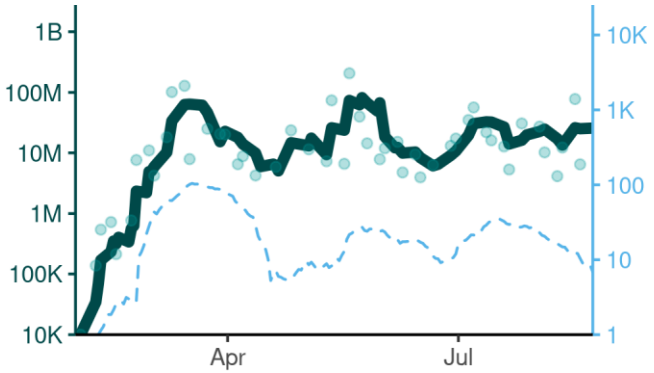


Waikato

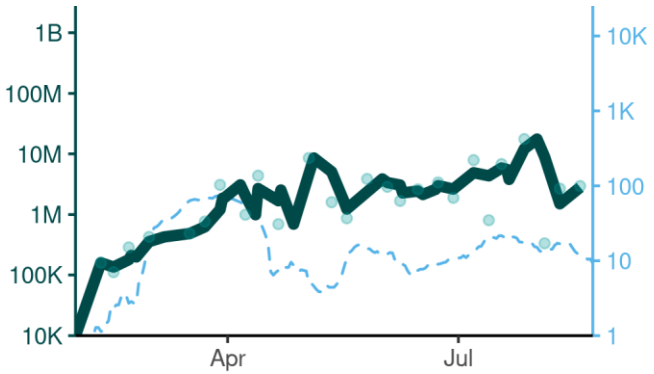
Hamilton *Autosampler 169.0K*



Taupo *Auto/grab 23.0K*

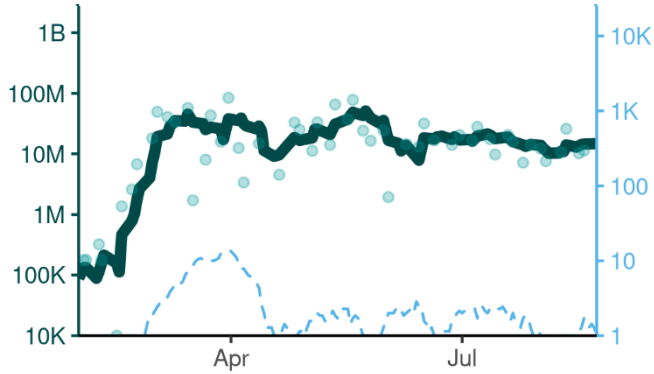


Cambridge *Autosampler 20.1K*

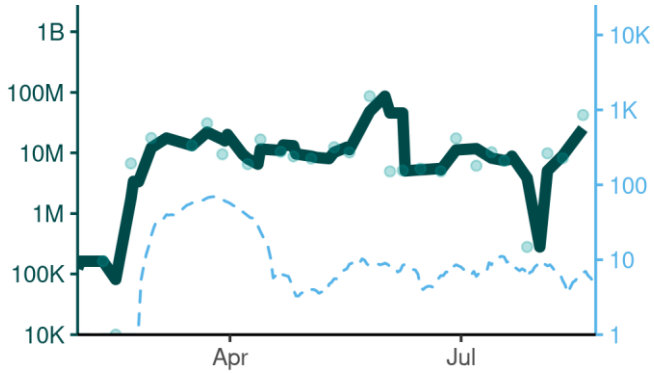


SARS-CoV-2 genome copies / day / person

Whangamata *Autosampler 4.0K*

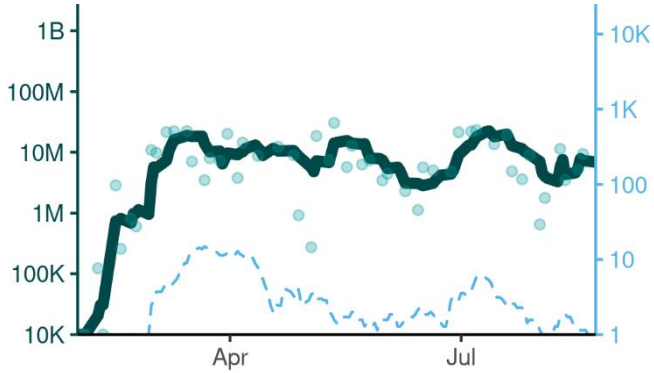


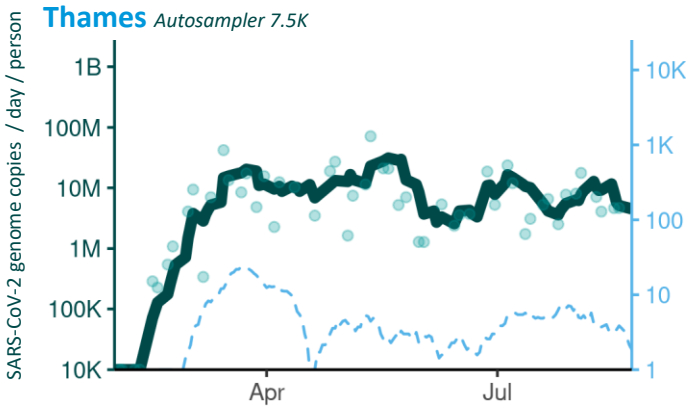
Te Awamutu *Autosampler 13.1K*



Cases - 7 day rolling average

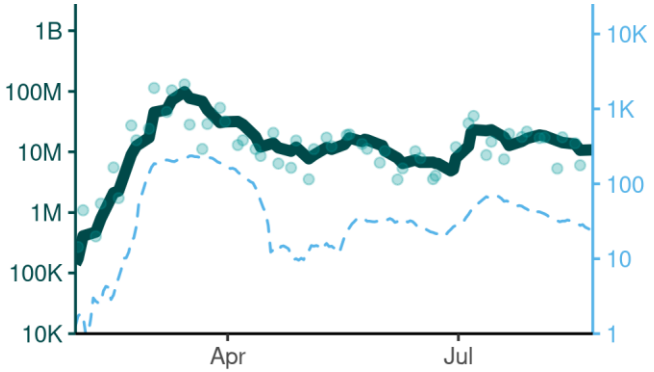
Whitianga *Autosampler 6.6K*



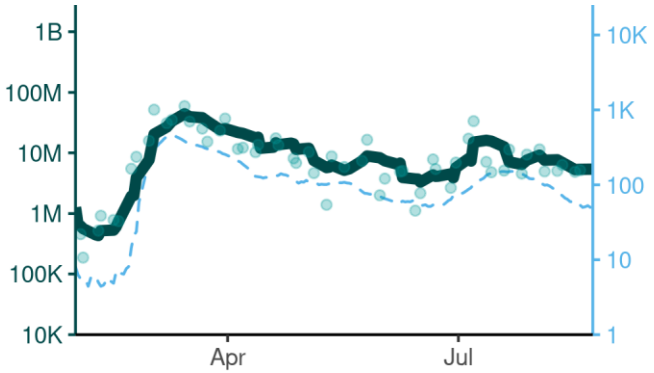

Thames Autosampler 7.5K
SARS-CoV-2 genome copies / day / person
1B
100M
10M
1M
100K
10K
10K
1K
100
10
1
Apr
Jul

Bay of Plenty and Gisborne

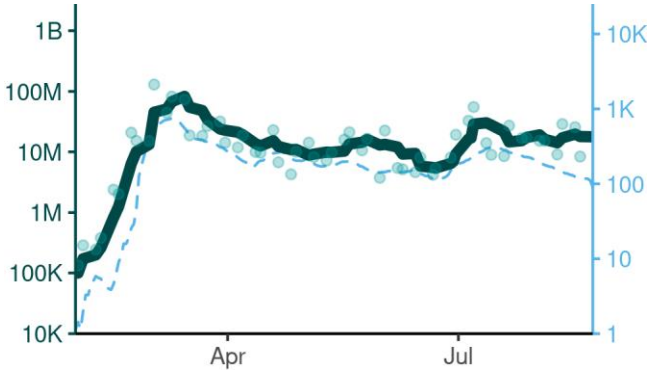
Mt Maunganui/Papamoa *Autosampler 65.0K*



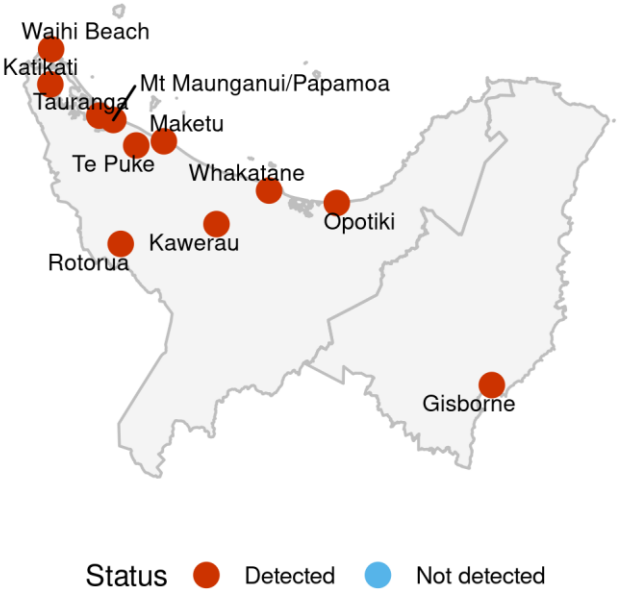
Rotorua *Autosampler 59.0K*



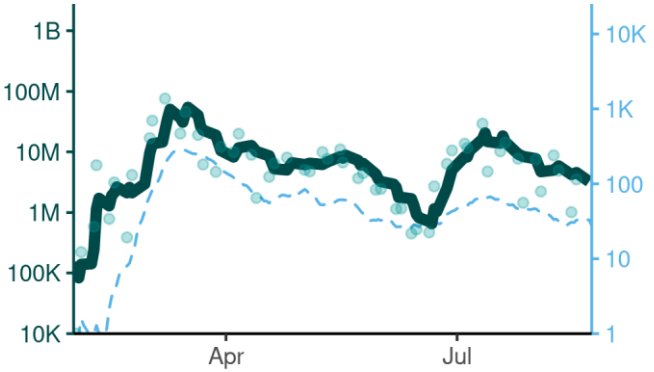
Tauranga *Autosampler 50.0K*



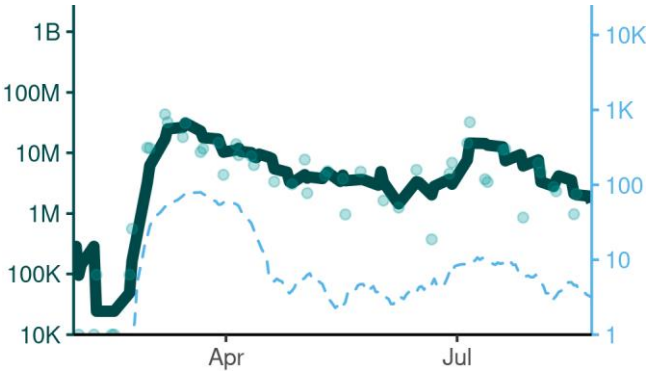
SARS-CoV-2 genome copies / day / person



Gisborne *Autosampler 37.0K*

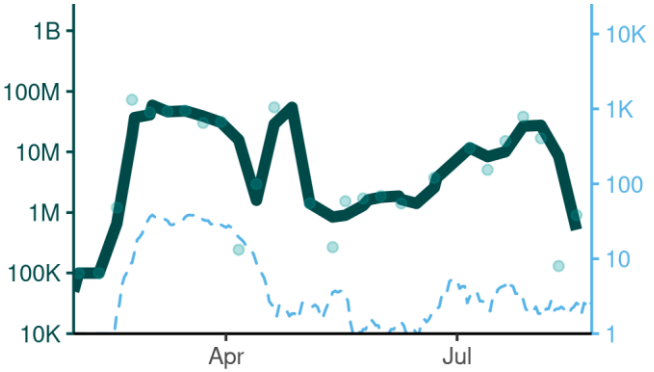


Whakatane *Autosampler 21.0K*

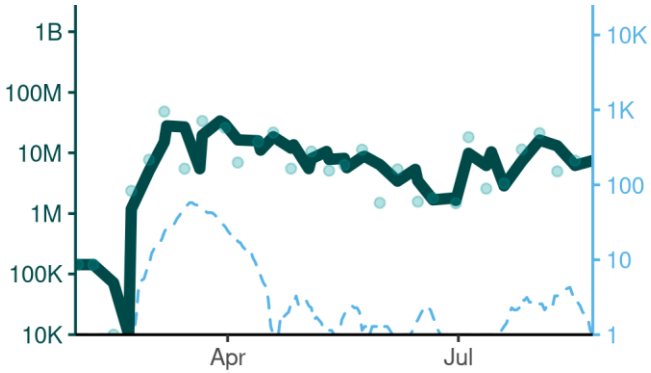


Cases - 7 day rolling average

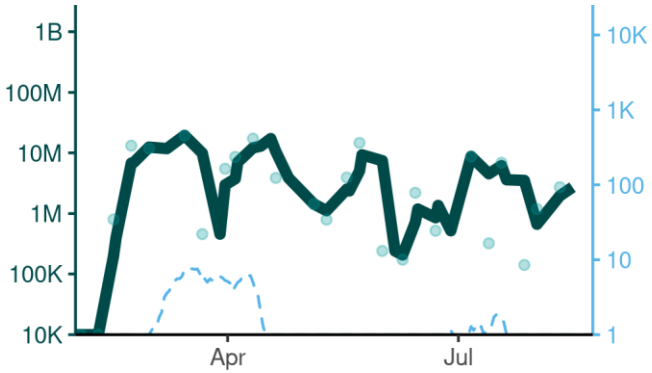
Te Puke *Autosampler 9.7K*



Kawerau *Autosampler 7.0K*

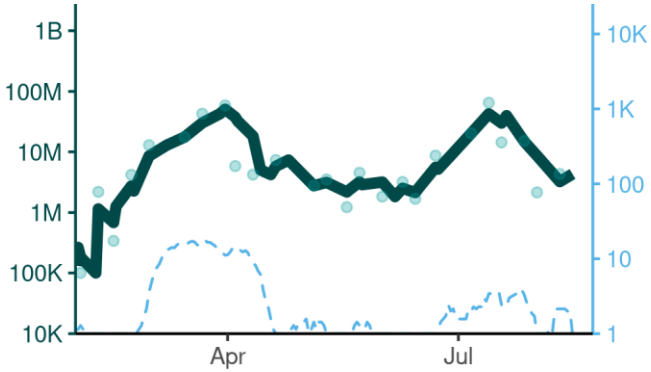


Waihi Beach *Autosampler 3.6K*

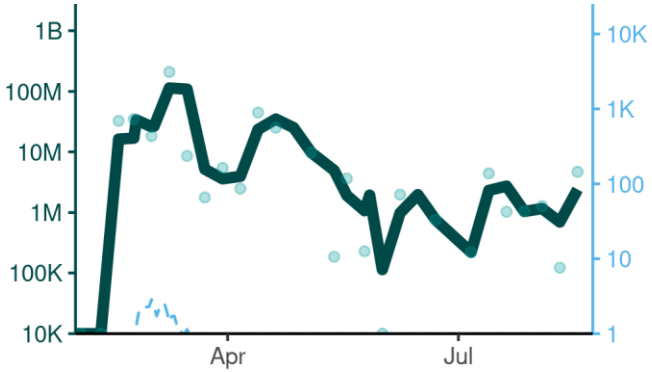


SARS-CoV-2 genome copies / day / person

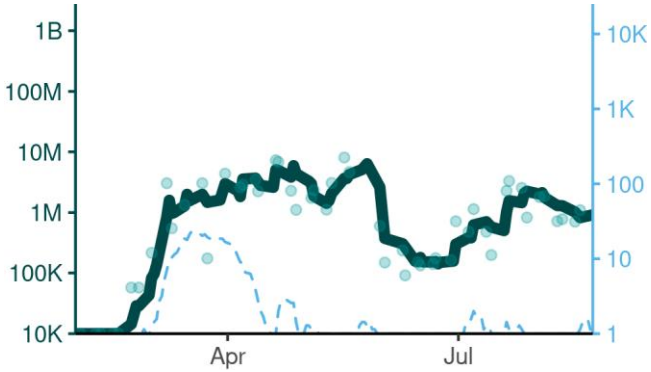
Katikati *Autosampler 5.5K*



Maketu *Autosampler 1.3K*



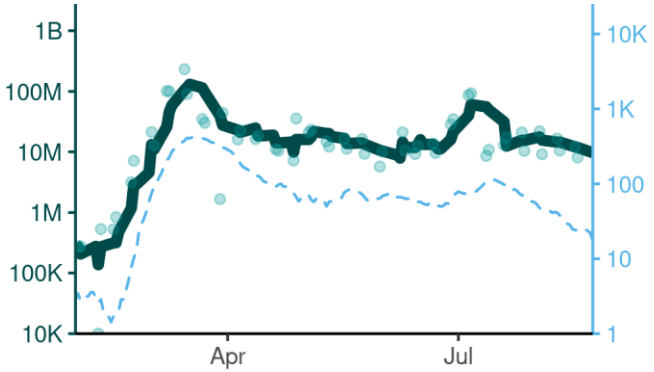
Opotiki *Grab 3.8K*



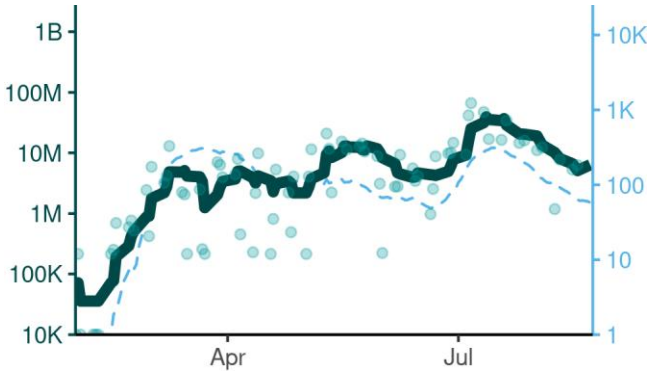
ge

Hawke's Bay

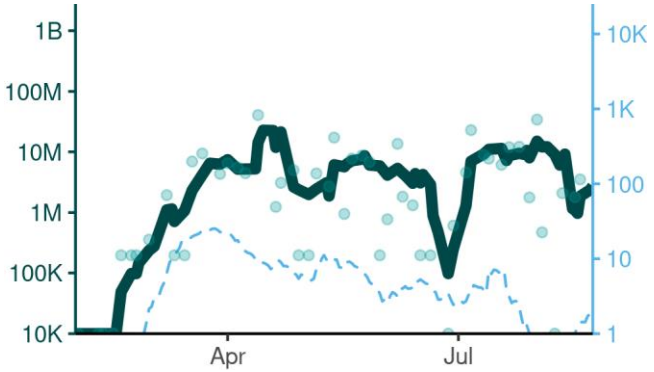
Hastings *Autosampler 80.0K*



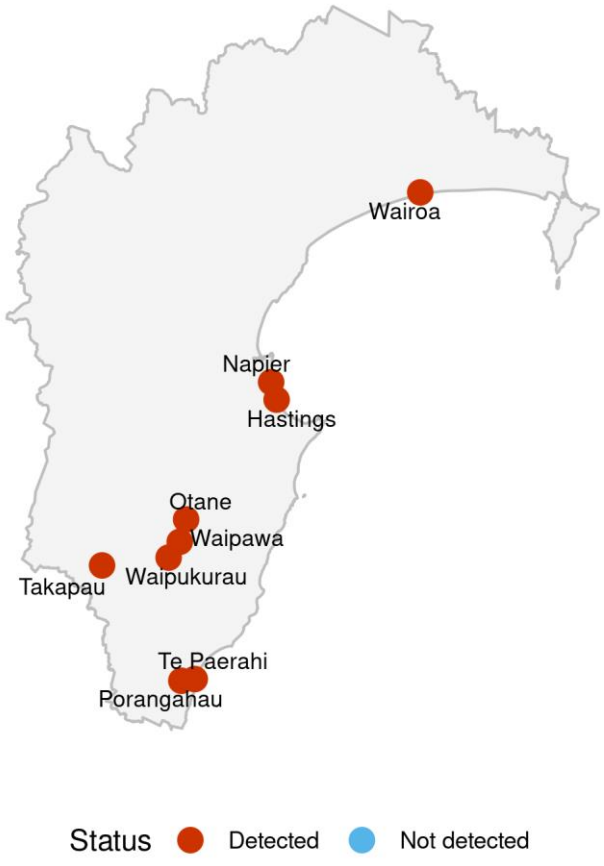
Napier *Autosampler 55.0K*



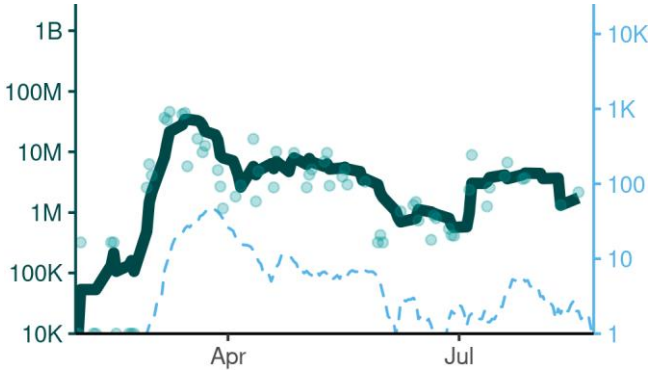
Waipukurau *Autosampler 4.6K*



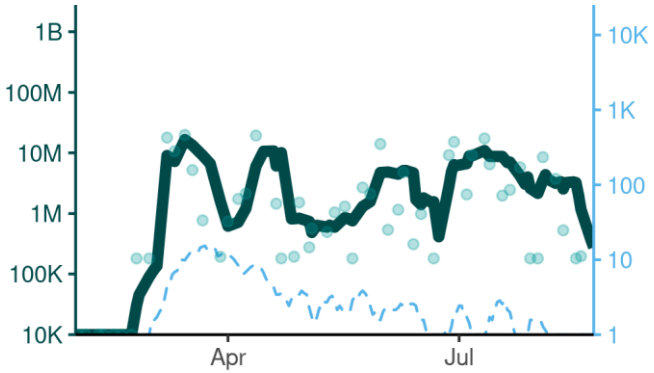
SARS-CoV-2 genome copies / day / person



Wairoa *Grab 4.4K*



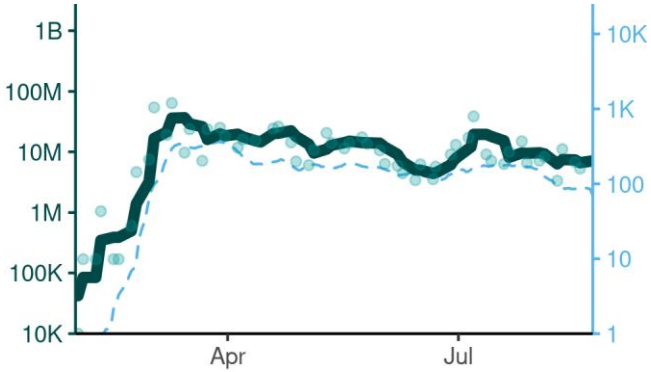
Waipawa *Autosampler 2.2K*



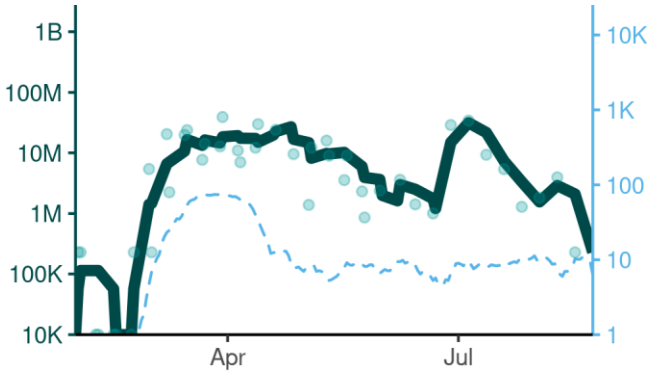
Cases - 7 day rolling average

Taranaki

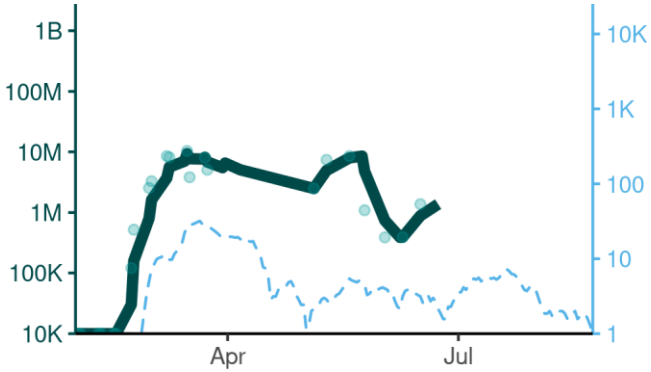
New Plymouth *Autosampler 88.0K*



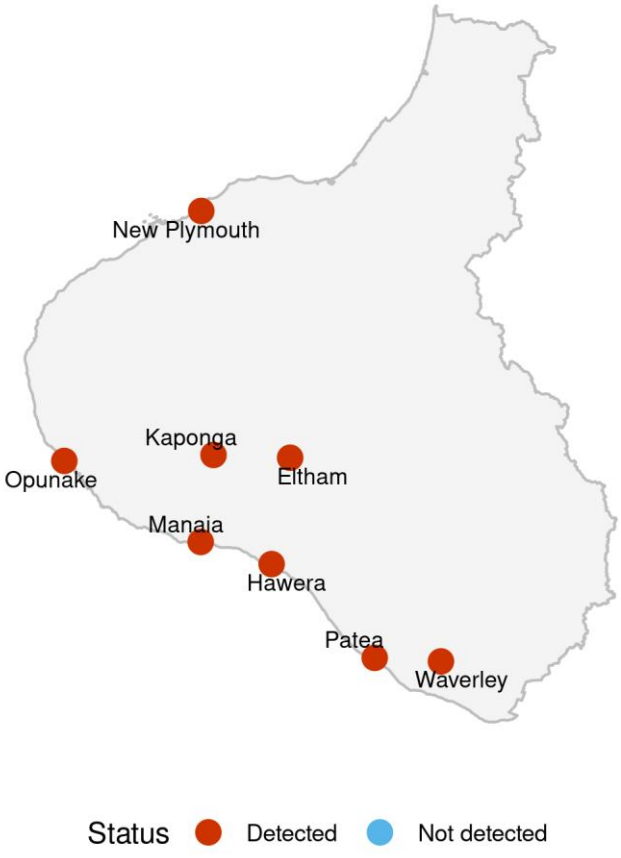
Hawera *Autosampler 12.0K*



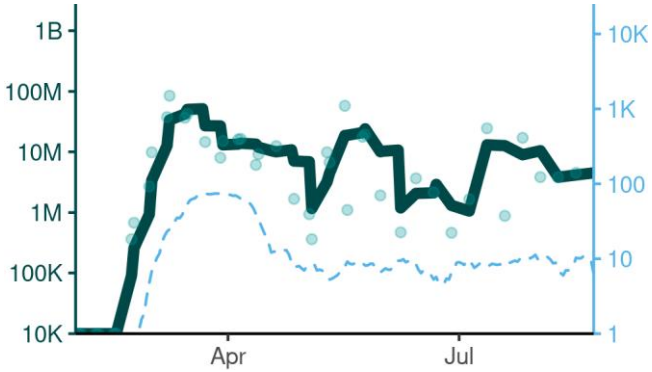
Stratford *Autosampler 9.9K*



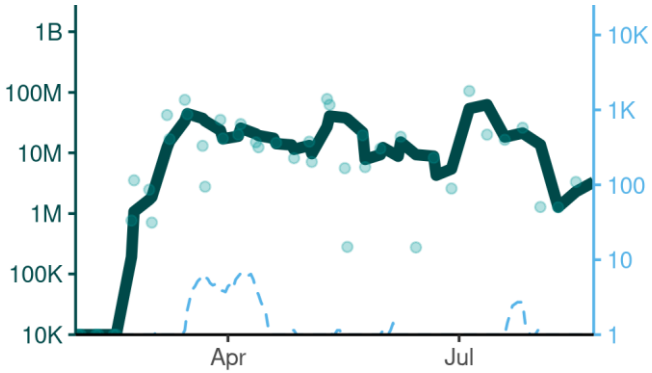
SARS-CoV-2 genome copies / day / person



Eltham *Autosampler 2.0K*

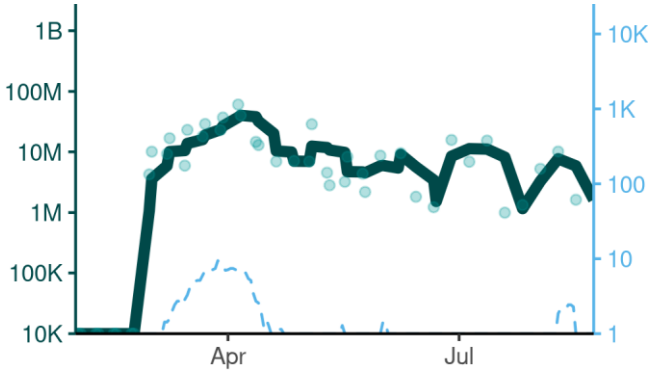


Opunake *Autosampler 1.4K*



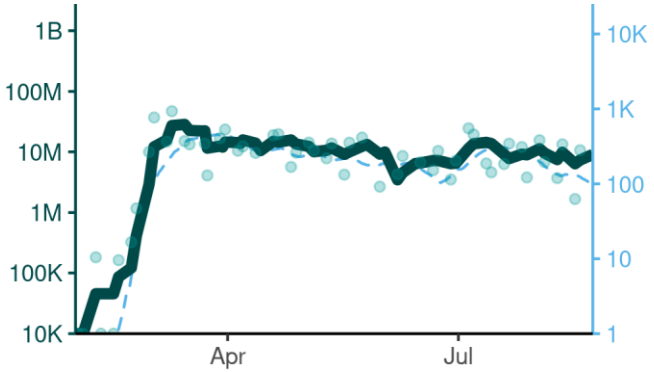
Cases - 7 day rolling average

Patea *Autosampler 1.2K*

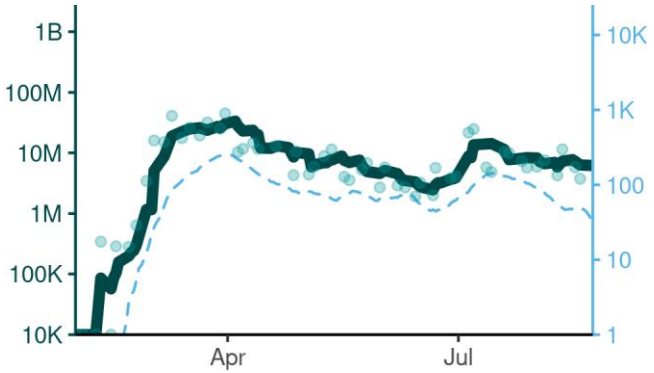


Manawatu-Whanganui

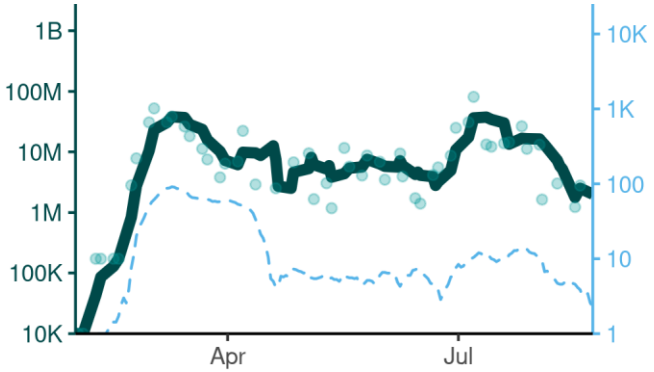
Palmerston North *Autosampler 90.0K*



Whanganui *Autosampler 44.5K*

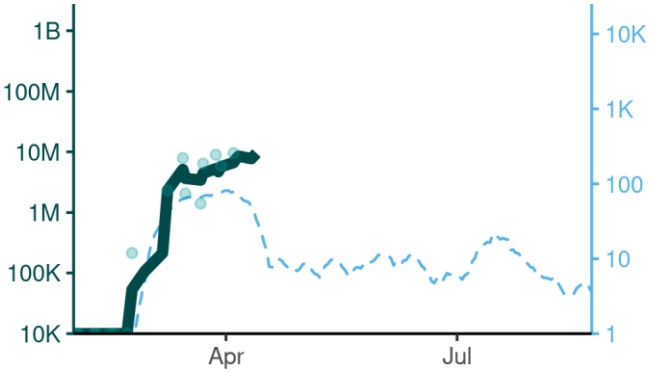


Levin *Autosampler 21.2K*

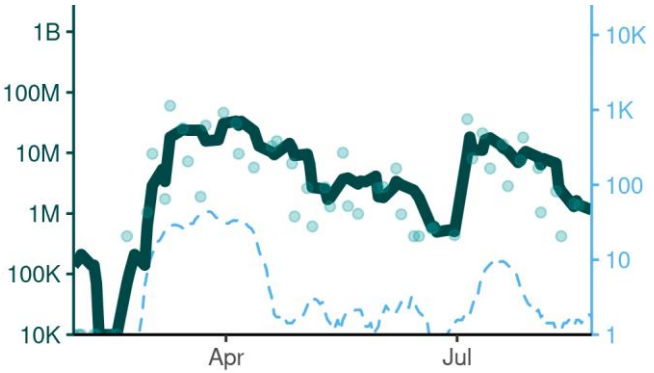


SARS-CoV-2 genome copies / day / person

Feilding *Autosampler 16.0K*

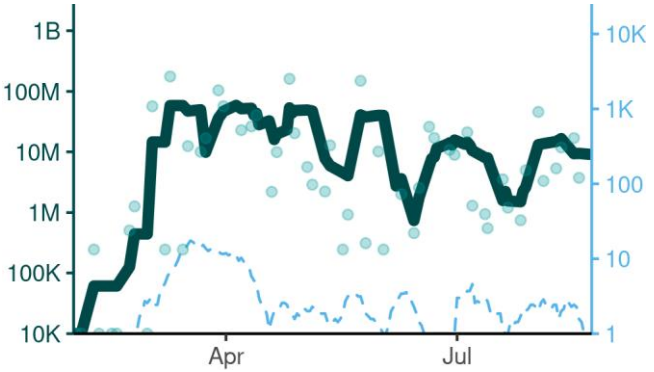


Dannevirke *Grab 5.7K*

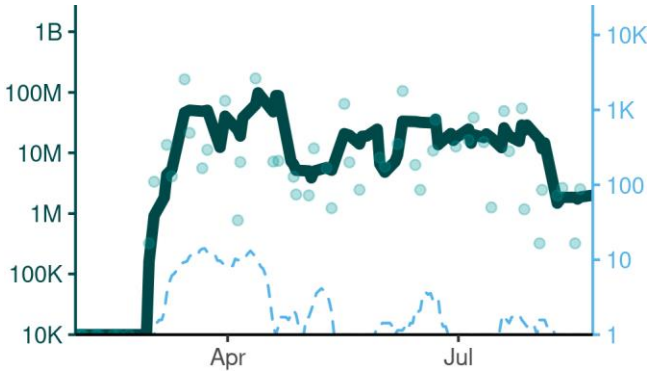


Cases - 7 day rolling average

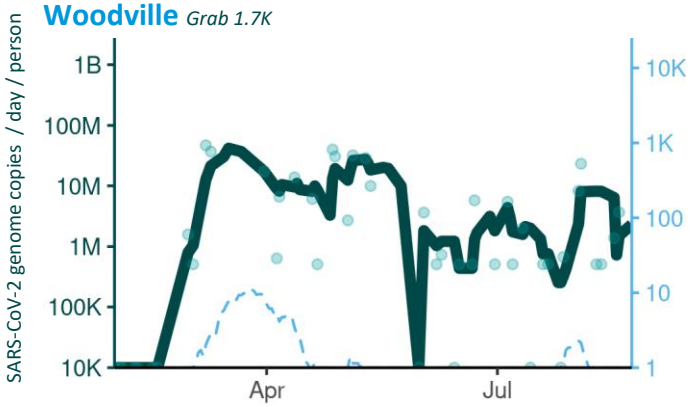
Taumarunui *Grab 4.0K*



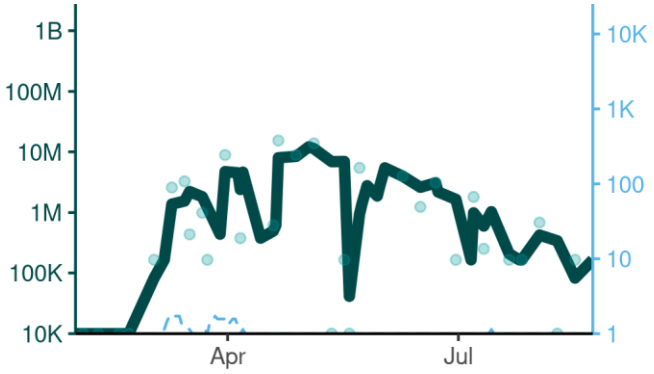
Pahiatua *Grab 2.8K*



Woodville *Grab 1.7K*

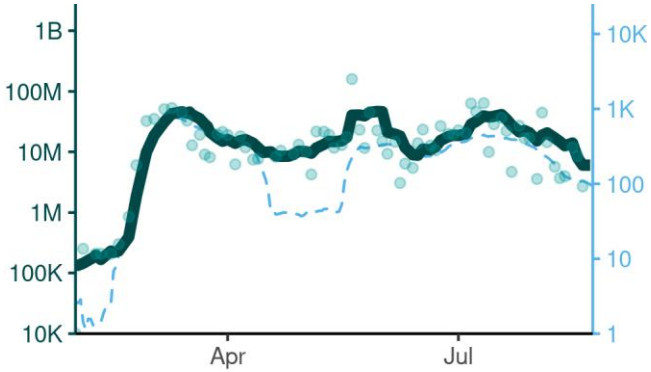


Eketahuna *Grab 1.6K*

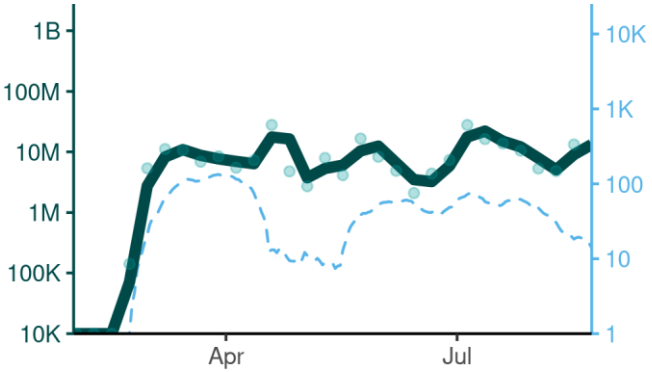


Wellington

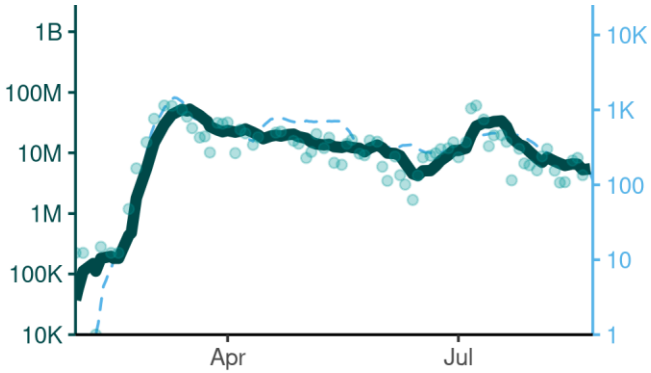
Wellington (Moa Point) *Autosampler 168.0K*



Paraparaumu *Autosampler 49.0K*

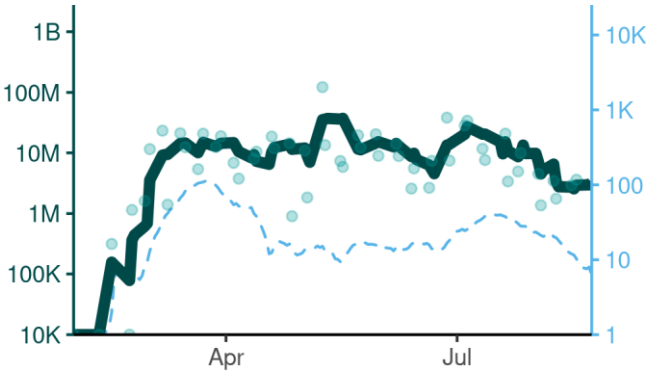


Hutt Valley *Autosampler 133.0K*



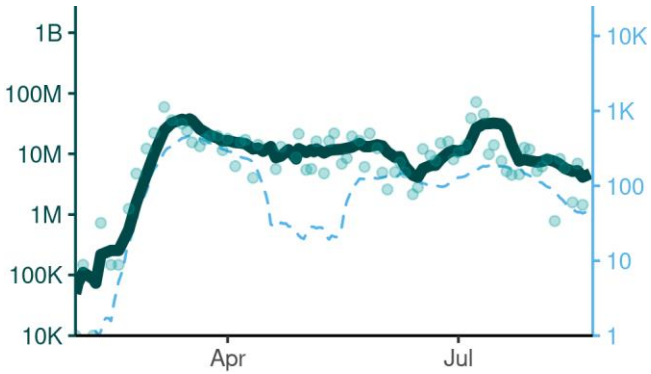
SARS-CoV-2 genome copies / day / person

Masterton *Grab 20.7K*



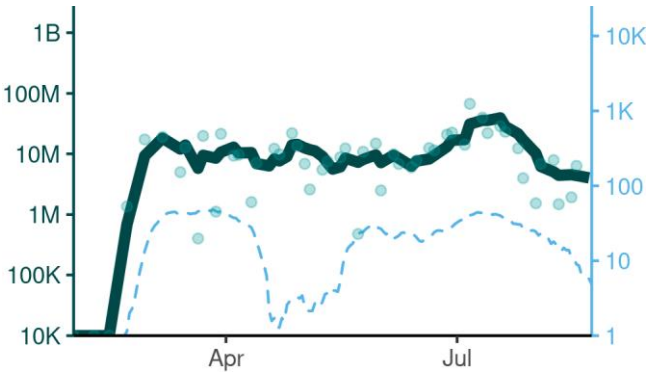
Cases - 7 day rolling average

Porirua *Autosampler 85.0K*

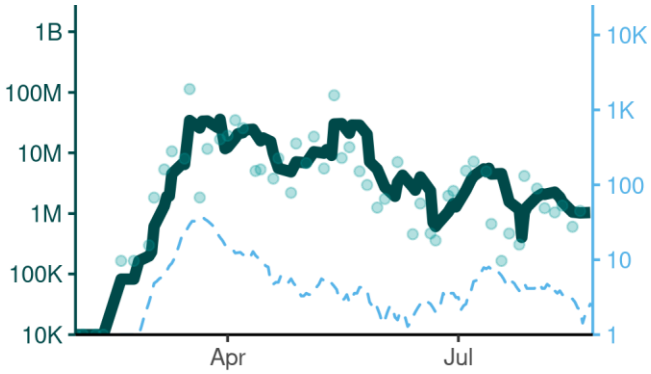


Status Detected Not detected

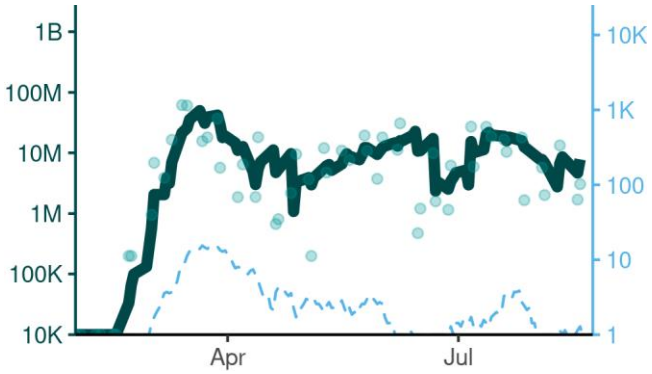
Wellington (Western) *Autosampler 14.0K*



Carterton *Grab 5.8K*

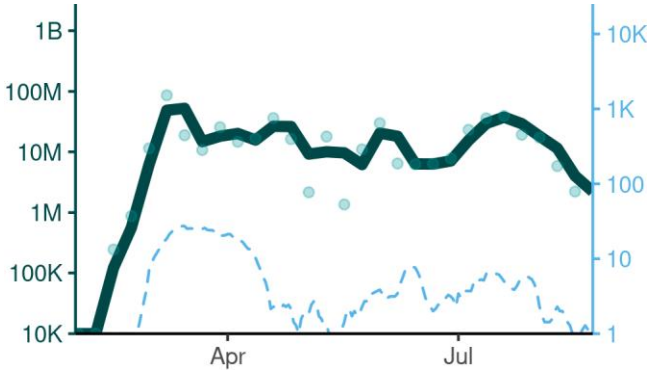


Greytown *Grab 2.4K*

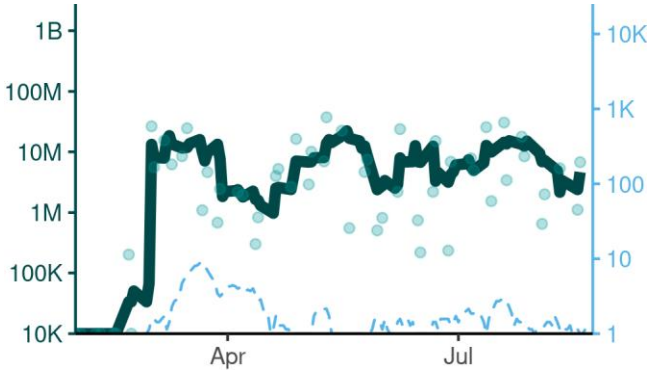


SARS-CoV-2 genome copies / day / person

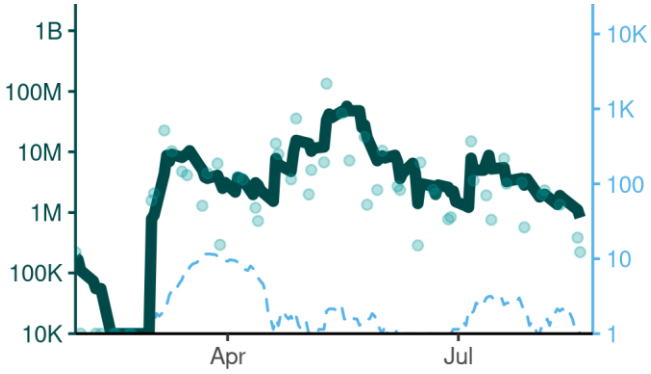
Otaki *Grab 3.5K*



Martinborough *Auto/grab 1.6K*

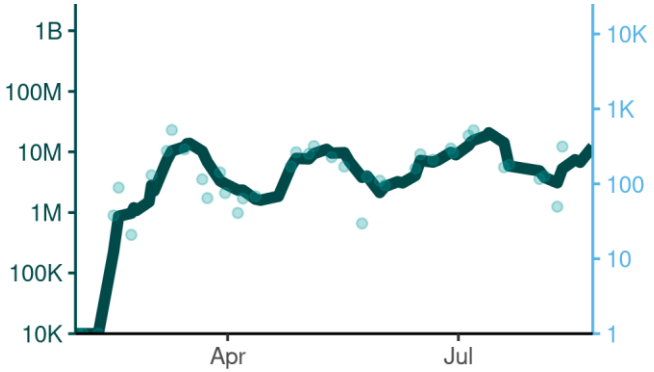


Featherston *Grab 2.5K*

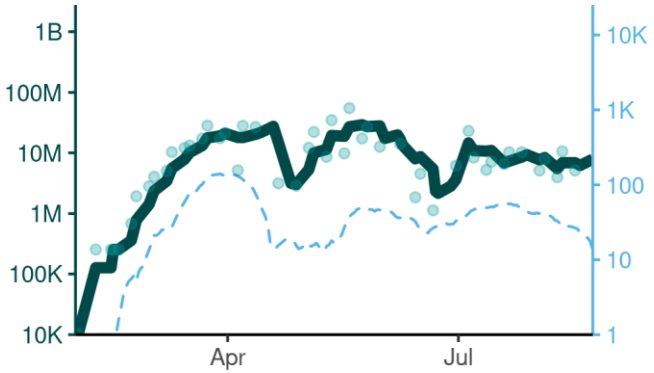


Tasman, Nelson, and Marlborough

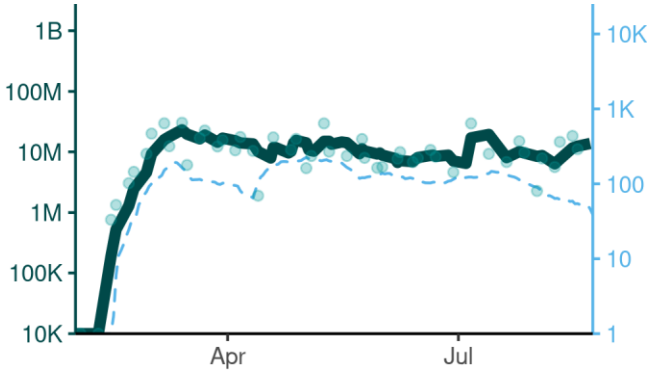
Richmond/Nelson South *Autosampler 60.0K*



Blenheim *Autosampler 31.0K*

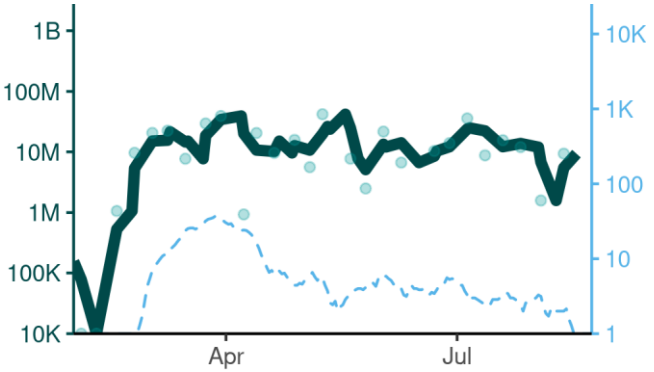


Nelson Central/North *Autosampler 26.0K*

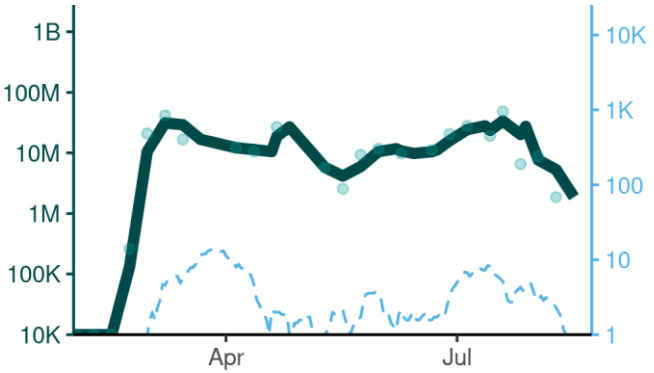


SARS-CoV-2 genome copies / day / person

Motueka *Autosampler 8.3K*



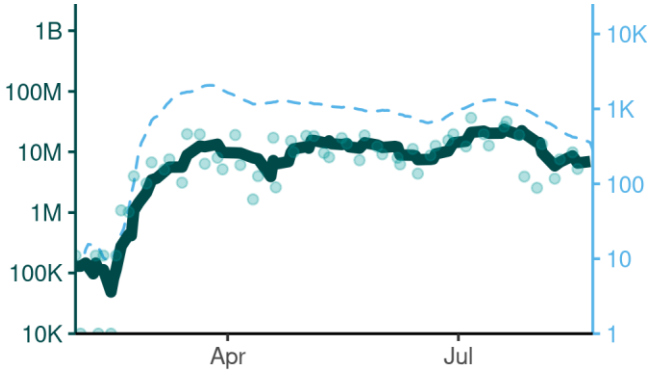
Picton *Autosampler 5.0K*



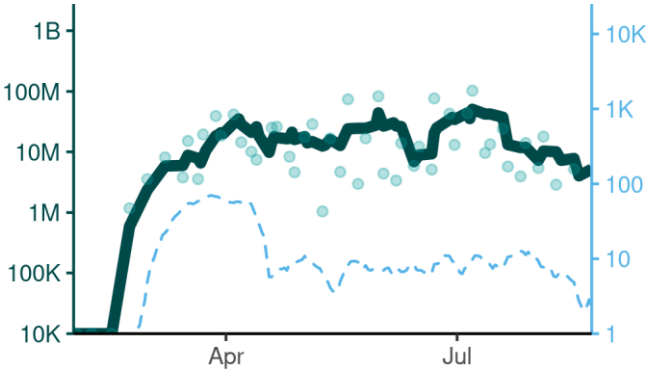
Cases - 7 day rolling average

West Coast and Canterbury

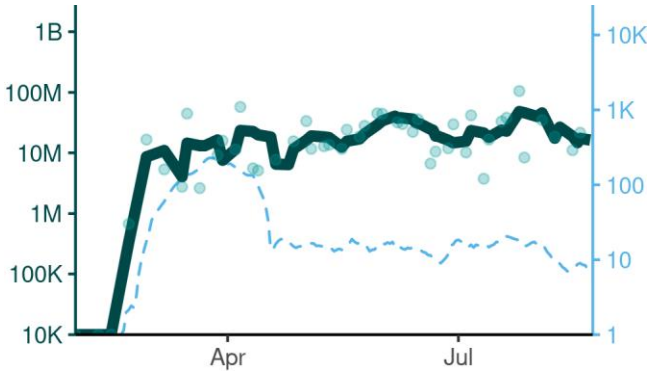
Christchurch *Autosampler 368.0K*



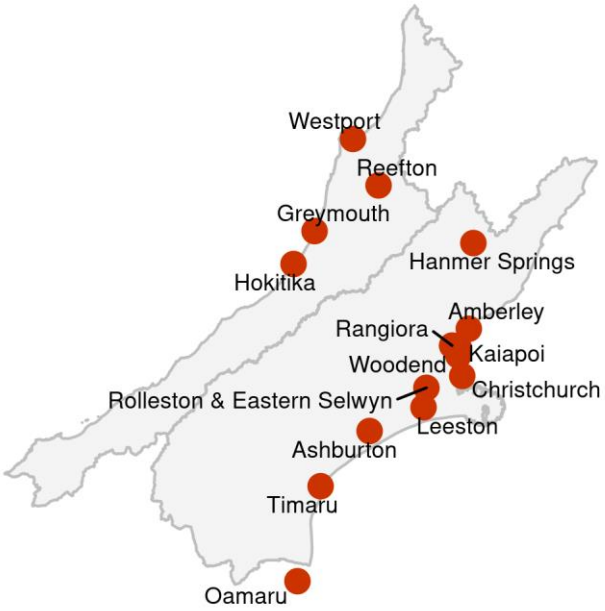
Rangiora *Grab 19.0K*



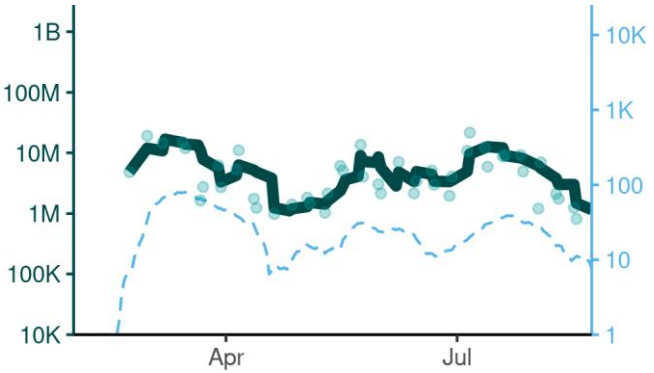
Rolleston & Eastern Selwyn *Autosampler 35.0K*



SARS-CoV-2 genome copies / day / person

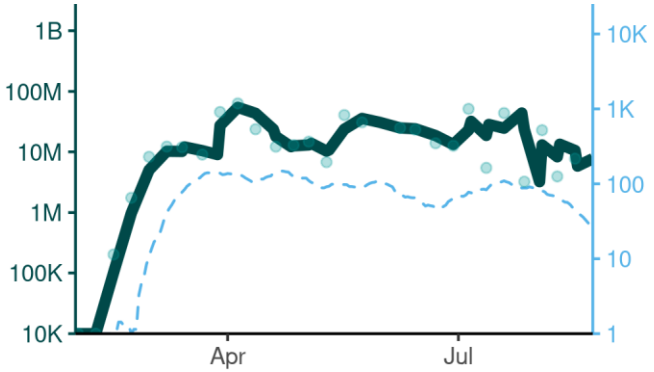


Ashburton *Autosampler 18.0K*

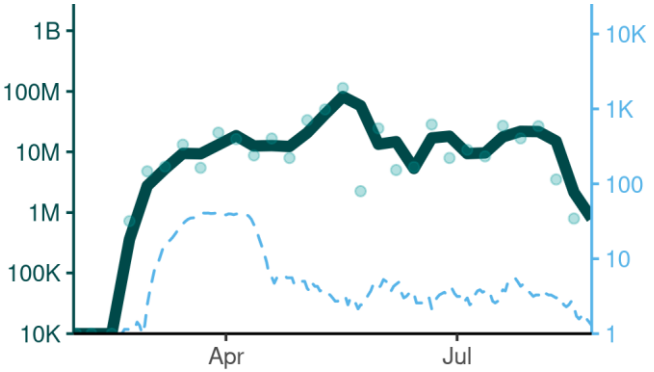


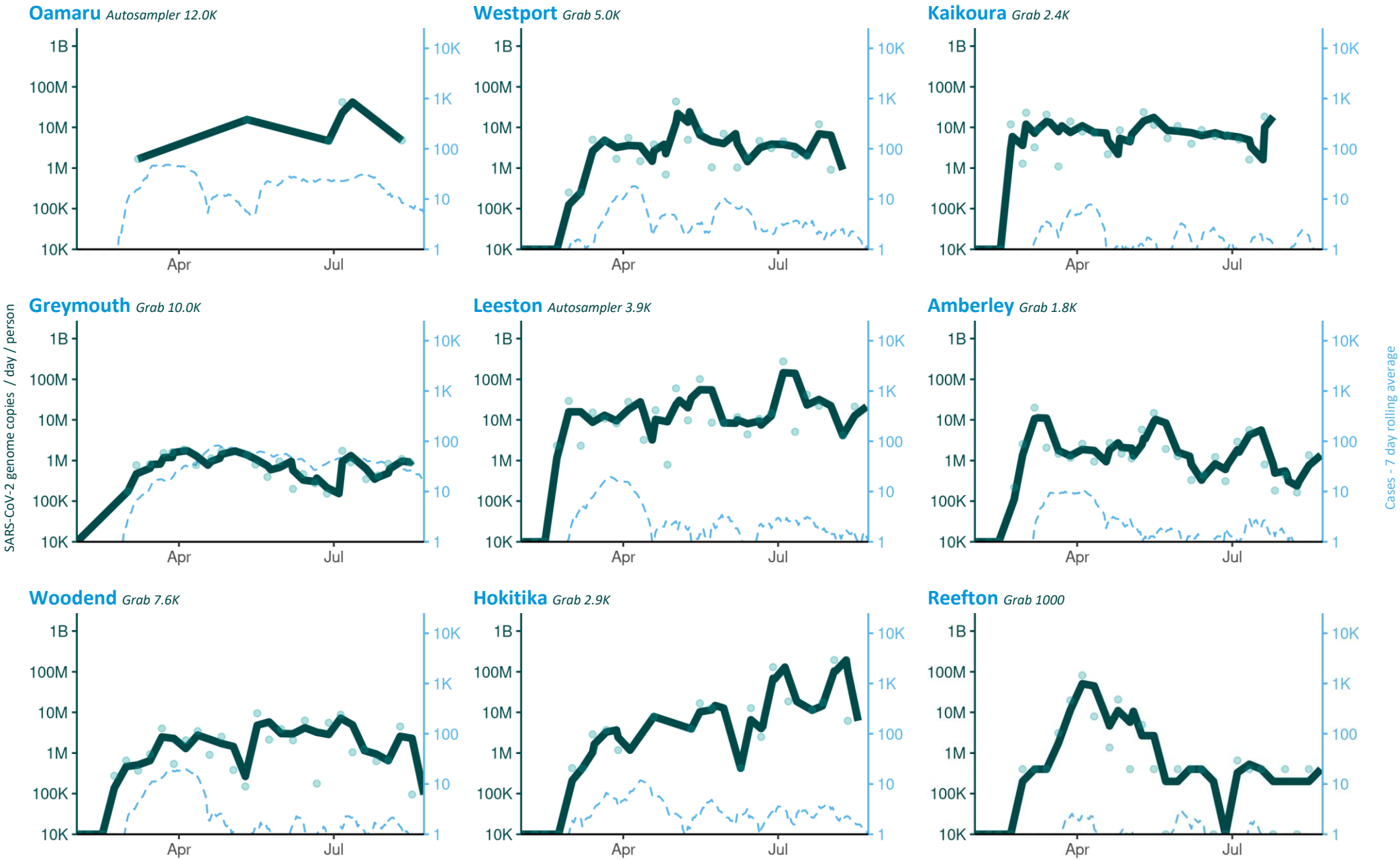
Cases - 7 day rolling average

Timaru *Autosampler 28.0K*



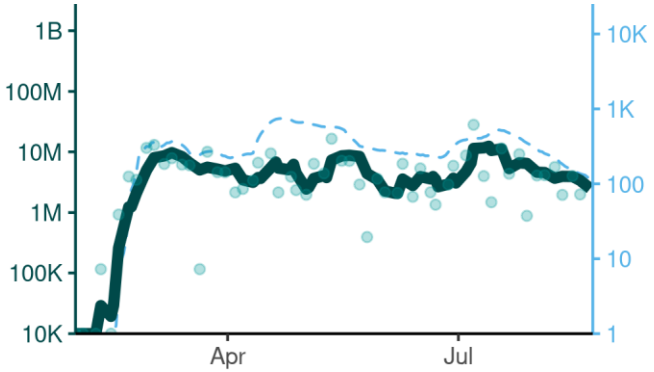
Kaiapoi *Grab 12.5K*



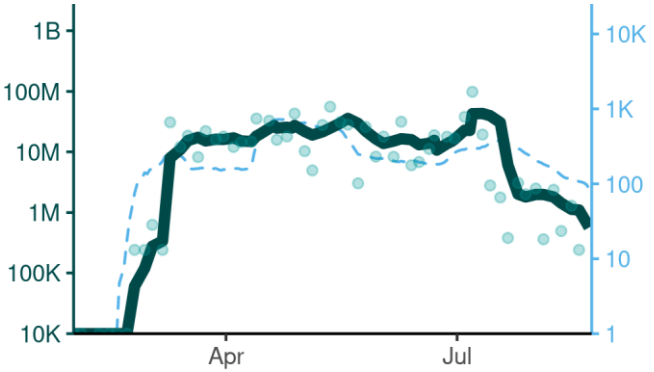

Oamaru Autosampler 12.0K
Westport Grab 5.0K
Kaikoura Grab 2.4K
Greymouth Grab 10.0K
Leeston Autosampler 3.9K
Amberley Grab 1.8K
Woodend Grab 7.6K
Hokitika Grab 2.9K
Reefton Grab 1000
SARS-CoV-2 genome copies / day / person
Cases - 7 day rolling average
1B
100M
10M
1M
100K
10K
1K
100
10
1
Apr
Jul

Otago and Southland

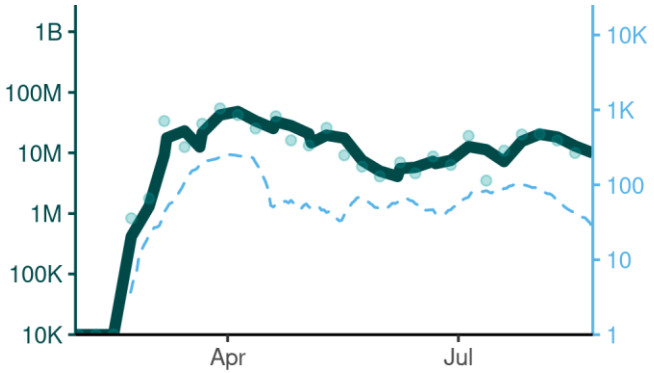
Dunedin (Tahuna) *Autosampler 84.0K*



Dunedin (Green Island) *Autosampler 22.9K*

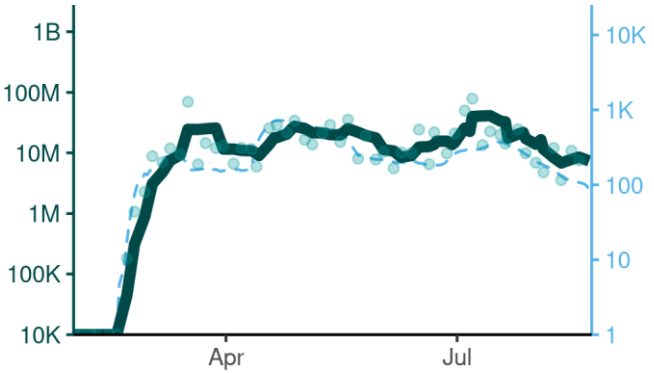


Invercargill *Autosampler 50.0K*



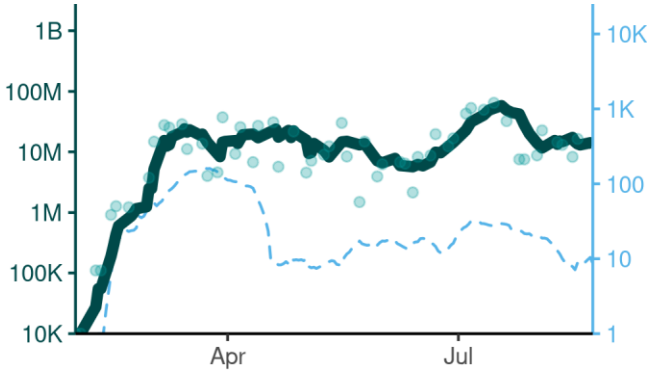
SARS-CoV-2 genome copies / day / person

Dunedin (Mosgiel) *Autosampler 14.6K*

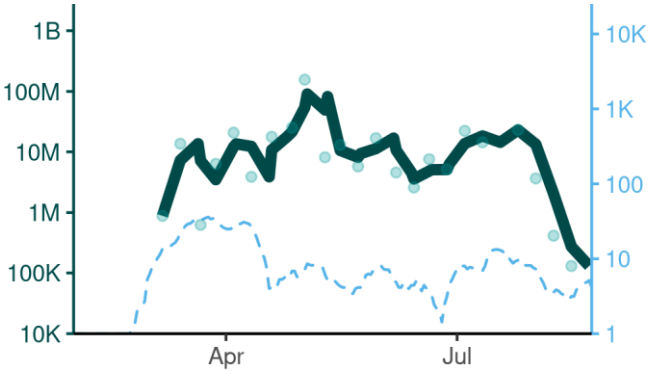


Cases - 7 day rolling average

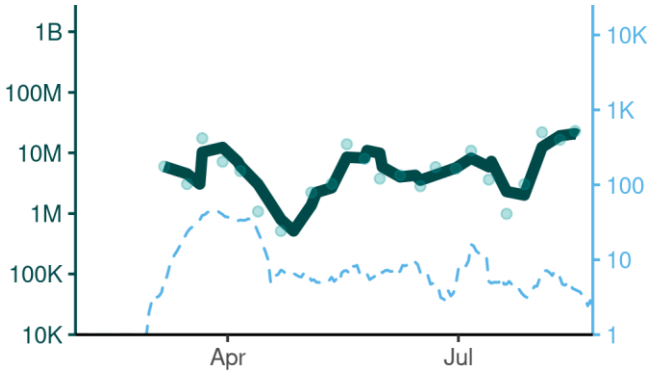
Queenstown *Autosampler 40.0K*



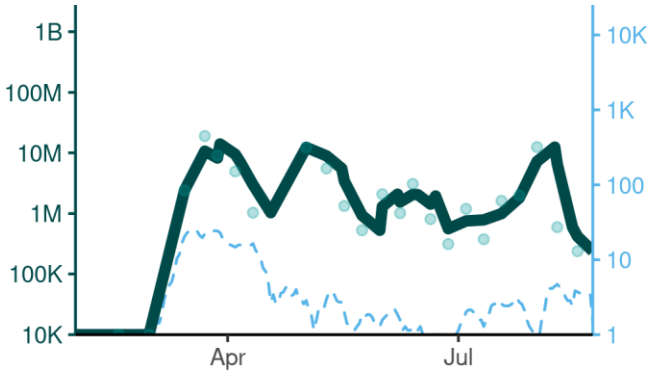
Wanaka *Grab 14.5K*



Gore *Autosampler 8.0K*

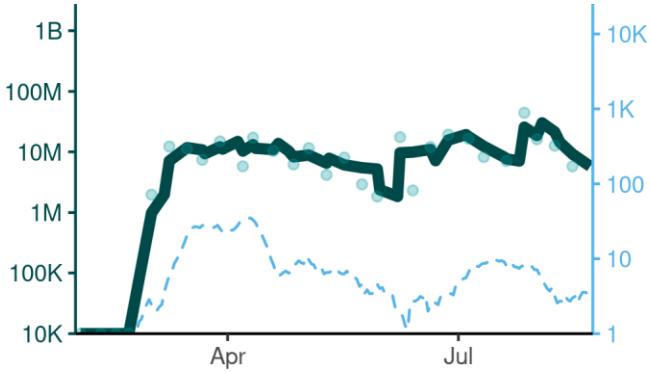


Balclutha *Grab 4.1K*

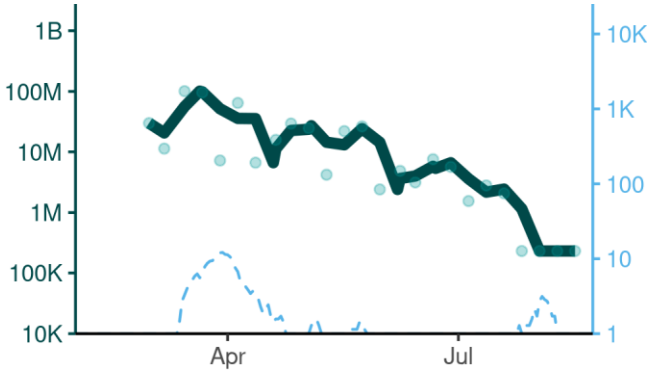


SARS-CoV-2 genome copies / day / person

Cromwell *Autosampler 7.1K*



Bluff *Autosampler 2.0K*



Alexandra *Autosampler 6.2K*

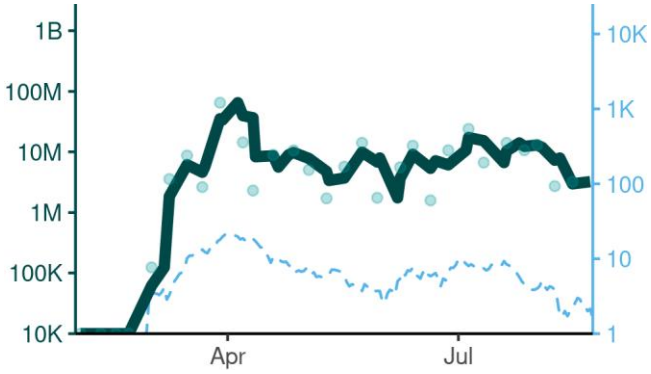
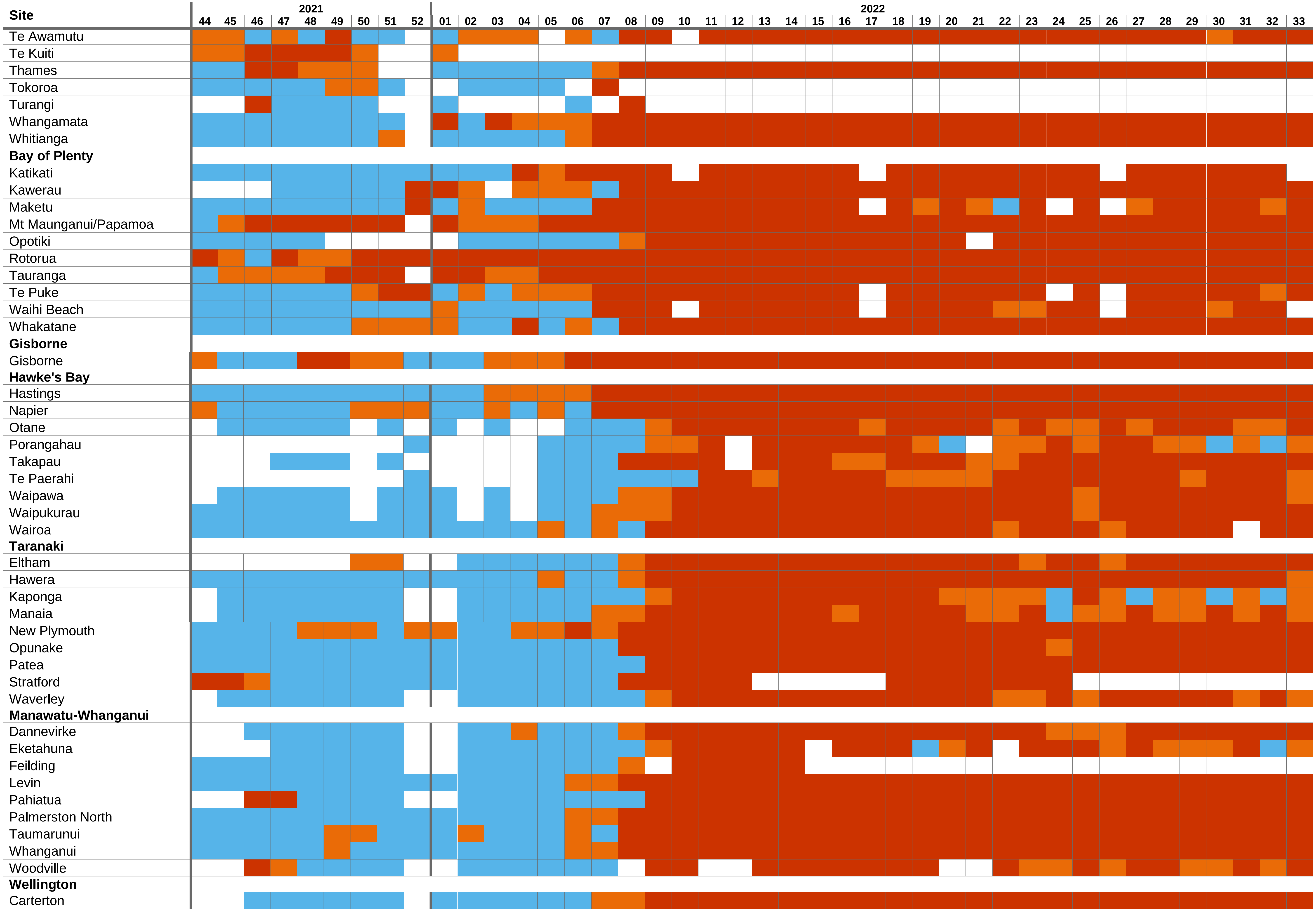
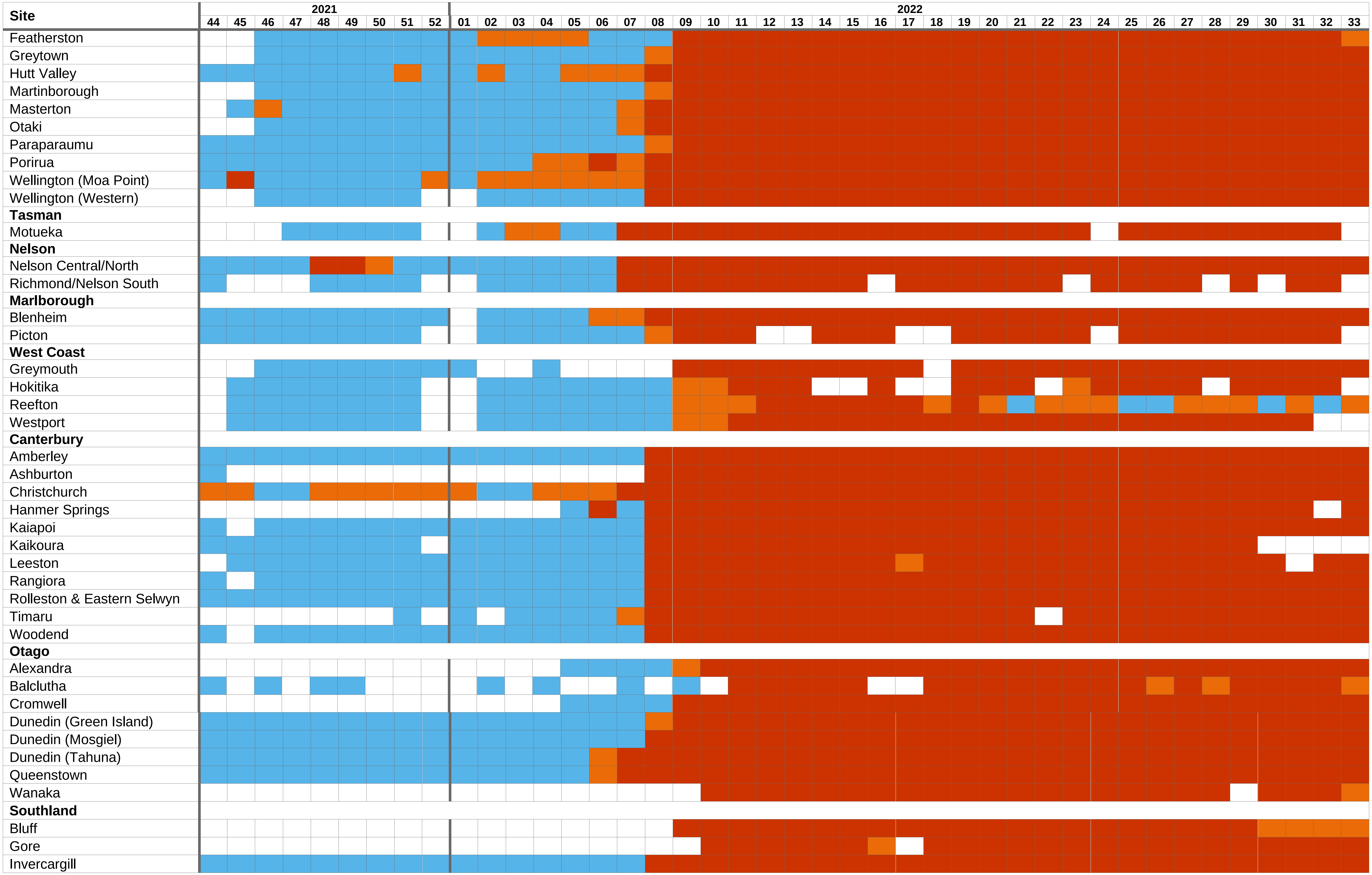


Table 1: Weekly summary of results

Key: Not Detected | Detected (below limit of quantification) | Detected) | Not sampled

Site	2021									2022																																
	44	45	46	47	48	49	50	51	52	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Northland																																										
Ahipara																																										
Dargaville																																										
Hikurangi																																										
Kaeo																																										
Kaikohe																																										
Kaitaia																																										
Kaiwaka																																										
Kawakawa																																										
Kerikeri																																										
Kohukohu																																										
Mangawhai																																										
Maungaturoto																																										
Opononi																																										
Paihia																																										
Rawene																																										
Ruakaka																																										
Russell																																										
Taipa																																										
Whangarei																																										
Whatuwhiwhi																																										
Auckland																																										
Army Bay																																										
Auckland East																																										
Auckland Southwest																																										
Auckland West																																										
Beachlands																																										
Clarks Beach																																										
Helensville																																										
Kawakawa Bay																																										
Kingseat																																										
North Shore																																										
Omaha																																										
Pukekohe																																										
Snells/Algies																																										
Waiuku																																										
Warkworth																																										
Wellsford																																										
Waikato																																										
Cambridge																																										
Hamilton																																										
Matamata																																										
Morrinsville																																										
Ngatea																																										
Otorohanga																																										
Paeroa																																										
Putaruru																																										
Taupo																																										


Site
2021
44 45 46 47 48 49 50 51 52
2022
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Te Awamutu
Te Kuiti
Thames
Tokoroa
Turangi
Whangamata
Whitianga
Bay of Plenty
Katikati
Kawerau
Maketu
Mt Maunganui/Papamoa
Opotiki
Rotorua
Tauranga
Te Puke
Waihi Beach
Whakatane
Gisborne
Gisborne
Hawke's Bay
Hastings
Napier
Otane
Porangahau
Takapau
Te Paerahi
Waipawa
Waipukurau
Wairoa
Taranaki
Eltham
Hawera
Kaponga
Manaia
New Plymouth
Opunake
Patea
Stratford
Waverley
Manawatu-Whanganui
Dannevirke
Eketahuna
Feilding
Levin
Pahiatua
Palmerston North
Taumarunui
Whanganui
Woodville
Wellington
Carterton


Site
2021
44 45 46 47 48 49 50 51 52
2022
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Featherston
Greytown
Hutt Valley
Martinborough
Masterton
Otaki
Paraparaumu
Porirua
Wellington (Moa Point)
Wellington (Western)
Tasman
Motueka
Nelson
Nelson Central/North
Richmond/Nelson South
Marlborough
Blenheim
Picton
West Coast
Greymouth
Hokitika
Reefton
Westport
Canterbury
Amberley
Ashburton
Christchurch
Hanmer Springs
Kaiapoi
Kaikoura
Leeston
Rangiora
Rolleston & Eastern Selwyn
Timaru
Woodend
Otago
Alexandra
Balclutha
Cromwell
Dunedin (Green Island)
Dunedin (Mosgiel)
Dunedin (Tahuna)
Queenstown
Wanaka
Southland
Bluff
Gore
Invercargill

Overview

SARS-CoV-2, the virus that causes COVID-19 disease, is shed in the faeces of people that are infected and so the viral RNA can be detected in wastewater. As such, testing wastewater for SARS-CoV-2 RNA is an efficient population-based COVID-19 surveillance tool. Based on national and international data, this method has been shown to be an indicator of increasing and decreasing cases (i.e., early warning system) and complements other surveillance tools. A national wastewater COVID-19 surveillance programme was established in 2021 by the Institute of Environmental Science and Research (ESR). This work is funded by the New Zealand Ministry of Health and is part of New Zealand's COVID-19 response.

Wastewater samples are collected from wastewater treatment plants across both the North and South Island of New Zealand. Grab or 24 hr composite samples are collected. Most sites are sampled at least weekly between Monday and Thursday of any given week. The number of sites and frequency of collection varies over time. Greater variability is expected with grab samples.

Approach

Samples are sent from each wastewater treatment plant to one of the ESR laboratories (Porirua or Christchurch). Processing involves the concentration of virus and extraction of viral RNA. The presence of SARS-CoV-2 RNA in the sample is then determined using RT-qPCR.

A result of not detected means that SARS-CoV-2 RNA is either absent from the sample, or at a level too low to be detected. When SARS-CoV-2 RNA is detected, the concentration in the sample can be calculated. Low amounts of SARS-CoV-2 RNA in a sample may not be able to be accurately quantified and are recorded as less than the limit of quantitation. For quantitation, the raw concentration data (i.e., genome copies per L) is converted to a viral load of genome copies per day per person. This calculation considers the flow rate of wastewater entering the wastewater treatment plant and the population in the catchment. This is the population-normalised viral load.

Key Points & Limitations

- SARS-CoV-2 RNA concentrations should not be compared between wastewater catchments.
- Day to day variability in SARS-CoV-2 RNA concentrations, especially in smaller catchments, is to be expected. Greater variability is expected with grab samples.
- Generally, increasing viral loads are associated with increasing numbers of people with SARS-CoV-2 infection and vice versa (decreasing concentrations indicating decreasing cases). However, there are a number of factors that affect the amount of viral RNA detected and so data from wastewater surveillance cannot indicate the exact number of COVID-19 cases in the catchment area.
- The number of COVID-19 cases reported via individual testing are reported for each region to provide a comparison to the wastewater results. The cases in each catchment area are an estimate of the number of people in that wastewater catchment area that have reported a positive test. However, because the wastewater catchments do not exactly align with regional boundaries, the number of cases estimated by region and by water catchment area may be different.
- Data are provisional and may be subject to change by location.
- As septic tank systems are not connected to wastewater treatment plants, the wastewater from these households will not be represented in the data.

Acknowledgements

This work represents the combined efforts of many individuals and organisations.

We continue to be indebted to the teams across the country who are collecting the wastewater that underpins this work.

The wastewater analysis has been undertaken at ESR by a team which may on any given week include contributions from: Joanne Chapman, Dawn Croucher, Joanne Hewitt, Joycelyn Ho, Anower Jabed, Olivia Macrae, Ashley McDonald, Andrew Ng, Ashley Orton, Andri Rachmadi and Fatiha Sulthana. Data science analysis, visualisation and reporting is the result of team effort from: Franco Andrews, Bridget Armstrong, Michael Bunce, Raewyn Campbell, Gerhard de Beer, Richard Dean, Brent Gilpin, Joanne Hewitt, Dawen Li, Helen Morris and Bindu Priya. Ongoing support for this work from the Ministry of Health and ESR management is appreciated.

Notes

Sites and frequency of sample collection: The catchment population sites selected for the surveillance range from approximately 100 to over 1,000,000 individuals. The sites cover all regions of the country. Most major towns and all cities, as well as many smaller communities, are included. In early 2022, the wastewater catchment areas cover over 80% of the population connected to wastewater treatment plants. The sites from which samples have been collected have varied over the last 12 months. New sites may be added over time, and/or sampling may reduce in frequency or cease for other sites. The selection and frequency of sampling vary depending on the local population, access to wastewater collection points, staff availability to collect samples and risk factors. When included, samples are collected at least weekly, with twice weekly sampling being common. A number of samples have also been collected from non-WWTP sites (manholes and pump stations- mostly in Auckland).

Sampling method: The preferred option is to automatically collect a 24 hour ‘composite’ sample. This is where a pump automatically collects a small volume of wastewater every 15 minutes over 24 hours using a composite sampler. These samplers are available in some wastewater treatment plants. When composite samplers are not available, ‘grab’ samples are collected. These range from a sample being taken at a single point in time, to 3 samples taken over 30 minutes, to samples collected over a day. Grab samples represent only the composition of the source at that time of collection and may not be as representative as a 24-hour composite sampler. More variation may be expected with grab samples.

Laboratory analysis of wastewater samples: Samples are sent from each wastewater treatment plant to ESR. Processing of each sample commences within an hour or two of receipt. Processing involves the concentration of virus from 250 mL sample to approx. 1 mL using centrifugation and polyethylene glycol. Viral RNA is then extracted from a small volume of 0.2 mL concentrate to give a final volume of 0.05 mL The presence of SARS-CoV-2 RNA is determined using RT-qPCR. SARS-CoV-2 is considered detected when any of the RT-qPCR replicates are positive.

RT-qPCR: Reverse transcription (RT) to convert RNA to complementary DNA (cDNA), followed by quantitative PCR (qPCR). RT-qPCR is used for detection and quantification of viral RNA.

Method sensitivity: The protocol used to concentrate SARS-CoV-2 from wastewater allows for the sensitive detection of SARS-CoV-2 by RT-qPCR. ESR has shown that when 10 individuals are actively shedding SARS-CoV-2 RNA in a catchment of 100,000 individuals, there was a high likelihood of detecting viral RNA in wastewater (https://doi.org/10.1016/j.watres.2021.118032). Shedding by one individual may be detected in wastewater, but it does depend on many factors including the amount and duration of shedding. Very low levels in wastewater may be not able to be quantified (i.e., less than the limit of quantification- see below).

SARS-CoV-2 RNA detected (positive result): A positive detection in the wastewater indicates that at least one person has been shedding SARS-CoV-2 into the wastewater at some point during the time period that the sample was being collected. In some cases, detections could also be due to the shedding of low levels of SARS-CoV-2 RNA by a recently recovered case. The detection of SARS-CoV-2 RNA does not indicate that infectious virus is present.

SARS-CoV-2 RNA not detected (negative result): A negative result can occur because there are no active 'shedding' cases in the catchment or because the SARS-CoV-2 RNA concentration is too low to be detected, most likely because there are a very low number of cases in the wastewater catchment. Therefore, negative finding does not necessarily guarantee the absence of COVID-19 in the community.

Viral loads and normalisation: When detected, the SARS-CoV-2 RNA concentration is calculated as genome copies per L of wastewater. This is then converted to a viral load of genome copies/day/person. This conversion takes into account the flow rate of wastewater entering the treatment plant (the influent) and the population in the catchment. The flow rate is the total volume (m3 per day) recorded at the inlet of the wastewater treatment plant over 24 hours. This is a population-normalised viral load. Currently, the flow rate is the average annual flow rate, but will be replaced with daily flow rate when available (note that rainfall may significantly increase the flow rate at the inlet, diluting the sample, and may result in lower concentrations and a false negative result).

In future, SARS-CoV-2 RNA concentrations will also be normalised by testing for the presence of pepper mild mottled virus (PMMoV). PMMoV is a virus that infects peppers but not humans. Consumption of peppers or pepper products, such as chilli sauce, means that PMMoV is detected in wastewater – normally at very high concentrations. Therefore, PMMoV has been found to be a useful proxy for the amount of faecal material in a wastewater sample. For normalisation, the concentration of SARS-CoV-2 RNA is divided by that of PMMoV in each sample. Different normalisation methods may result in changes to some data points, but trends are unlikely to change significantly.

Limit of quantification: The lowest concentration of the target that can be reliably quantified is referred to as the limit of quantification. For those samples where SARS-CoV-2 is detected but cannot be quantified, a value of 5 genome copies/mL wastewater is used. While a standard method is being used, virus recovery can vary from sample to sample, and this may affect the quantitation.

Data subject to change: Data generated for the New Zealand Wastewater COVID-19 Surveillance Programme should be considered provisional and may be subject to change. Data may be incomplete for the most recent 2-week period due to processing, testing and reporting delays.

Data not shown:

- Data from ‘ad hoc’ sampling locations including from individual facilities/building (e.g., workplaces, prisons, MIQs) are not included.
- Results from certain samples may not be shown, as the result was either deemed invalid, or the sample could not be tested (e.g., leaked in transit, not labelled).

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