# COVID Model Projections

October 27, 2021

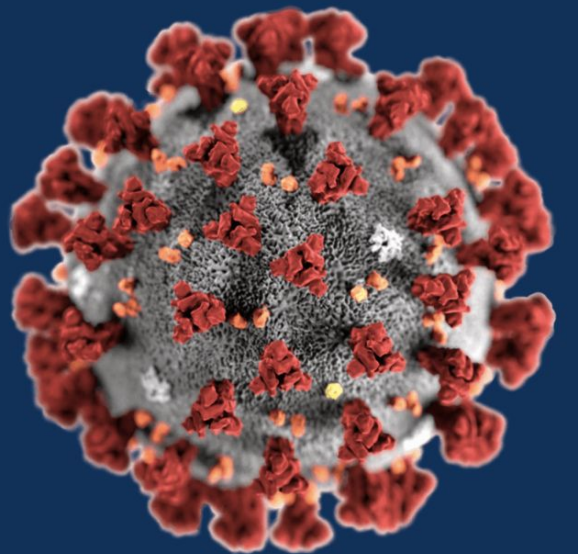
BC COVID-19 Modelling Group

@bcCOVID19group

# About BC COVID-19 Modelling Group

The BC COVID-19 Modelling Group works on rapid response modelling of the COVID-19 pandemic, with a special focus on British Columbia and Canada.

The interdisciplinary group, working independently from Government, includes experts in epidemiology, mathematics, and data analysis from UBC, SFU, UVic, and the private sector, with support from the Pacific Institute for the Mathematical Sciences.



https://bccovid-19group.ca

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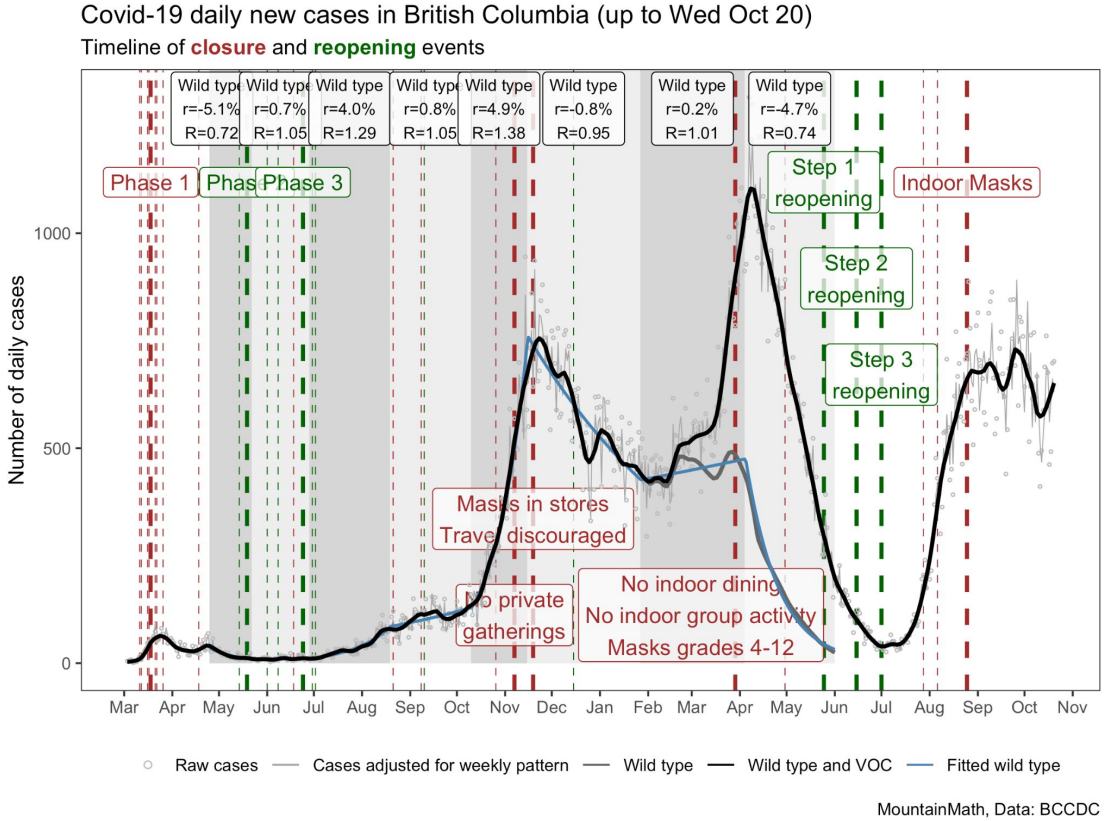
*Independent and freely offered advice, using a diversity of modelling approaches.*

# Overview

- State of the pandemic in BC
  - Case rates are slowly declining, currently at around 600 cases per day.
- Cases among children
  - Dramatic rise in case rate among <12 year olds has reversed.
  - Incidence remains slightly higher among <12 year olds across the province.
- Hospitalizations and ICU
- Vaccination and its impact
- Vaccine uptake
- Situation has improved in Alberta and Saskatchewan
- Most European nations are experiencing a fall resurgence.

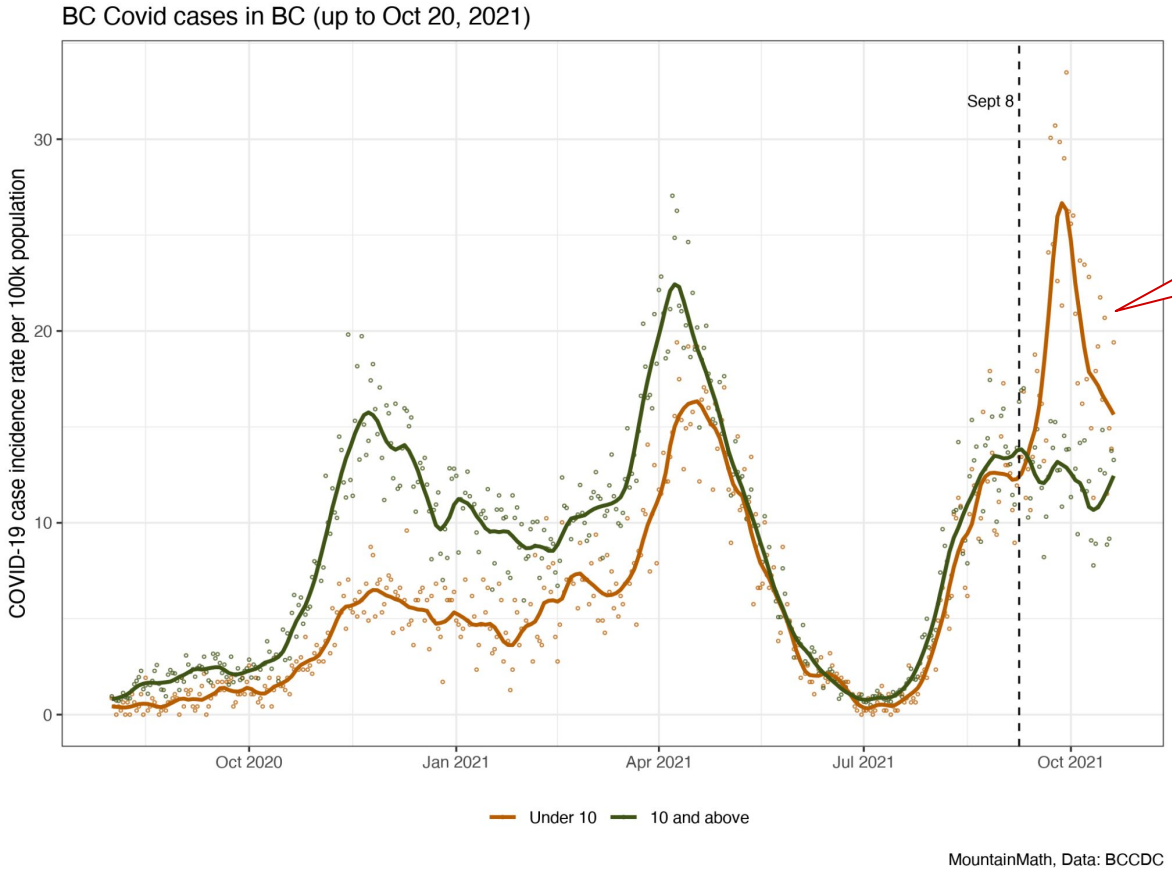
# State of the COVID-19 Pandemic in BC




Indoor masking and localized measures in regions with high case counts (Interior and Northern Health Authorities) stabilized cases through the fall.

**Source (J. von Bergmann)** Case data from BC COVID-19 Database (http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data). Vertical lines give dates of public health measures (major as thick lines, minor as thin lines). Grey dots are raw case counts, grey lines is cases abused for weekly pattern, black STL trend line and blue fitted periods of constant exponential growth. *Central Okanagan – July 29: masks, August 6: restrictions on group gatherings; Interior – August 21: masks; August 23: some restrictions on group gatherings. BC – August 25 mask mandate; BC's Vaccine Card to come into effect on September 13 (first dose) and October 24 (second dose)

# State of the COVID-19 Pandemic in BC



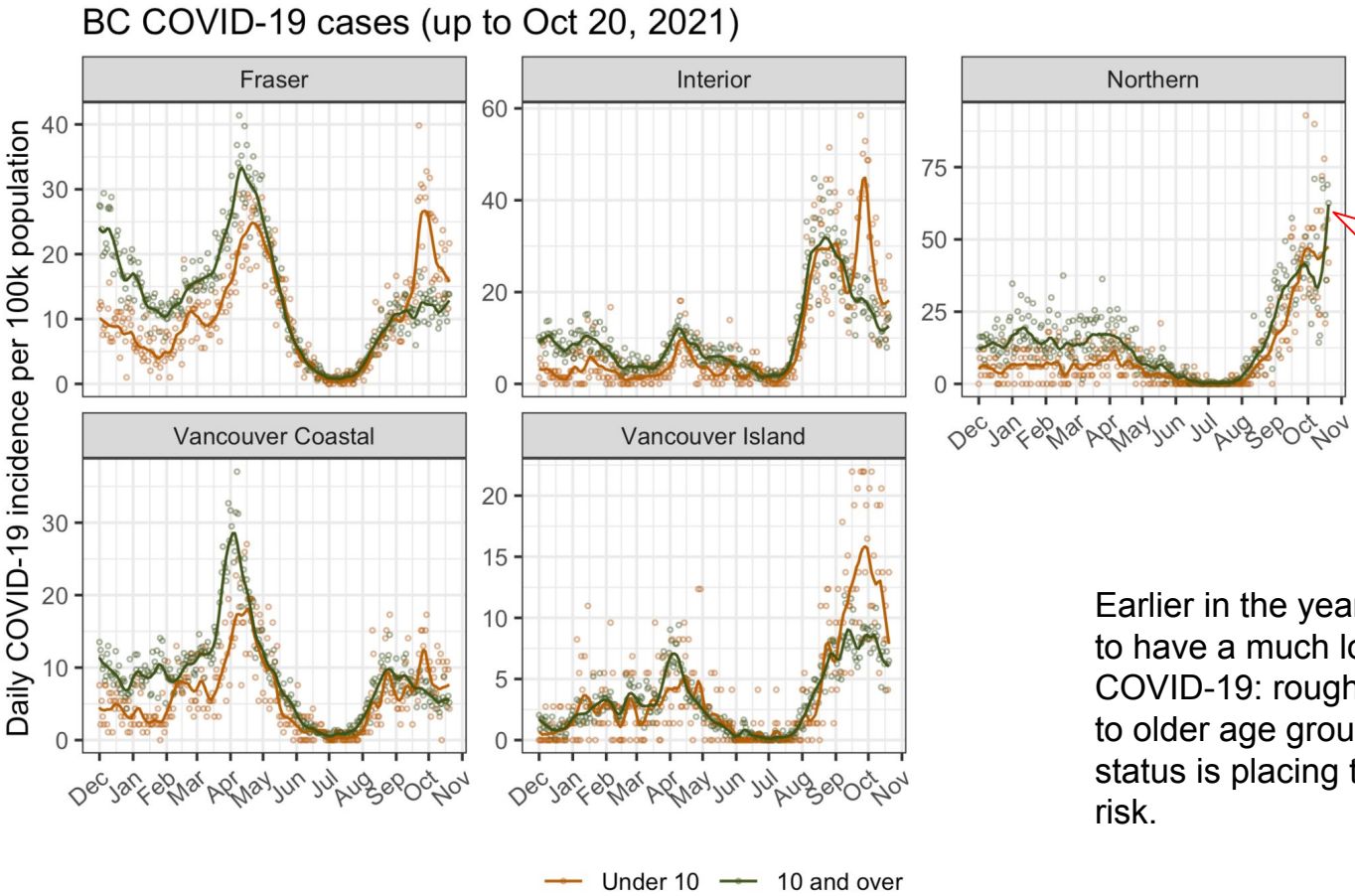

Rapid rise in <10 cases has largely reversed.

The rapid rise and fall in cases in this age group suggest more out-of-school contacts at the end of summer & beginning of the school year, stabilizing afterwards.

Testing also increased, but our previous analysis* suggested the increase in testing was caused by an increase in cases among school-aged children and not vice versa.

**Source (J. von Bergmann)** Case data from BC COVID-19 Database (http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data). *See slide 10 in October 7 report: there was no evidence for an increase in background testing in the fall for school-aged children, instead the rise in testing reflected the rise in cases.

# State of the COVID-19 Pandemic in BC



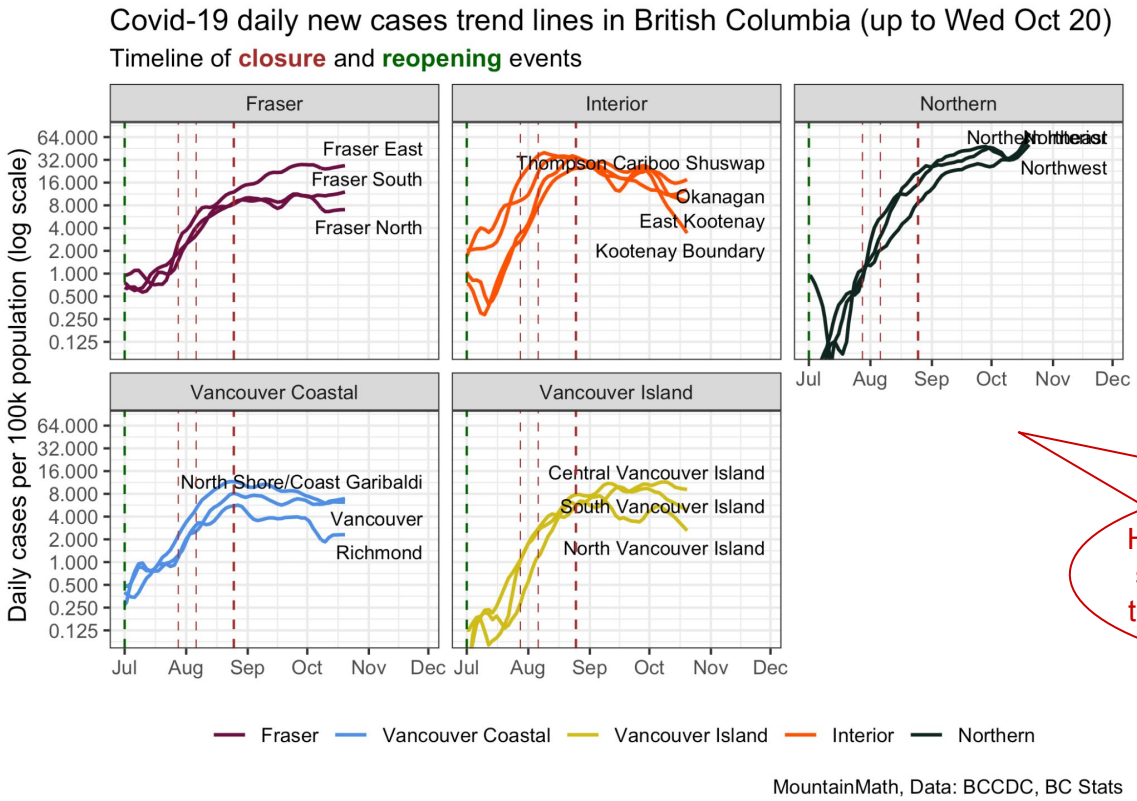

Incidence among children under 10 has come back in line with the rest of the population, across all HA.

Earlier in the year, children under 10 tended to have a much lower incidence of COVID-19: roughly half the case rate relative to older age groups. Now, their unvaccinated status is placing them at a higher relative risk.

**Source (J. von Bergmann)** Case data from BC COVID-19 Database (http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data).

MountainMath, Data: BCCDC

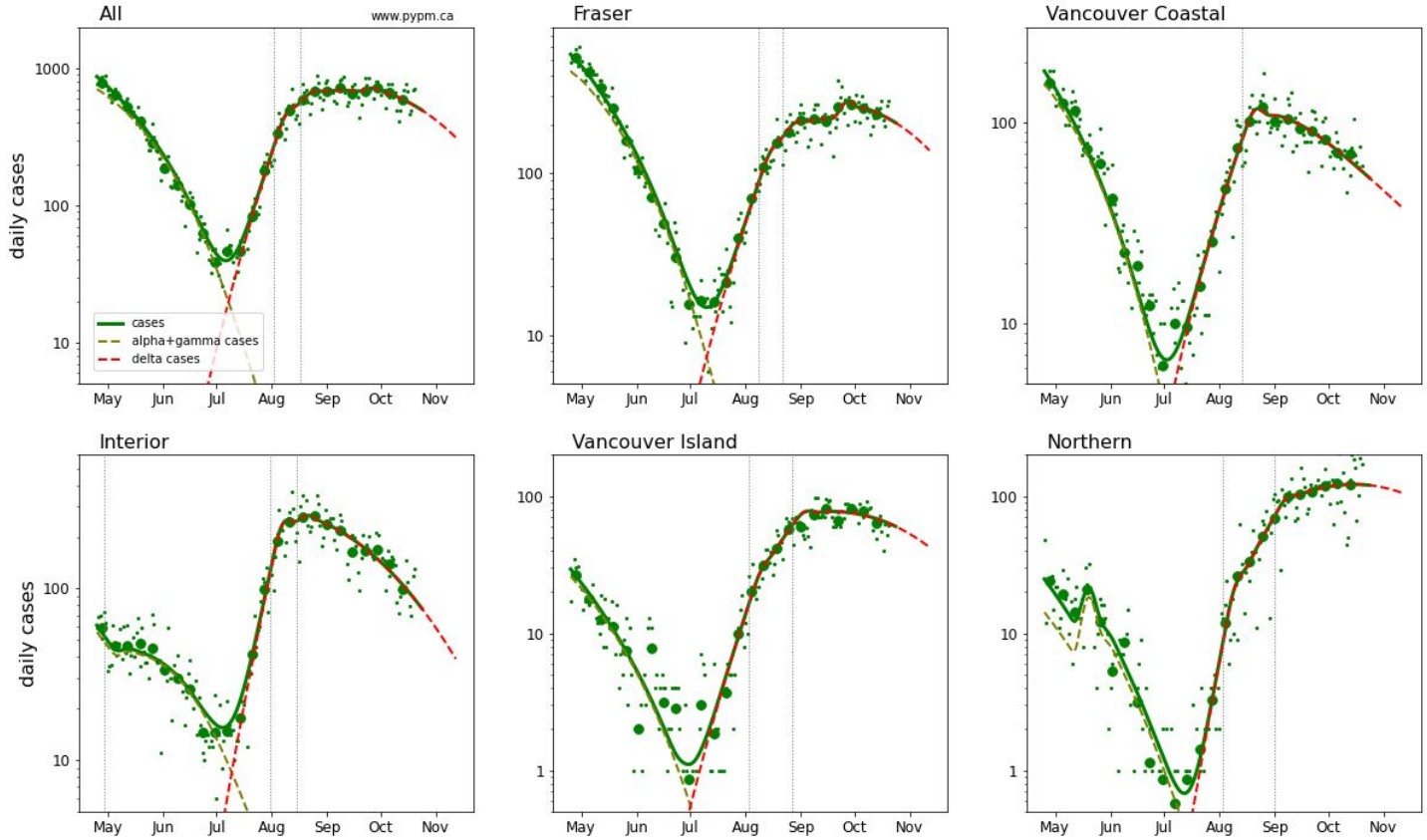
# State of the COVID-19 Pandemic in BC




Health Service Delivery Areas (HSDA) follow similar trends within a Health Authority, with the highest per-capita case rates in Northern Health.

**Source (J. von Bergmann)** Case data from BC COVID-19 Database (http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data). Vertical lines give dates of public health measures (major as thick lines, minor as thin lines). STL trend lines on log scale.

# Model fits to BC data




The measures taken in August and the public's response significantly reduced transmission.

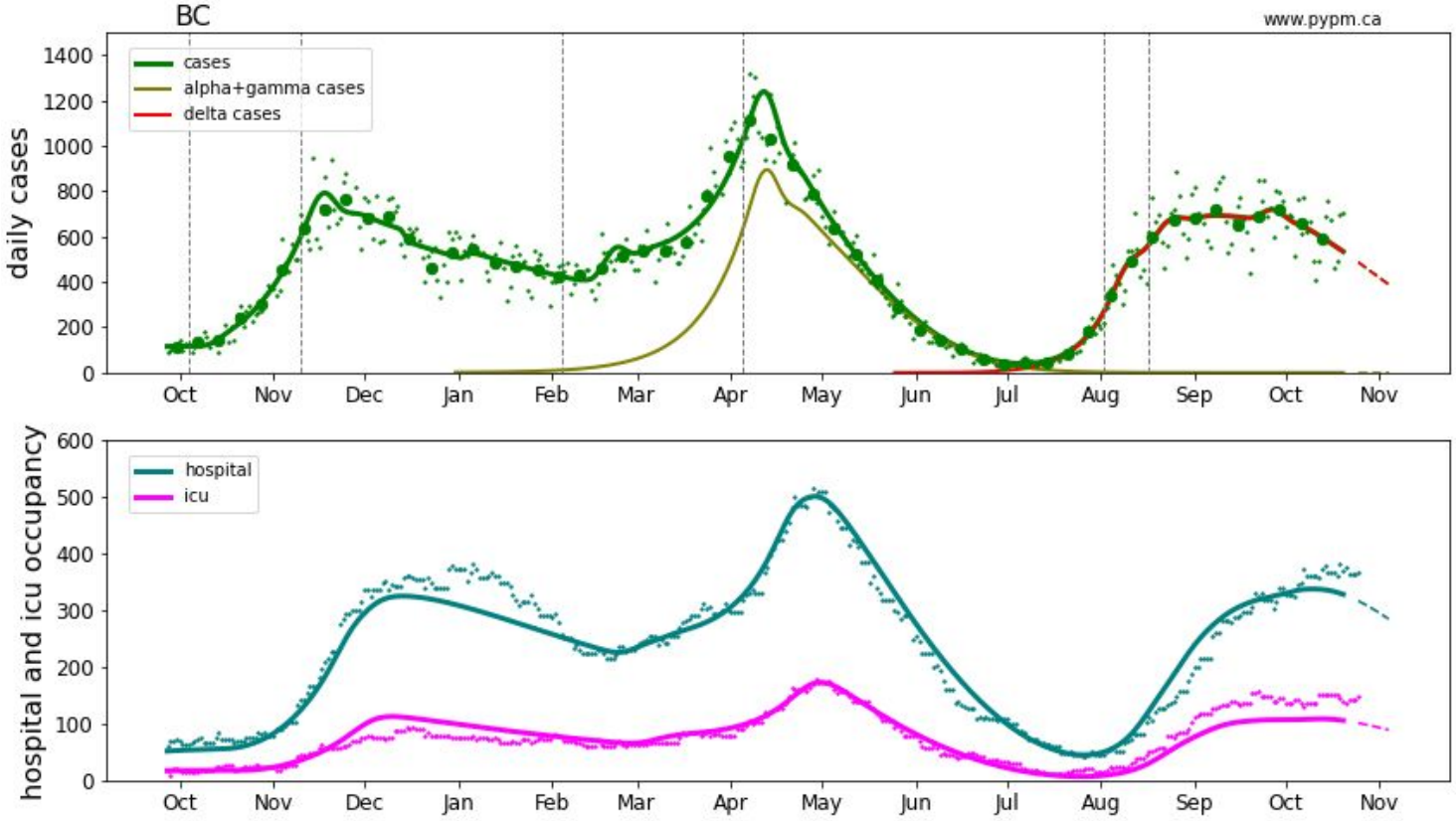
Cases in BC overall are currently declining at a rate of 2% per day.

Strongest declines are in Interior, Fraser, and Vancouver Coastal.

Fraser HA model indicates a burst of infections in early September.

**Source (D. Karlen).** See www.pypm.ca. These models include vaccination but have no age structure. Seasonal effects, such as the increased transmission in Fall 2020, or the appearance of new variants may increase growth, additional vaccinations beyond current rates of vaccination would bring growth rates down. Vertical lines show fitted dates for transmission rate changes. The larger dots show weekly averages.

# Estimating demands on health care




The COVID-19 pandemic is tracked using positive tests (cases), yielding an infection model (green curve).

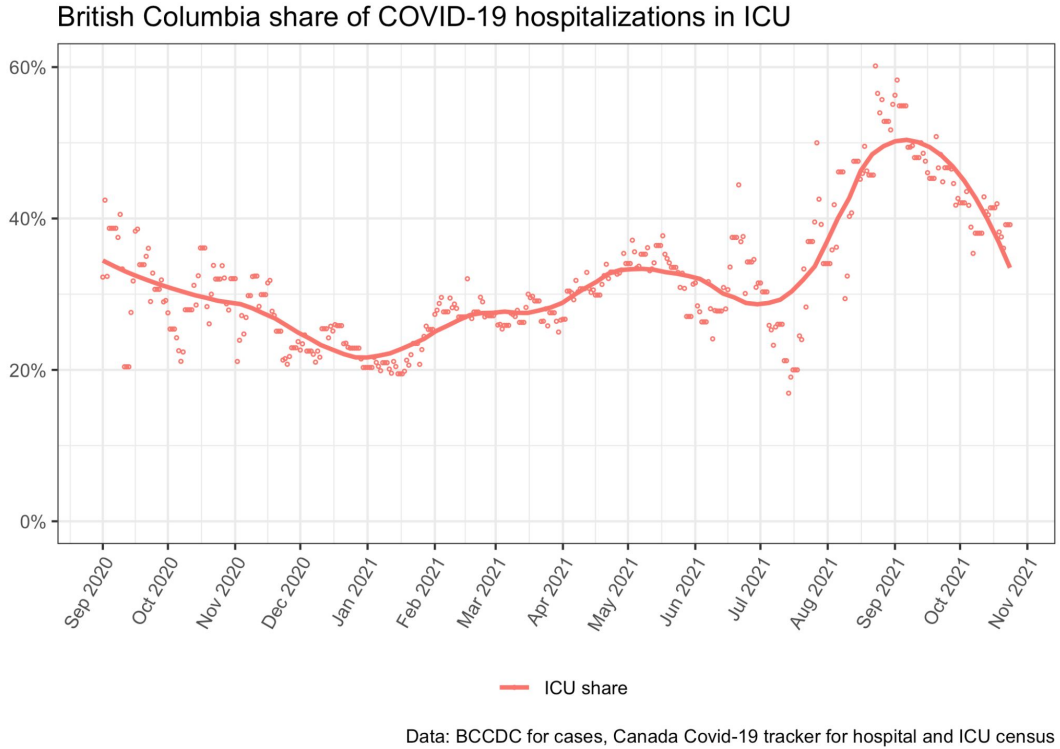
The infection model well describes past hospital occupancy.

Recent hospital and ICU occupancies exceed projections calibrated by data from the third wave.

**Source (D. Karlen).** See www.pypm.ca. These models include vaccination but have no age structure.

# Hospital and ICU occupancy over time

Of those patients in hospital, the fraction in ICU rose in September but has since returned to levels observed earlier in the year.

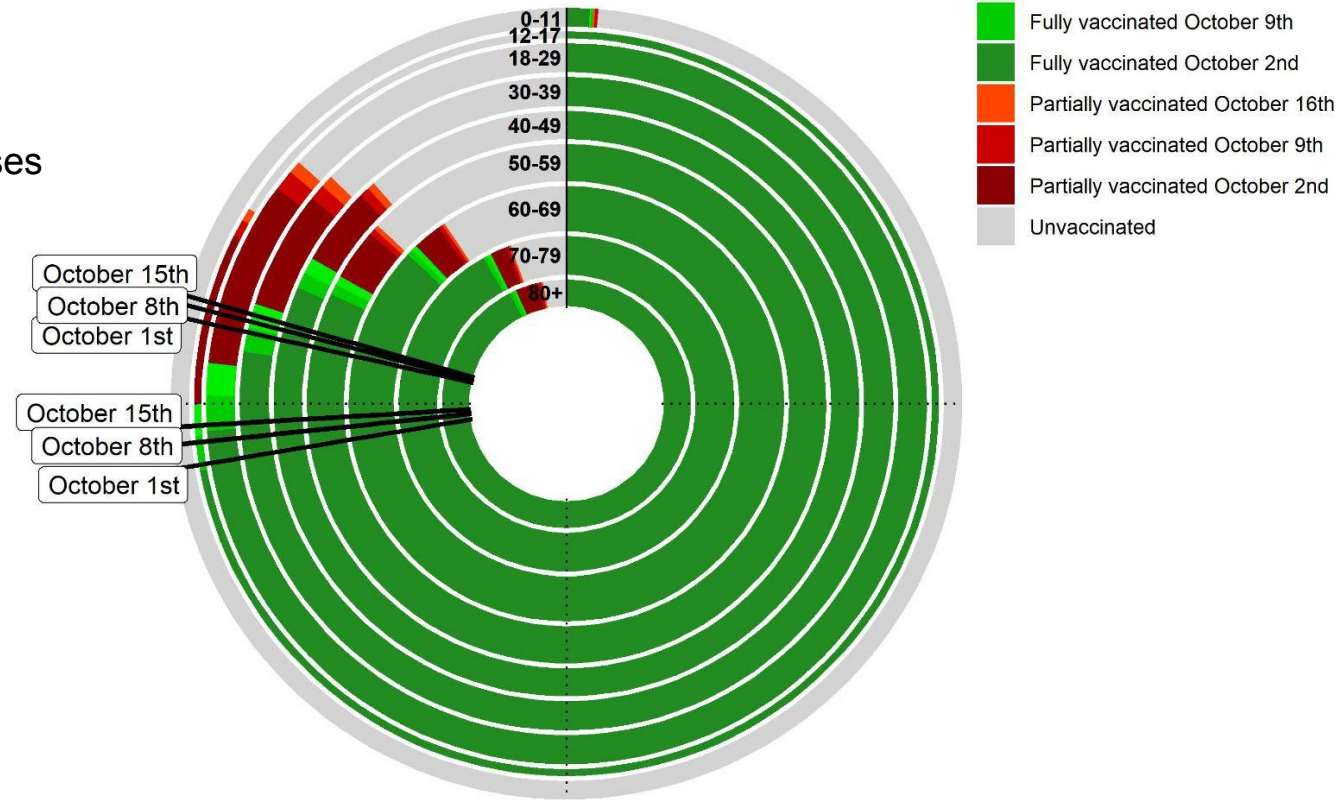



**Source (J. von Bergmann)** Case data from BC COVID-19 Database (http://www.bccdc.ca/health-info/diseases-conditions/covid-19/data). STL trend lines on linear scale.

# Closing the circle: Vaccination status by age

October 22nd update includes data through October 16th, 2021

**Slowing progress:**
The fraction of BC's entire population with one or two doses is rising, but slowly (0.3% and 0.7% increase over the past week, respectively).

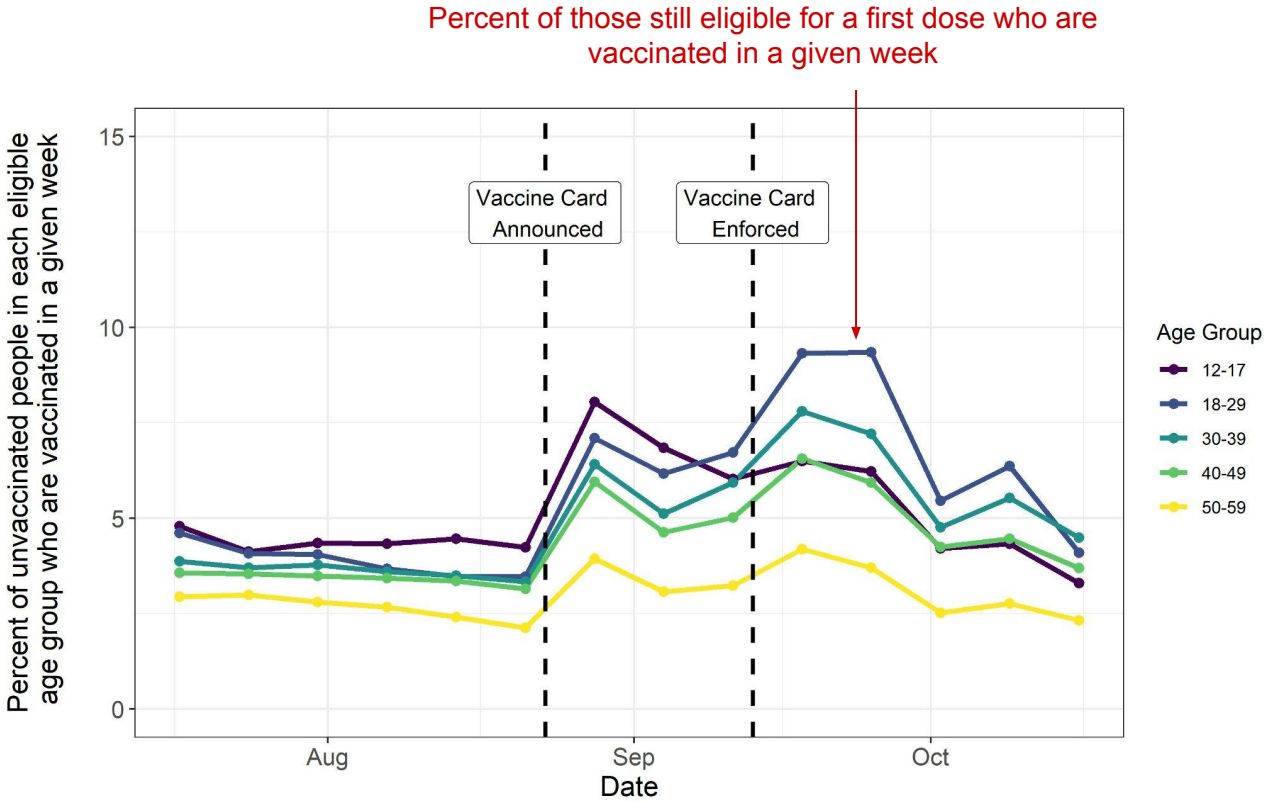



**Source (B. Wiley).** Design by Blake Shaffer (https://blakeshaffer.shinyapps.io/app_vaccines/) BC Vaccination data from https://health-infobase.canada.ca/covid-19/vaccination-coverage/, with area of each circle segment proportional to BC's population in that age class. BC 2021 Population projections for vaccination percentages from BC Stats: https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-projections

# Slow movement on vaccinations in BC

**Slowing progress:**
Both the announcement and the enforcement of BC's vaccine card boosted the rate of vaccinations among the unvaccinated.

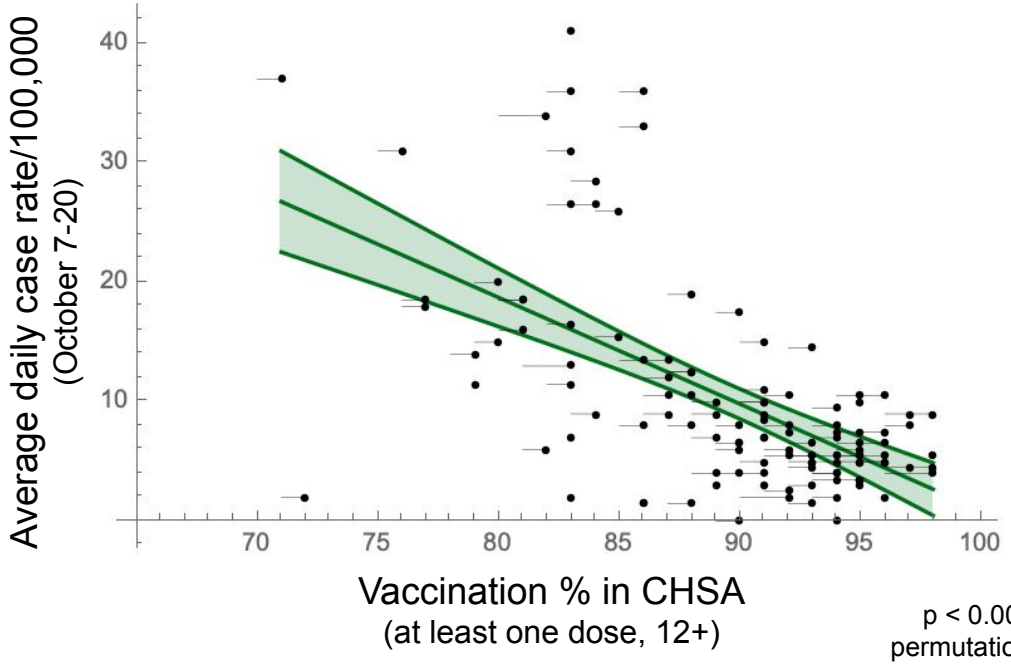
At current numbers of first dose vaccinations per week, it would take **~5 weeks** to vaccinate 90% of the 18-29 age group and **~9 weeks** for the 50-59 age group.




**Source (B. Wiley).** BC Vaccination data from https://health-infobase.canada.ca/covid-19/vaccination-coverage/. BC 2021 Population projections for vaccination percentages from BC Stats: https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-projections

# A pandemic of the unvaccinated: Communities at risk

We continue to see a major effect of vaccination levels across Community Health Service Areas (CHSA). For the most recent two-weeks of cases, communities with 95% of eligible people vaccinated have **4.3 times** fewer COVID-19 cases than those with 75% vaccination.



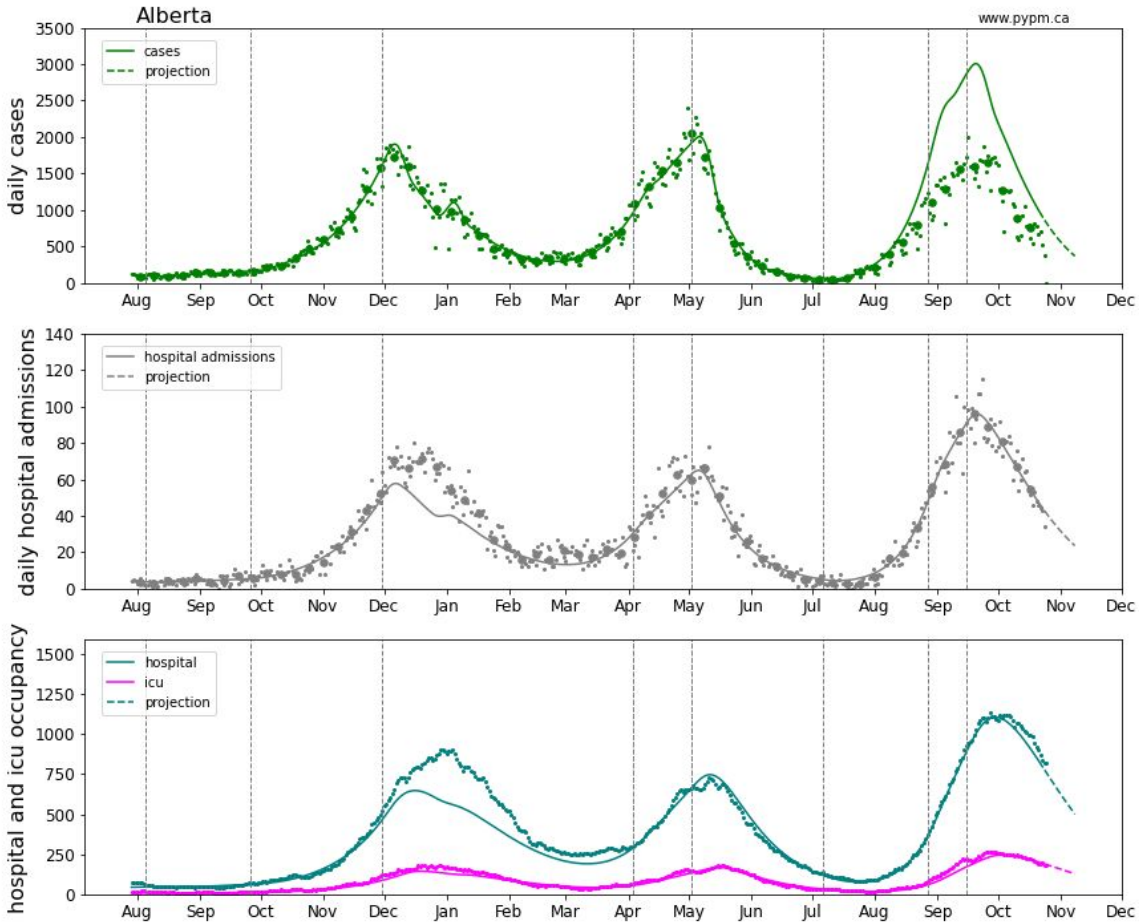

Thin lines show vaccination progress over the past two weeks.

Vaccinations protect communities, as well as protecting individuals.

**Source (S. Otto).** BCCDC data portal's surveillance dashboard data; see maps for regions that would most benefit from community vaccination drives (accessed October 25, 2021).

http://www.getvaccinated.gov.bc.ca

# Alberta update




Fits hospital admission data (grey) rather than case data.

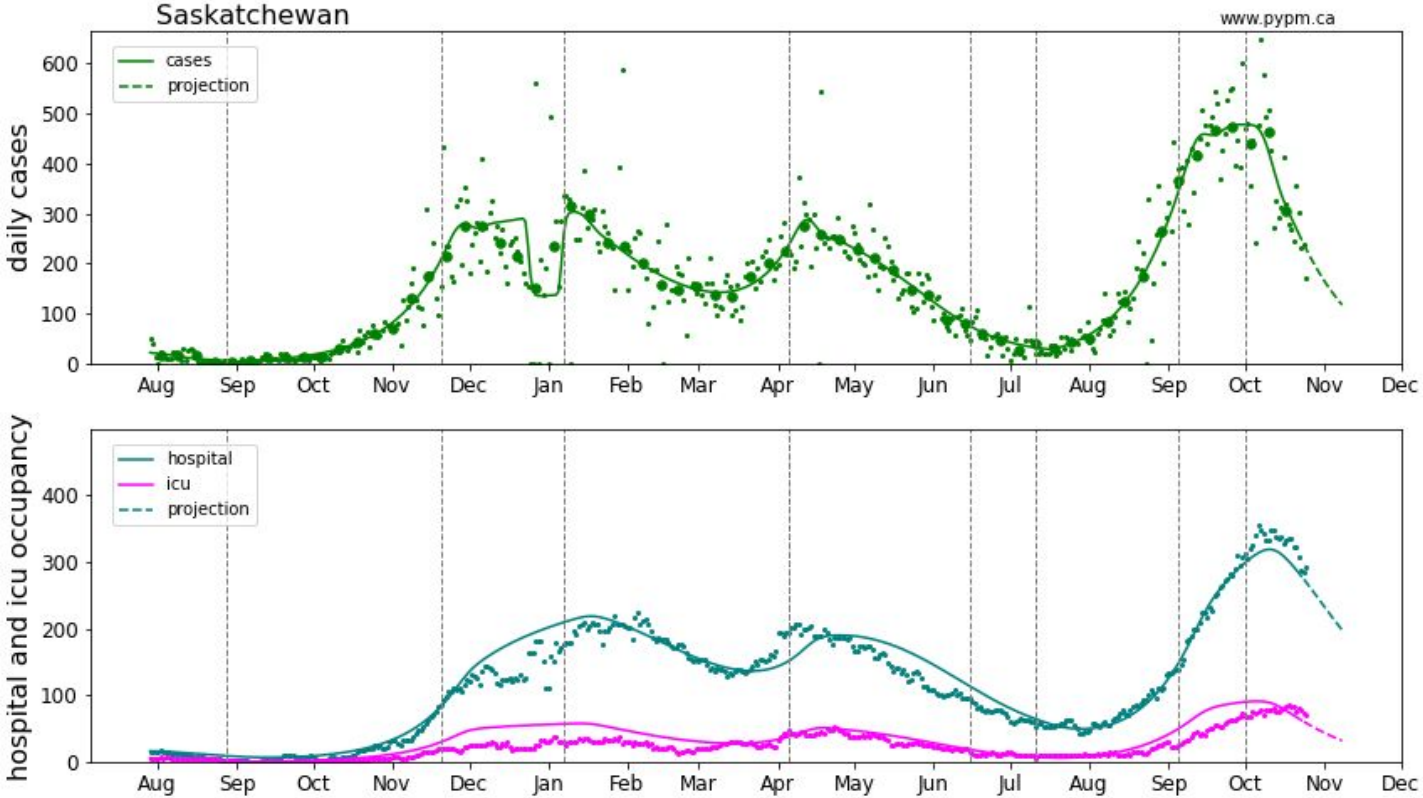
The previous report showed that case rates could no longer be relied upon to track infection rates, likely due to changes in testing practice. Hospital admission data indicated a significant reversal in growth, coinciding with measures announced on September 15.

Data from past 3 weeks confirms the turnaround.

Analysis indicates that many more infections have gone undetected since August.

**Source (D. Karlen):** COVID-19 Alberta Statistics, www.pypm.ca

# Saskatchewan update

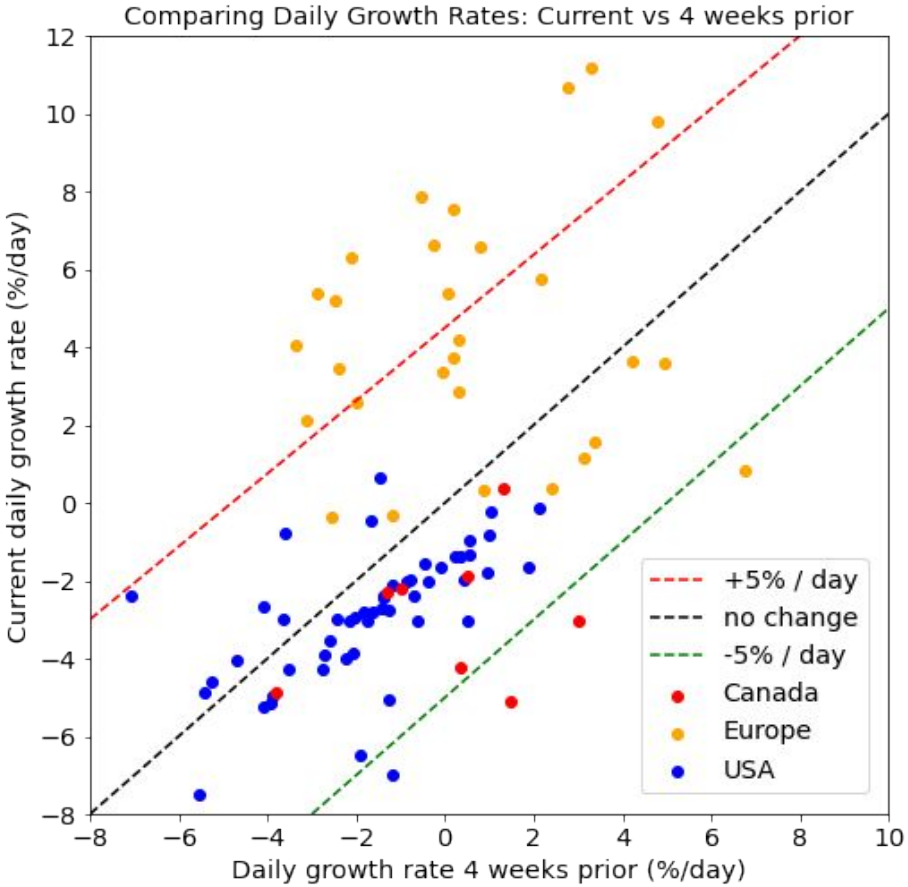



The rapid growth in infections in August has been reversed.

Hospital occupancy is declining, as projected from the case history.

**Source (D. Karlen).** See www.pypm.ca. These models include vaccination but have no age structure.

# Recent trends in Canada, USA, and Europe




Over the past 4 weeks, growth rates have reduced in all Provinces and most US states.

- The daily growth rates are now typically about 2%/day less than they were a month ago, consistent with the effect of increasing immunity of the populations.

In the past few weeks, most European countries have seen dramatic increases in growth rates.

- Cases now growing 5%/day (or more) faster than they were a month ago.
- This could be due in part to seasonal changes in behaviour.
- Serves as a warning that the situation in BC could take a turn for the worse.

**Source (D. Karlen):** www.pypm.ca

# Key messages

**State of the pandemic:**

- The COVID-19 pandemic is largely stable in BC, declining at a rate of about 2% per day
- Measures in effect are preventing cases from growing but a high daily case rate remains (averaging 628 daily cases in October)
- Over the next three weeks, model projections indicate that COVID-19 cases are expected to decline in all Health Authorities, including the North, as immunity levels build following vaccinations.
- Future risks that could see COVID-19 growing again in BC include reductions in individual protective measures (e.g., mask wearing), seasonal effects (more time indoors), and the evolution of more transmissible variants.
- Improvements that would further bend down the curve in BC include more individuals becoming vaccinated and improving protective measures (e.g., masks, ventilation, etc.).
- 80% of BC is now vaccinated, with children under 12 accounting for half of the remaining unvaccinated. Nearly 90% of eligible British Columbians have now been vaccinated.
- Vaccination strongly protects individuals and communities, with ~4 fold lower COVID-19 risk in communities with ~95% vaccination rates (aged 12+) compared to those with only ~75%.

**Alberta and Saskatchewan**: Both case and hospitalization rates are now declining and predicted to continue to do so.