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Traffic and road safety effects of the 2020 COVID-19 restrictions in South Australia

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ABSTRACT

The purpose of this study was to document relevant COVID-19 restrictions in South Australia and present the resultant effects on traffic and road safety measures during 2020 through comparison with years prior to the pandemic. Data were extracted from various sources to analyse the changes throughout 2020 and during two active COVID-19 periods, for both the whole of South Australia as well as for metropolitan Adelaide and rural areas separately. A 'matching dates' process was devised to account for the effects of public holidays and asynchronous days of weeks between comparison years. Over the whole of 2020, traffic volumes decreased by 8.5%, average traffic speeds decreased by 0.7%, and injury crashes decreased by 18.7%. The first COVID-19 period, from mid-March to the start of May, was associated with a decrease in traffic volumes of 33.8%, an increase in traffic speeds of 0.7%, and a decrease in injury crashes of 28.1%. The second COVID-19 period, in mid-November during a 3-day state-wide lockdown, was associated with a 57.0% decrease in traffic volumes, an 8.1% increase in traffic speeds, and a 24.1% decrease in injury crashes.

KEYWORDS

Traffic volumes, Traffic speeds, Traffic injury crashes, COVID-19, Coronavirus, 2020, Pandemic, Community

Summary

The purpose of this study was to document relevant COVID-19 restrictions in South Australia during 2020 and present the resultant effects on traffic and road safety through comparison with years prior to the pandemic.

As well as providing historical context for future analyses, the large changes in traffic volumes in two periods during 2020 resulting from COVID-19 restrictions provided a natural experiment where the effects of large changes in traffic volumes and speeds on injury crash frequency could be explored.

A 'matching dates' process was used to compare traffic statistics from 2020 to 2018 and 2019 while accounting for the effects due to public holidays and asynchronous days of week of each year (i.e., Mondays and Tuesdays not occurring on the same date of each year). Two COVID-19 periods were identified in 2020 where the traffic volumes dropped more than 20% below the typical levels for each period, and both periods were analysed individually. The traffic volumes, speeds and injury crashes were analysed for metropolitan and rural areas, together as well as separately. The results from the analyses are presented in Table 1.1.

Table 1.1
Changes in traffic volume, speed, and injury crashes for 2020 (compared to 2018 and 2019)

Timeframe	Change in traffic volume (relative to average in 2018 and 2019)	Change in traffic speeds (relative to 2019)	Change in traffic injury crashes (relative to average in 2018 and 2019)
2020	-8.5%	-0.7%	-18.7%
2020 (metropolitan only)	-8.6%	-0.1%	-20.0%
2020 (rural only)	-2.8%	-4.4%	-14.4%
First COVID-19 period – 21 Mar to 10 May	-33.8%	+0.7%	-28.1%
First COVID-19 period (metropolitan only)	-34.0%	+1.5%	-31.7%
First COVID-19 period (rural only)	-24.2%	-5.1%	-18.0%
Second COVID-19 period – 20 Nov to 22 Nov	-57.0%	+8.1%	-24.1%
Second COVID-19 period (metropolitan only)	-57.3%	+8.8%	-36.6%
Second COVID-19 period (rural only)	-39.9%	+0.3%	+5.9%*
Non-COVID periods	-4.2%	-1.0%	-17.0%
Non-COVID periods (metropolitan only)	-4.3%	-0.5%	-18.1%
Non-COVID periods (rural only)	+0.8%	-4.3%	-13.2%

*less than 10 rural crashes per year in the second COVID-19 period

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1 Introduction

The COVID-19 pandemic had profound effects on nearly every aspect of society in every country around the world. The disruptions and changes created a large-scale natural experiment, which allows for unique research opportunities. In South Australia, the major effects started occurring in early 2020.

The purpose of this study was to document relevant COVID-19 restrictions in South Australia and present the resultant effects on traffic and road safety during 2020 through comparison with the years prior to the pandemic. This study contains only a surface-level analysis with the potential for further analyses in the future.

Specifically, the aims of this study were to:

- Document the timeline of COVID-19 related events in 2020 that are relevant to road safety,
- Examine traffic volumes in 2020 and compare to previous years,
- Examine traffic speeds in 2020 and compare to previous years,
- Examine reported injury crashes in 2020 and compare to previous years, and
- Relate changes in traffic volumes and speeds to the frequency of injury crashes.

While it may be obvious that COVID-19 restrictions resulted in reductions in traffic volumes due to the community response, the aim of this study was to quantify the reductions. How the reductions in traffic volumes affected traffic speeds and injury crashes is also explored. The changes throughout 2020 also provide a historical context for future analyses.

This report includes relevant background information, the methods for analysis and an exploration of traffic volume, traffic speed and traffic injury crashes one at a time, followed by a brief discussion.

2 Background

This Section documents significant dates in 2020 (and earlier where relevant) that are necessary for carrying out the analyses conducted in the later Sections.

2.1 COVID-19 related dates in 2020

Significant dates related to the COVID-19 pandemic specific to South Australia in 2020 are shown in Table 2.1. Where applicable, the dates relate to press releases made by the Australian Federal Government and the South Australian Government. Some entries have been highlighted in bold as they had a significant effect on the general community and are pertinent to this study.

Table 2.1
COVID-19 related dates in South Australia in 2020

COVID-19 related event	Date in 2020
First mention of COVID-19 in Parliament House	23 Jan
Mandatory quarantine for returning citizens who travelled from China	1 Feb
Only returning citizens permitted to travel from China and must self-isolate	13 Feb
Travellers from Iran included in travel restrictions	1 Mar
National supermarket 'panic buying' begins	3 Mar
Travellers from South Korea blocked	5 Mar
World Health Organization (WHO) declared COVID-19 a global pandemic	11 Mar
Travellers from Italy blocked	11 Mar
South Australia declares a public health emergency	15 Mar
Outdoor gatherings for 500+ people no longer allowed	15 Mar
Overseas travellers ordered to self-quarantine	16 Mar
SAPOL temporarily suspends Random Breath Testing (RBT) operations	17 Mar
Australian border closed to all non-citizens and non-residents	20 Mar
South Australia declares COVID-19 outbreak a major emergency allowing for legislative changes to be made	22 Mar
Federal government imposes social distancing of 4 square metres per person	22 Mar
Visitors banned from aged care facilities	22 Mar
Non-essential businesses closed (pubs, restaurants, gyms, cinemas, theatres, places of worship etc.)	23 Mar
Non-essential travellers into SA required to self-quarantine	24 Mar
Significant number of workplaces transitioning staff to work from home where possible	16 Mar to 27 Mar
Gatherings of more than 10 people prohibited and a limit of 1 person per four square metres	27 Mar
Interstate travellers advised to return and stay home	29 Mar
Federal government reduces public gatherings to a maximum of 2 people	30 Mar
Services SA suspends Licence theory and hazard perception test, rider safe course	4 Apr
Pupil free days for all schools in South Australia	6 Apr to 9 Apr
First COVID-19 related death in South Australia	7 Apr
COVID-19 testing available to anyone with even mild symptoms	24 Apr
COVID Safe app released by the federal government	26 Apr
Federal government allows 1 st phase of easing restrictions	8 May
Non-essential workplaces starting to allow staff to return to workplace	11 May to 25 May
Restrictions lifted to allow gatherings of up to 10 people	22 May
Restrictions lifted to allow gatherings of up to 20 people	8 Jun
Restrictions on gatherings increase from 20 to 75 people, or bigger venues to 300 people	19 Jun
All venues allowed to open without restriction in numbers, however a 2 square metre per person rule still applies	29 Jun
Electronic cross border process for people to apply for pre-approval prior to reaching South Australia's borders	1 Jul
State border closed to Victoria amid community outbreak	28 Jul
Restrictions on gatherings at private residence to 10 people	5 Aug
COVID marshal must supervise prescribed operations for many businesses	21 Aug
Funeral gatherings allowance increased to 150 people	5 Sep
Cluster of 3 cases turns to 17 cases overnight in northern suburbs of Adelaide	15 Nov
Restrictions reintroduced after outbreak in the northern suburbs of Adelaide	16 Nov

2.2 Daily cases of COVID-19

There were two major outbreaks of COVID-19 in South Australia in 2020; one that started in mid-March and one in mid-November. Figure 2.1 shows the numbers of new COVID-19 cases recorded per day in South Australia. Note that this also includes positive cases from the medi-hotels where international arrivals were being quarantined. Separate local-transmission data was not recorded during 2020.

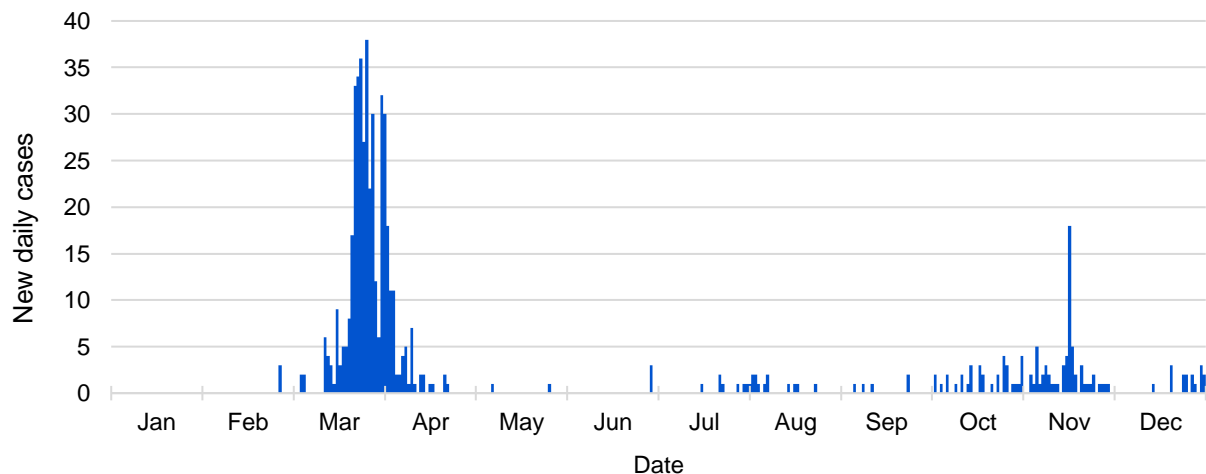


Figure 2.1

New daily cases of COVID-19 in South Australia throughout 2020 (medi-hotel cases and community transmissions)

2.3 Public holidays

The dates of public holidays in South Australia for 2018, 2019 and 2020 are shown in Table 2.2. Traffic volumes on public holidays in South Australia have considerably lower traffic volumes than other days. For holidays that were adjacent to a weekend, the dates include the entire weekend.

Table 2.2

Public holidays dates in South Australia 2018-2020

Public holiday	2018	2019	2020
New Year's Day	Mon, 1 Jan	Tue, 1 Jan	Wed, 1 Jan
Australia Day long weekend	Fri, 26 Jan to Sun, 28 Jan	Sat, 26 Jan to Mon, 28 Jan	Sat, 25 Jan to Mon, 27 Jan
Adelaide Cup Day long weekend	Sat, 10 Mar to Mon, 12 Mar	Sat, 9 Mar to Mon, 11 Mar	Sat, 7 Mar to Mon, 9 Mar
Easter long weekend	Fri, 30 Mar to Mon, 2 Apr	Fri, 19 Apr to Mon, 22 Apr	Fri, 10 Apr to Mon, 13 Apr
Anzac Day	Wed, 25 Apr	Thu, 25 Apr	Sat, 25 Apr
Queen's Birthday long weekend	Sat, 9 Jun to Mon, 11 Jun	Sat, 8 Jun to Mon, 10 Jun	Sat, 6 Jun to Mon, 8 Jun
Labour Day long weekend	Sat, 29 Sep to Mon, 1 Oct	Sat, 5 Oct to Mon, 7 Oct	Sat, 3 Oct to Mon, 5 Oct
Christmas period	Mon, 24 Dec to Wed, 26 Dec	Tue, 24 Dec to Thu, 26 Dec	Fri, 24 Dec to Mon, 28 Dec
New Year's Eve	Mon, 31 Dec	Tue, 31 Dec	Thu, 31 Dec

2.4 Comparisons between years

Two methods were used to compare 2020 to the years prior: a 7-day average method and a matching dates method. Both are outlined below. A validity check is shown in Figure 2.2, to determine how each

method performed when comparing the traffic volumes of the same dates between 2018 and 2019, where there should be minimal differences (as there were no major disruptions to traffic flows on average throughout the South Australian network). The figure also has the direct date-to-date comparison to emphasise the inaccuracies of comparing years based on their dates alone. The pure date-to-date comparison had a maximum difference on a single date of 62.2% (where a value closer to 0% is more desirable).

7-day average method

The 7-day average filter is a moving average filter which calculates the average of the seven days around a date, the three days prior, the actual date, and the three days after, for all dates (including the starts and ends of each year). This process removes any 'day of week' variation and helps to smooth the data to highlight any long-term (greater than a few days in length) changes.

The main benefit of this technique is the simplicity of the process, however, some flaws appear at certain times of the year, especially close to public holidays. As some public holidays occur at certain times of the year, for example, the Labour Day public holiday occurs on the first Monday in October, the dates do not match between years, and therefore create inconsistencies when attempting to compare years. Another separate issue with the 7-day average method is that large changes in a small period of time (less than seven days long) can have their severity masked due to 'normal' days being present in the 7-day average calculation.

As shown in Figure 2.2, using the 7-day average method to compare 2018 and 2019, the largest discrepancies occurred close to the public holiday dates. The maximum difference for a single date was 19.2% using this method.

Matching dates method

As a solution to the problems introduced in the 7-day average method, the matching dates method was created. The matching dates method focuses on matching the day-of-week (Thursday matched to Thursday) between years and matching public holidays. A summary of the matched dates between 2019 and 2020 is shown in Table 2.3. Note, that for public holidays, the date was prioritised over the day-of-week unless it was a public holiday that occurred on a specific day every year (for example, the Queen's Birthday occurring on the second Monday of June every year).

A full list of all the matched dates for between 2018, 2019 and 2020 is provided in Appendix A.

As shown in Figure 2.2, the matching dates method had a slightly higher consistency, but was significantly closer to the 0% mark in the March and April period, which will be very important for this particular analysis (as featured later). The maximum difference for a single date was 14.0% using this method.

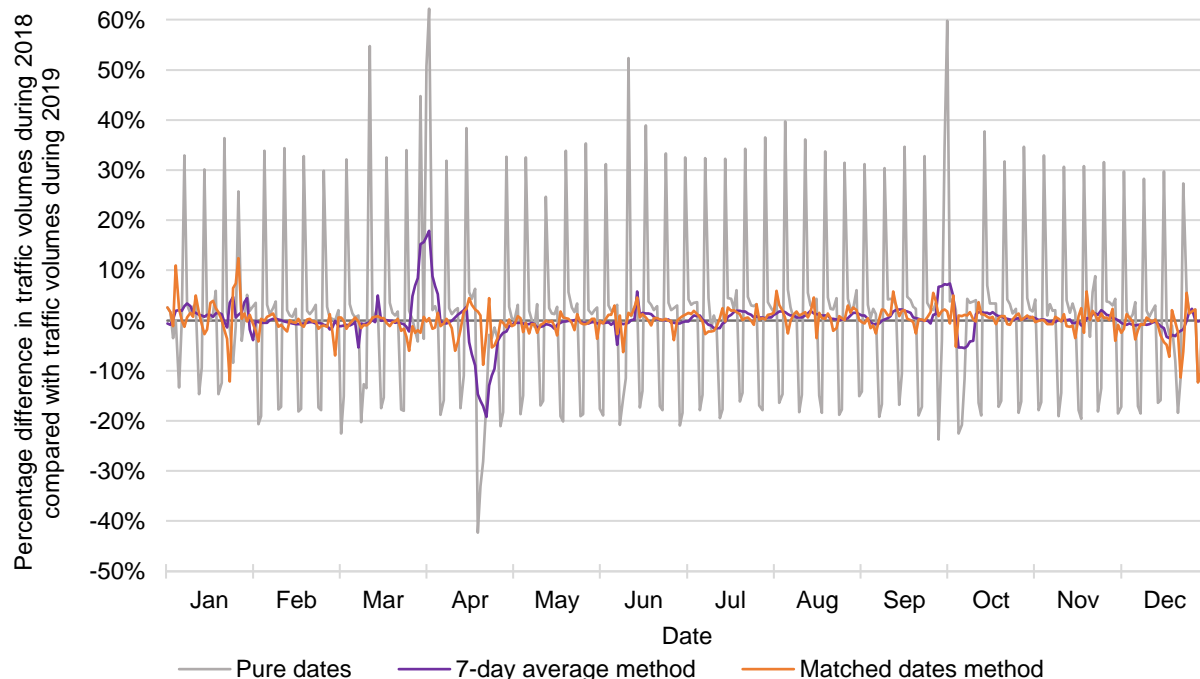


Figure 2.2
Percent 2019 traffic volume of 2018 traffic volume for pure dates, 7-day average method and matched dates method

Table 2.3
Matched dates between 2020 and 2019 based on day of week and Public Holidays

2020 date	2020 date day of week	Matched 2019 date	Matched 2019 day of week	Notes
1 Jan (New Year's Day)	Wed	1 Jan (New Year's Day)	Tue	Not changed due to Public Holiday
2 Jan	Thu	2 Jan	Wed	Matched date for start of year period
3 Jan	Fri	4 Jan	Fri	Matched day of week
4 Jan	Sat	5 Jan	Sat	
5 Jan	Sun	6 Jan	Sun	
...				
24 Jan	Fri	25 Jan	Fri	
25 Jan	Sat	26 Jan (Official Australia Day)	Sat	Matched day of week as Public Holiday falls on weekend
26 Jan (Official Australia Day)	Sun	27 Jan	Sun	
27 Jan (Australia Day Public Holiday)	Mon	28 Jan (Australia Day Public Holiday)	Mon	Matched day of week as Public Holiday falls on weekend
28 Jan	Tue	29 Jan	Tue	Matched day of week
...				
28 Feb	Fri	1 Mar	Fri	
29 Feb	Sat	2 Mar	Sat	Leap year extra day
1 Mar	Sun	3 Mar	Sun	Matched day of week
...				
8 Mar	Sun	10 Mar	Sun	
9 Mar (Adelaide Cup Day)	Mon	11 Mar (Adelaide Cup Day)	Mon	Matched day of week for Public Holiday
10 Mar	Tue	12 Mar	Tue	Matched day of week
...				
9 Apr	Thu	11 Apr	Thu	
10 Apr (Good Friday)	Fri	19 Apr (Good Friday)	Fri	Matched Public Holiday
11 Apr (Easter Saturday)	Sat	20 Apr (Easter Saturday)	Sat	
12 Apr (Easter Sunday)	Sun	21 Apr (Easter Sunday)	Sun	
13 Apr (Easter Monday)	Mon	22 Apr (Easter Monday)	Mon	
14 Apr	Tue	16 Apr	Tue	Matched day of week
...				
22 Apr	Wed	24 Apr	Wed	
23 Apr	Thu	18 Apr	Thu	Matched day of week, but not Anzac Day 2019
24 Apr	Fri	26 Apr	Fri	Matched day of week
25 Apr (Anzac Day)	Sat	27 Apr	Sat	Matched day of week as Anzac Day 2020 fell on weekend
26 Apr	Sun	28 Apr	Sun	Matched day of week
...				
7 Jun	Sun	9 Jun	Sun	
8 Jun (Queen's Birthday)	Mon	10 Jun (Queen's Birthday)	Mon	Matched day of week for Public Holiday
9 Jun	Tue	11 Jun	Tue	

...					
4 Oct	Sun		6 Oct	Sun	Matched day of week
05 Oct (Labour Day)	Mon	7 Oct (Labour Day)		Mon	Matched day of week for Public Holiday
6 Oct	Tue		8 Oct	Tue	Matched day of week
...					
22 Dec	Tue		24 Dec	Tue	
23 Dec	Wed		23 Dec	Mon	Matched date for Christmas period
24 Dec (Christmas Eve)	Thu	24 Dec (Christmas Eve)		Tue	Matched Public Holiday
25 Dec (Christmas Day)	Fri	25 Dec (Christmas Day)		Wed	
26 Dec (Proclamation Day)	Sat	26 Dec (Proclamation Day)		Thu	
27 Dec	Sun		27 Dec	Fri	Matched date for end of year period
28 Dec	Mon		28 Dec	Sat	
29 Dec	Tue		29 Dec	Sun	
30 Dec	Wed		30 Dec	Mon	
31 Dec (New Year's Eve)	Thu	31 Dec (New Year's Eve)		Tue	Matched Public Holiday

2.5 Date selection for COVID-19 focus periods

The periods to be analysed in this report include the whole of 2020, periods that were specifically affected by the COVID-19 pandemic restrictions, and periods that were not. To determine periods that were affected by the pandemic, a criterion was devised using the change in traffic volumes (which will be analysed in the following Section) and a selected threshold. A COVID-19 period was defined as *a period in which the traffic volume changed by more than 20% of the average of the previous two years for more than two consecutive days (using the matching dates method)*. There were two periods in 2020 where this occurred, and the dates for each are shown in Table 2.4. The second COVID-19 period had the same dates as the state-wide 3-day lockdown in November. Throughout the analyses in this report, the 'non-COVID' period refers to the dates throughout 2020 which were not included in the COVID-19 periods. The results of the non-COVID periods can be compared to the COVID-19 periods.

Table 2.4
Dates of COVID-19 periods

COVID-19 period	Start date	End date	Duration
First	21 March 2020	10 May 2020	51 days
Second	20 November 2020	22 November 2020	3 days
Non-COVID			312 days

3 Traffic volumes

Data collected by the Addinsight system SCATS counters provided a detailed long-term measure of traffic volumes in South Australia. SCATS counters use induction loops installed mainly at signalised intersections and count all vehicles that pass over them. There were 874 sites where SCATS counters had been installed in South Australia (see Figure 3.1). At each site there could be multiple counters installed. There was a total of 9,589 counters across the 874 sites, resulting in an average of around 11 counters per site. There were 9,314 counters in the Adelaide metropolitan area and 275 counters in rural areas (outside Adelaide). The two areas were defined using an Adelaide metropolitan boundary defined by the Australia Bureau of Statistics as shown in Figure 3.1 where the yellow zone indicates the Adelaide Metropolitan area.

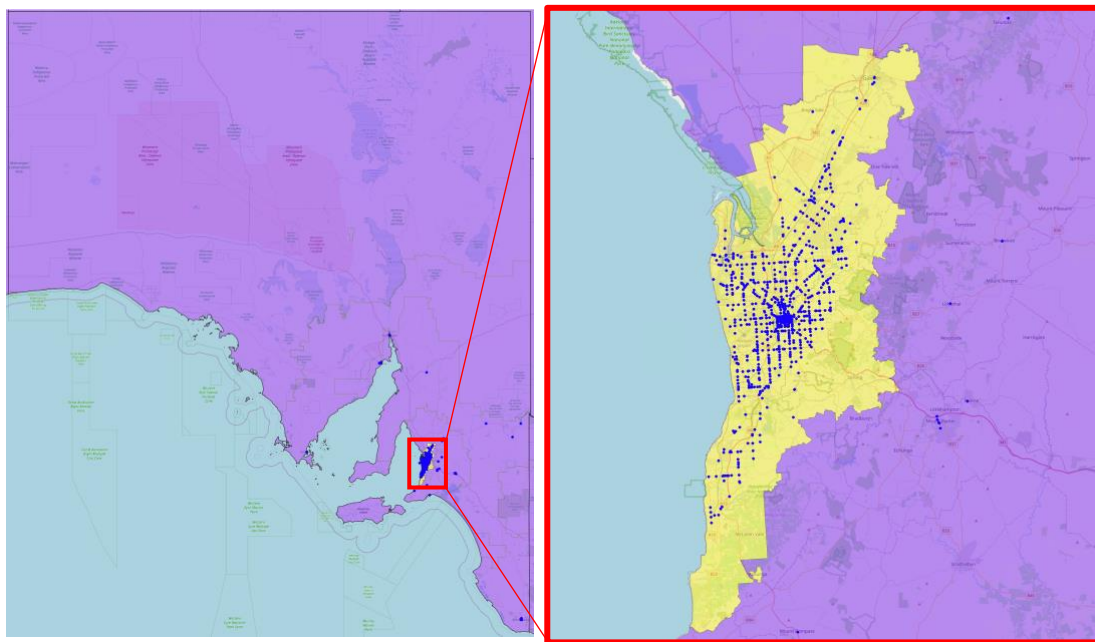


Figure 3.1
Locations of SCATS sites in South Australia and metropolitan boundary
(right-side figure is zoomed into metropolitan Adelaide)

Daily traffic volume numbers, summed across all counters in South Australia, were extracted from the SCATS system for all days in 2018, 2019 and 2020. The extracted data was also disaggregated into metropolitan and rural categories.

It was not practical to examine the traffic volumes at individual sites over the time period considered. As such, it was not possible to identify, or correct for, sites that may have been experiencing malfunctions or the addition of new sites over time. However, some ad-hoc examination of the available data suggested that malfunctioning sites were rare and that very few new sites have been added over time. This suggests that the SCATS data provides a relatively consistent measure of traffic volumes in South Australia over time.

Daily traffic volume numbers, summed across all counters, for each day in 2018, 2019 and 2020 are shown in Figure 3.2. An obvious weekly pattern is evident in which the volumes are higher on weekdays and lower on weekends. The average traffic volume on a weekday was between 40% and 60% greater than the average weekend day.

A large drop in traffic volumes from mid-March 2020 to mid-June 2020 and another large drop in mid-November 2020 coincide with the COVID-19 restrictions in South Australia.

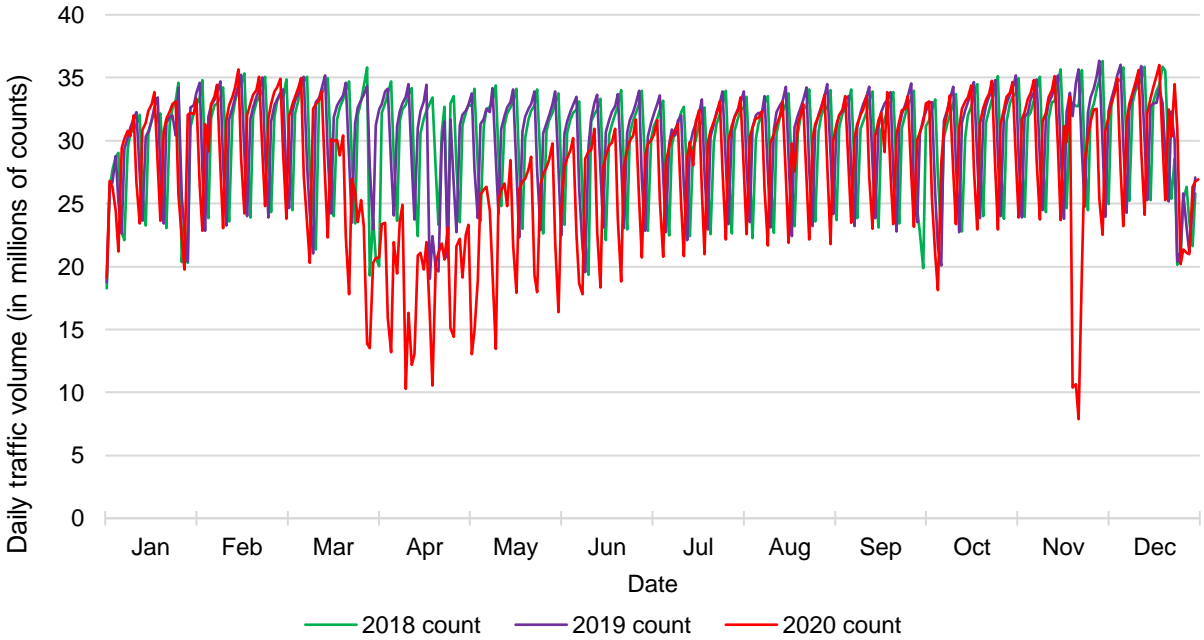


Figure 3.2
Total traffic volume counts for each day in 2018, 2019 and 2020

3.1 7-day average analysis

Figure 3.3 shows the 7-day averages for the daily total traffic volumes in 2018, 2019 and 2020. Public holidays in each year were associated with reductions in overall traffic volumes and have been highlighted. As some of the public holidays did not take place on the same calendar date in each year, there are some offsets for the effects in different years.

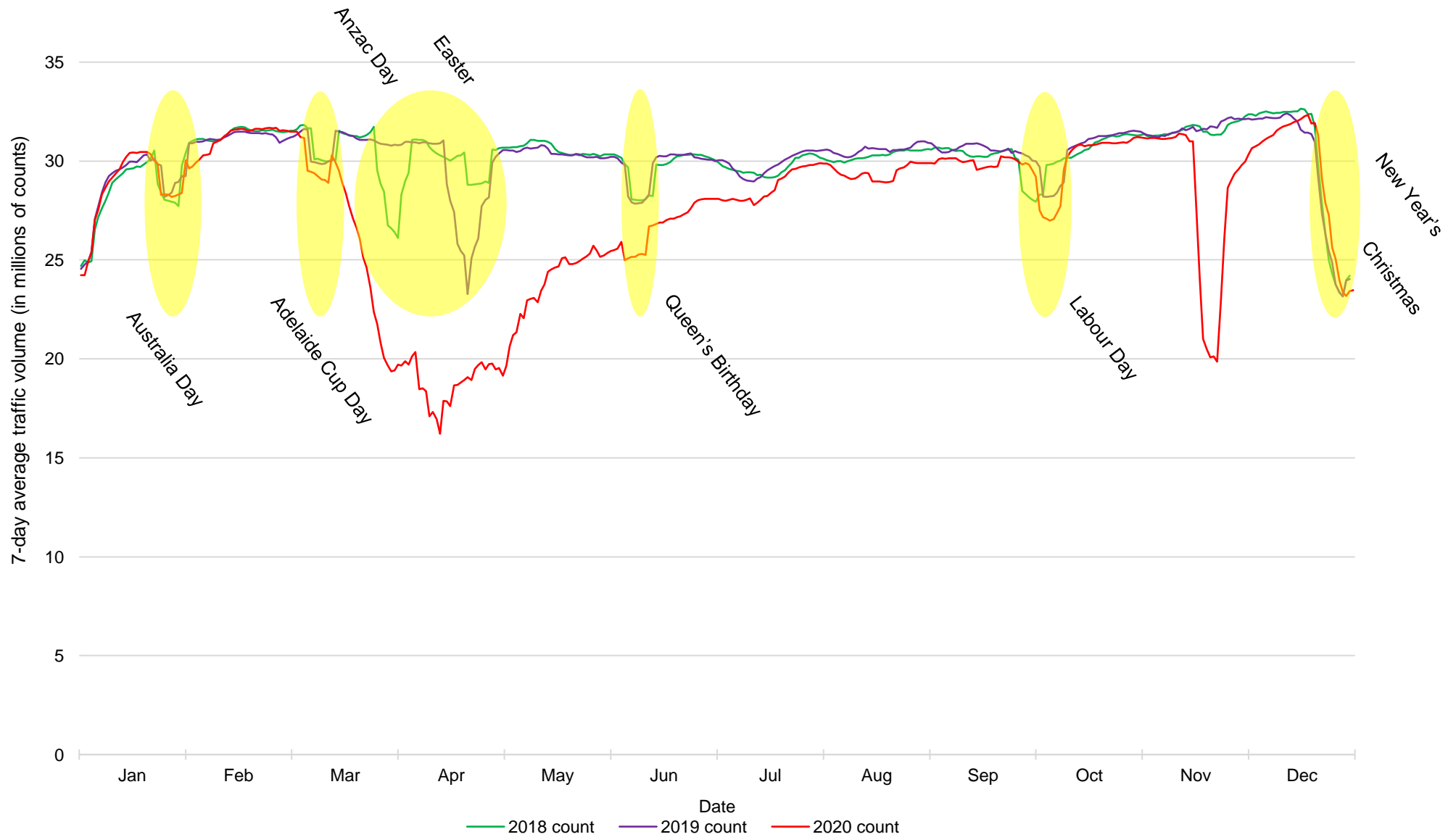


Figure 3.3
7-day average total traffic volume data for 2018, 2019, 2020 with public holidays highlighted

3.2 Matched dates analysis

The matched dates analysis was performed on the daily traffic volumes in 2020, comparing each date in the year to the average of each 2018 and 2019 matched dates. For example, 4 January 2020 had matched dates of 5 January 2019 and 6 January 2018, based on the day of week of each of the dates (all on a Saturday). The traffic volume on 4 January 2020 was 102% of the average of the traffic volumes on 5 January 2019 and 6 January 2018. The results of this matched dates comparison process are shown in Figure 3.4 with the COVID-19 periods highlighted.

A large reduction in traffic volumes is evident from mid-March 2020 through to July 2020, while another large drop is apparent in mid-November 2020.

The data were also analysed separately for metropolitan and rural areas, with the results shown in Figure 3.5 along with the COVID-19 periods.

Interestingly, rural traffic volumes returned to normal levels around June, while metropolitan traffic volumes took until September to return to normal levels. There was also a consistent increase in traffic volumes in rural areas from mid-October through to mid-December, where the average traffic volume was up 10% on previous years. Just before the second COVID-19 period (3-day state-wide lockdown), a 37% increase in rural traffic volumes was observed.

The very low number of vehicles recorded by rural counters on 28 March 2020 appears to be a malfunction in the data collection system as it was isolated to just a single day.

3.3 Traffic volume results

Over the whole of 2020 (taking the leap year into account), average traffic volumes decreased by 8.5% from the average of 2018 and 2019. Using the matched dates method, average traffic volumes in the first COVID-19 period decreased by 34.7%, and average traffic volumes decreased by 57.0% in the second COVID-19 period. These results, as well as those disaggregated by metropolitan and rural, and non-COVID periods are shown in Table 3.1.

Table 3.1
Changes in traffic volumes for 2020 (compared to average of 2018 and 2019)

Timeframe	Change in traffic volume
2020	-8.5%
2020 (metropolitan only)	-8.6%
2020 (rural only)	-2.8%
First COVID-19 period – 21 Mar to 10 May	-33.8%
First COVID-19 period (metropolitan only)	-34.0%
First COVID-19 period (rural only)	-24.2%
Second COVID-19 period – 20 Nov to 22 Nov	-57.0%
Second COVID-19 period (metropolitan only)	-57.3%
Second COVID-19 period (rural only)	-39.9%
Non-COVID periods	-4.2%
Non-COVID periods (metropolitan only)	-4.3%
Non-COVID periods (rural only)	+0.8%

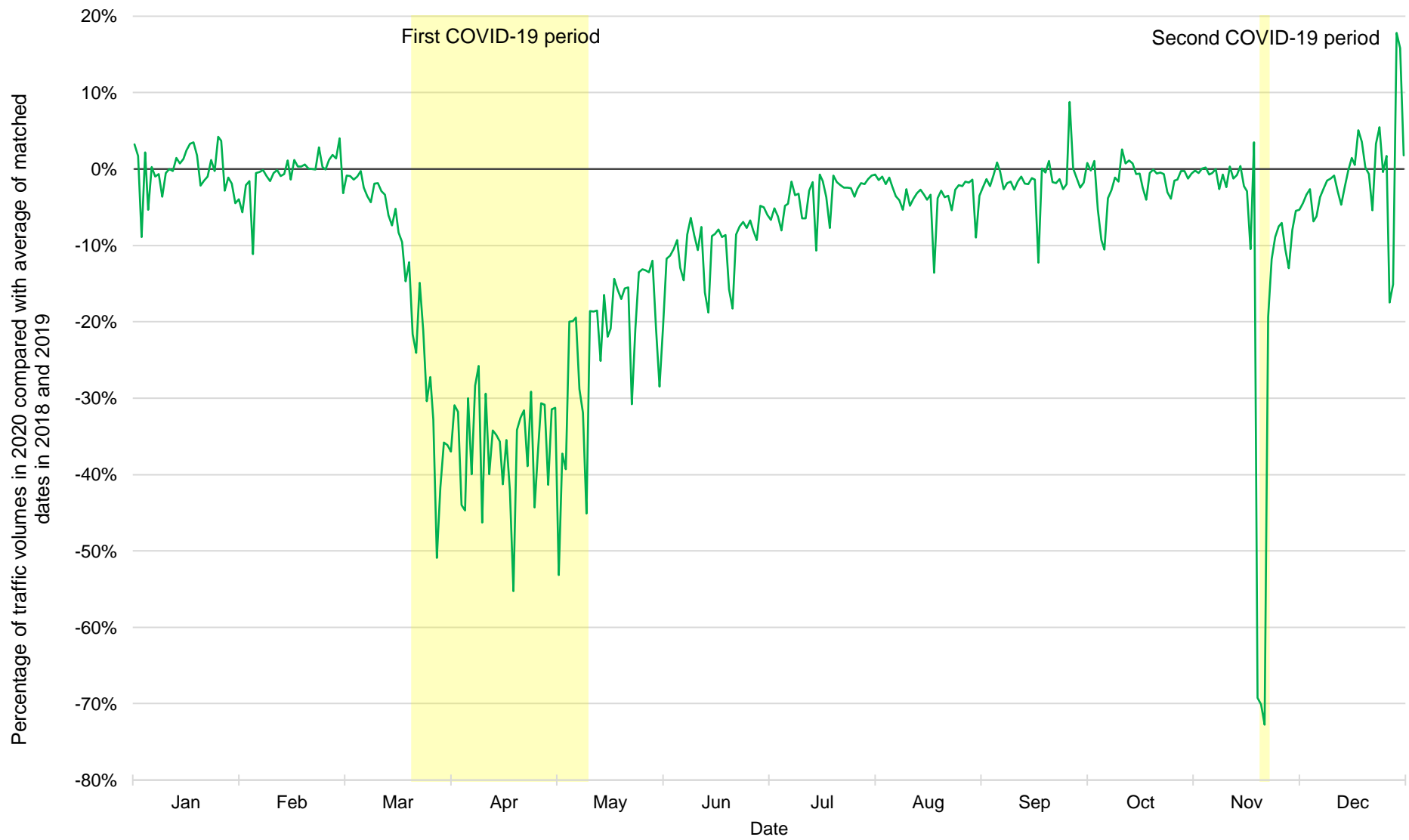


Figure 3.4
 Traffic volumes in 2020 compared with average of matched dates in 2018 and 2019

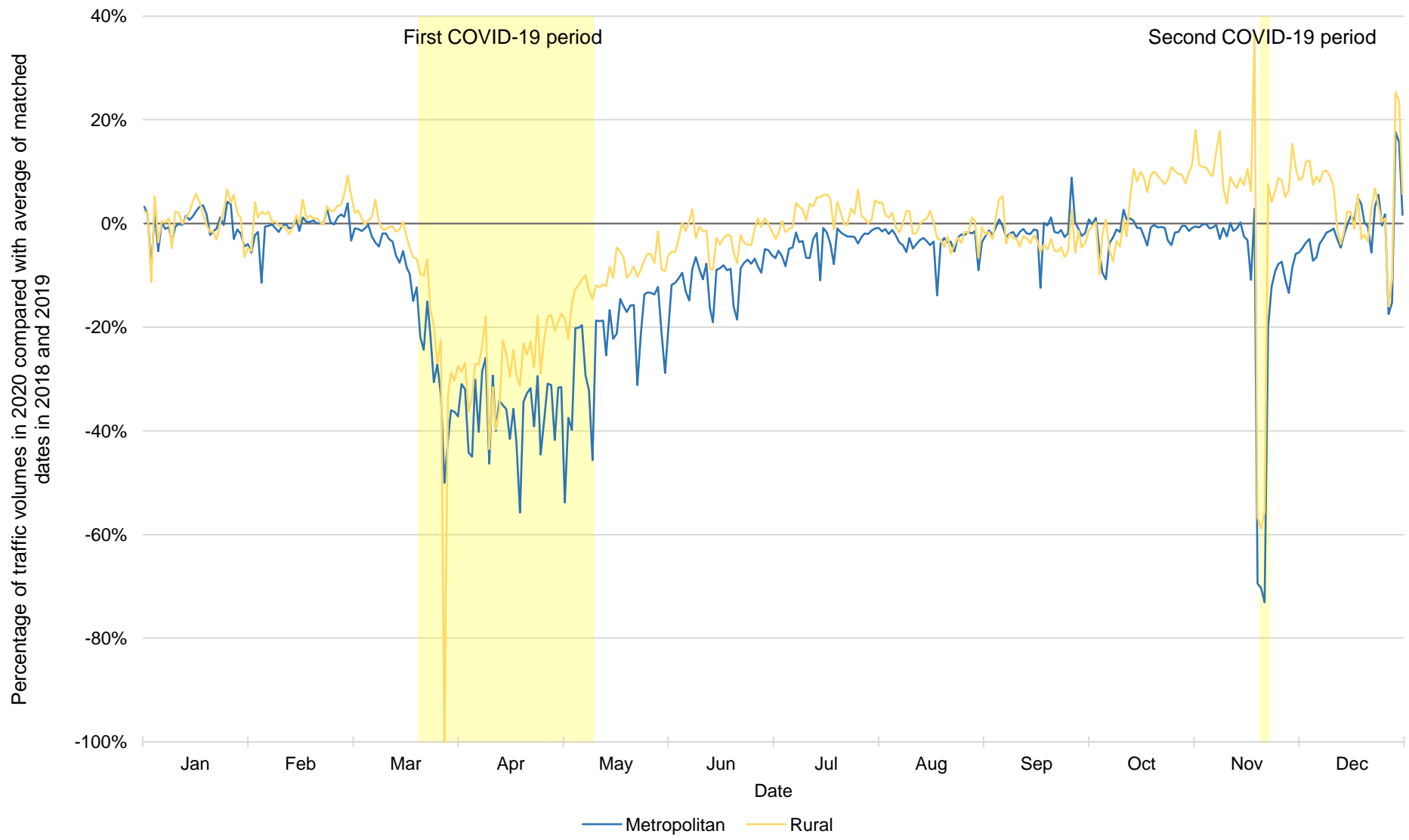


Figure 3.5
 Traffic volumes in 2020 compared with average of matched dates in 2018 and 2019, split by metropolitan and rural areas

4 Traffic speeds

The Addinsight Traffic Intelligence System also uses roadside detectors to identify Wi-Fi or Bluetooth addresses emitted by electronic devices in vehicles (such as in-vehicle entertainment systems). When a single Wi-Fi or Bluetooth address is detected at two detection locations, the average speed of the vehicle can be calculated using the timestamps of the detections and the known distance between the locations.

Sections of road with a known length and sensors at each end form Links in the Addinsight network. There were 3,385 defined Links in South Australia, ranging in length from 69 metres to 186 kilometres. Downloading individual Link data was a computationally and time intensive process, so only Links with a length of between two and four kilometres were downloaded for analysis, and for the years of 2019 and 2020 only. This resulted in 184 Links with 98 of those having complete data for the whole of 2019 and 2020 (i.e. no repair or malfunction periods). The locations of the 98 Links that were used to analyse traffic speeds are shown in Figure 4.1.

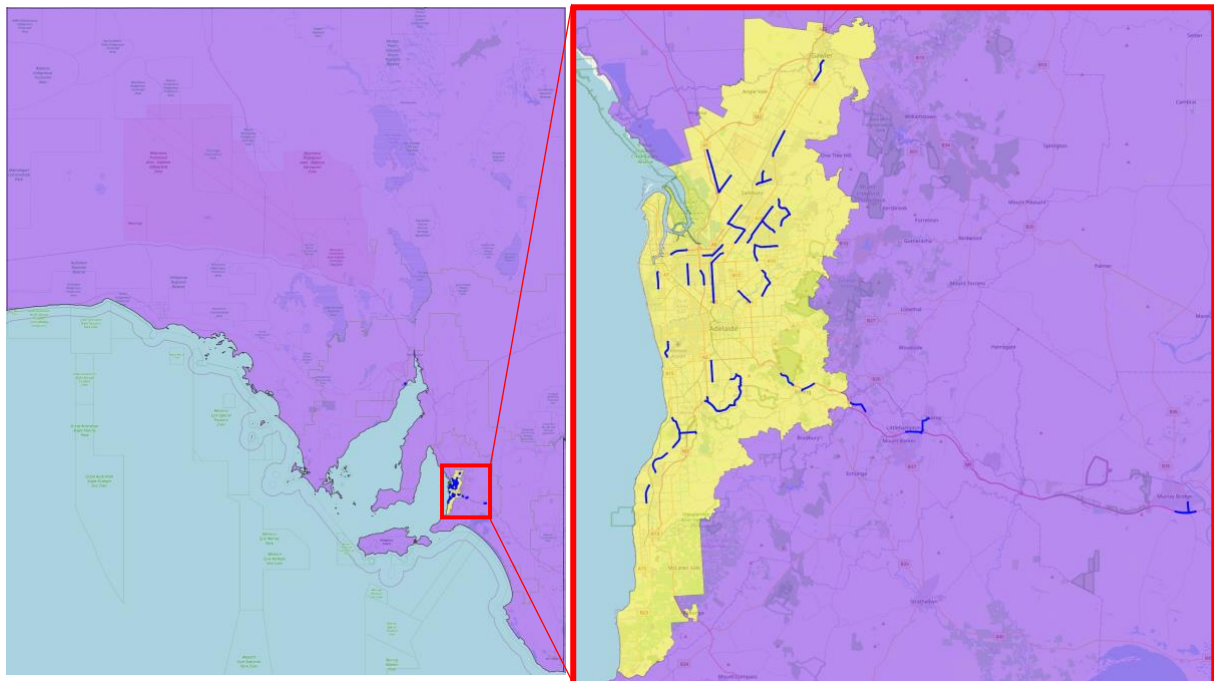


Figure 4.1
Locations of Links across South Australia (right-side figure is zoomed in to metropolitan Adelaide)

Twelve of the Links were in rural areas (as classified previously) and 86 of the Links were in the Adelaide metropolitan area.

The state-wide daily average traffic speeds in 2019 and 2020 are shown in Figure 4.2. Weekly patterns were evident with traffic speed on weekends around 3% to 10% higher than on weekdays.

Note that for all traffic speed related graphs in this report, the Y-axes have not started at zero to allow small changes to be more obvious.

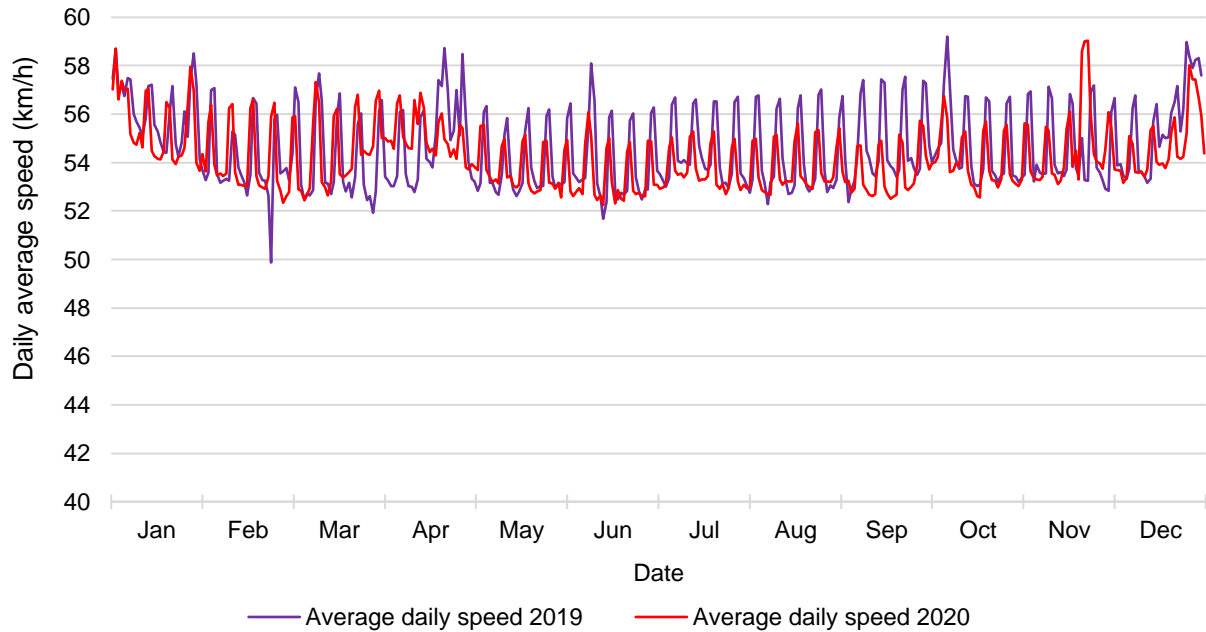


Figure 4.2
State-wide daily average traffic speeds in 2019 and 2020

The 7-day average speeds for 2019 and 2020 are shown in Figure 4.3. Generally, when a public holiday occurred, there was an increase in average speed compared to other similar periods.

The results of the matched dates process, comparing average speeds in 2020 to average speeds in 2019 is shown in Figure 4.4. During the first COVID-19 period, the changes in average traffic speeds were subtle compared to the decreases in traffic volumes. However, in late April 2019, there was a large increase in traffic speeds due to the Easter period (shown in Figure 4.3), which may have slightly concealed an increase in average travel speed. During the second COVID-19 period, a large increase in average traffic speed was evident.

The results of the matched dates analysis split for rural and metropolitan areas are shown in Figure 4.5. There was a noticeable, and sustained, drop in average speeds in rural areas from the beginning of April 2020.

4.1 Traffic speed results

A reduction in overall traffic speed of 0.7% was observed in 2020 compared to 2019. During the first COVID-19 period, there was a 0.7% increase in travel speed in 2020 compared to 2019 using the matching dates method, and during the second COVID-19 period, there was an 8.1% increase in travel speed in 2020. In the non-COVID periods, a reduction in overall traffic speed of 1.0% was observed in 2020 compared to 2019 using the matching dates method. Table 4.1 shows these results, along with the results from the metropolitan and rural split.

Table 4.1
Changes in traffic speed for 2020 (compared to 2019)

Timeframe	Change in traffic speed
2020	-0.7%
2020 (metropolitan only)	-0.1%
2020 (rural only)	-4.4%
First COVID-19 period – 21 Mar to 10 May	+0.7%
First COVID-19 period (metropolitan only)	+1.5%
First COVID-19 period (rural only)	-5.1%
Second COVID-19 period – 20 Nov to 22 Nov	+8.1%
Second COVID-19 period (metropolitan only)	+8.8%
Second COVID-19 period (rural only)	+0.3%
Non-COVID periods	-1.0%
Non-COVID periods (metropolitan only)	-0.5%
Non-COVID periods (rural only)	-4.3%

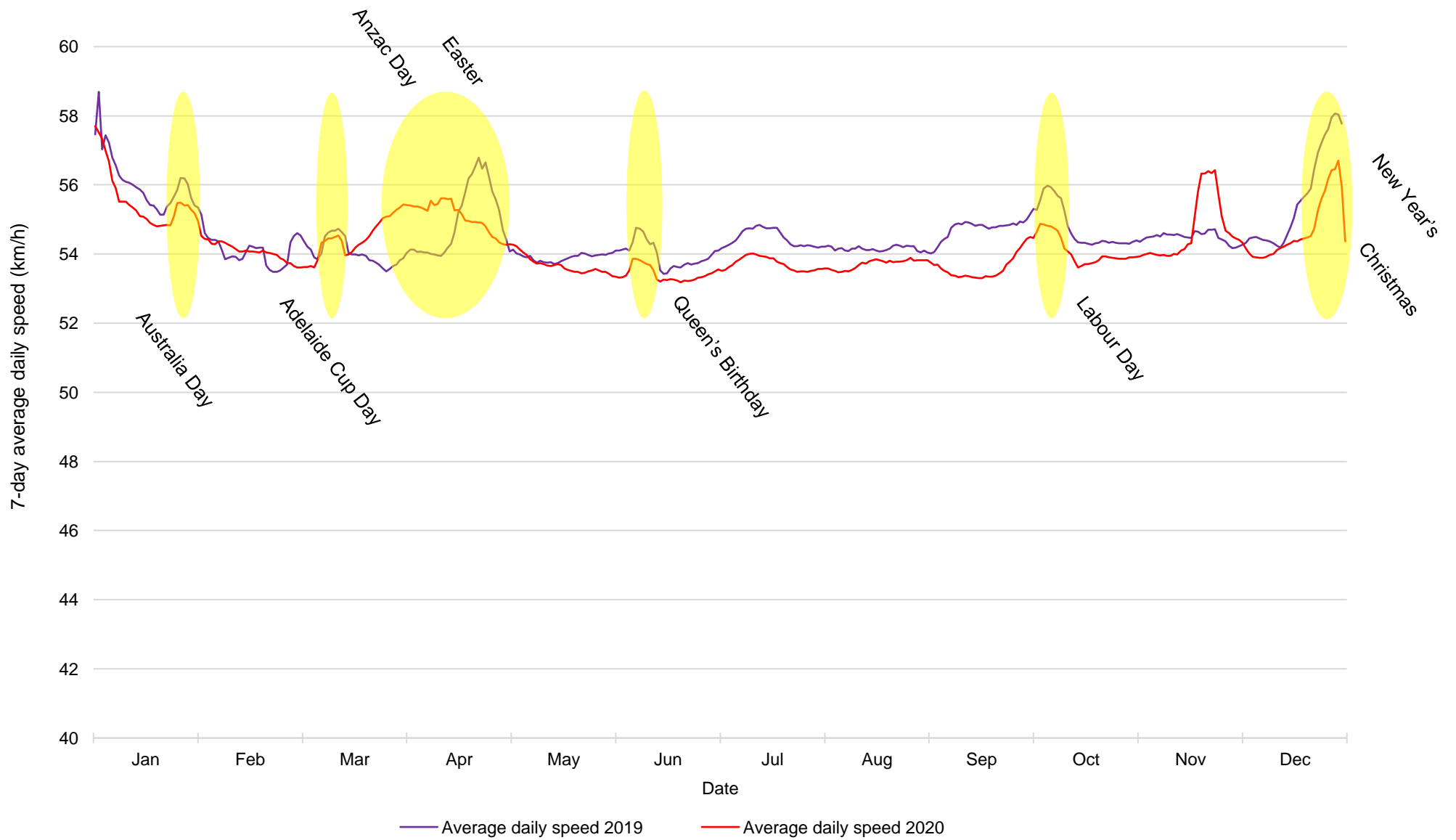


Figure 4.3
7-day average traffic speeds in 2019 and 2020

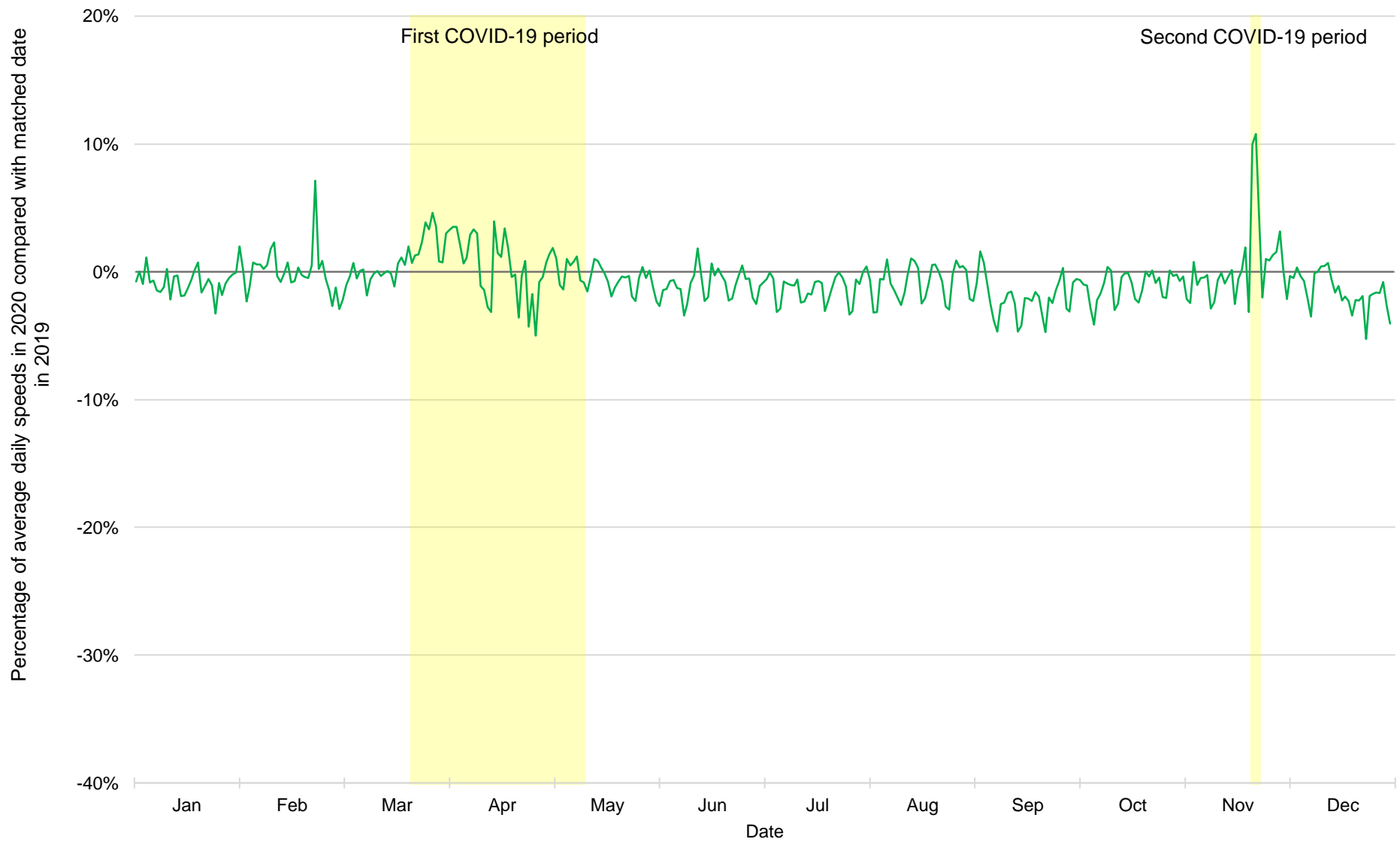


Figure 4.4
Daily traffic speeds in 2020 compared with matched date in 2019

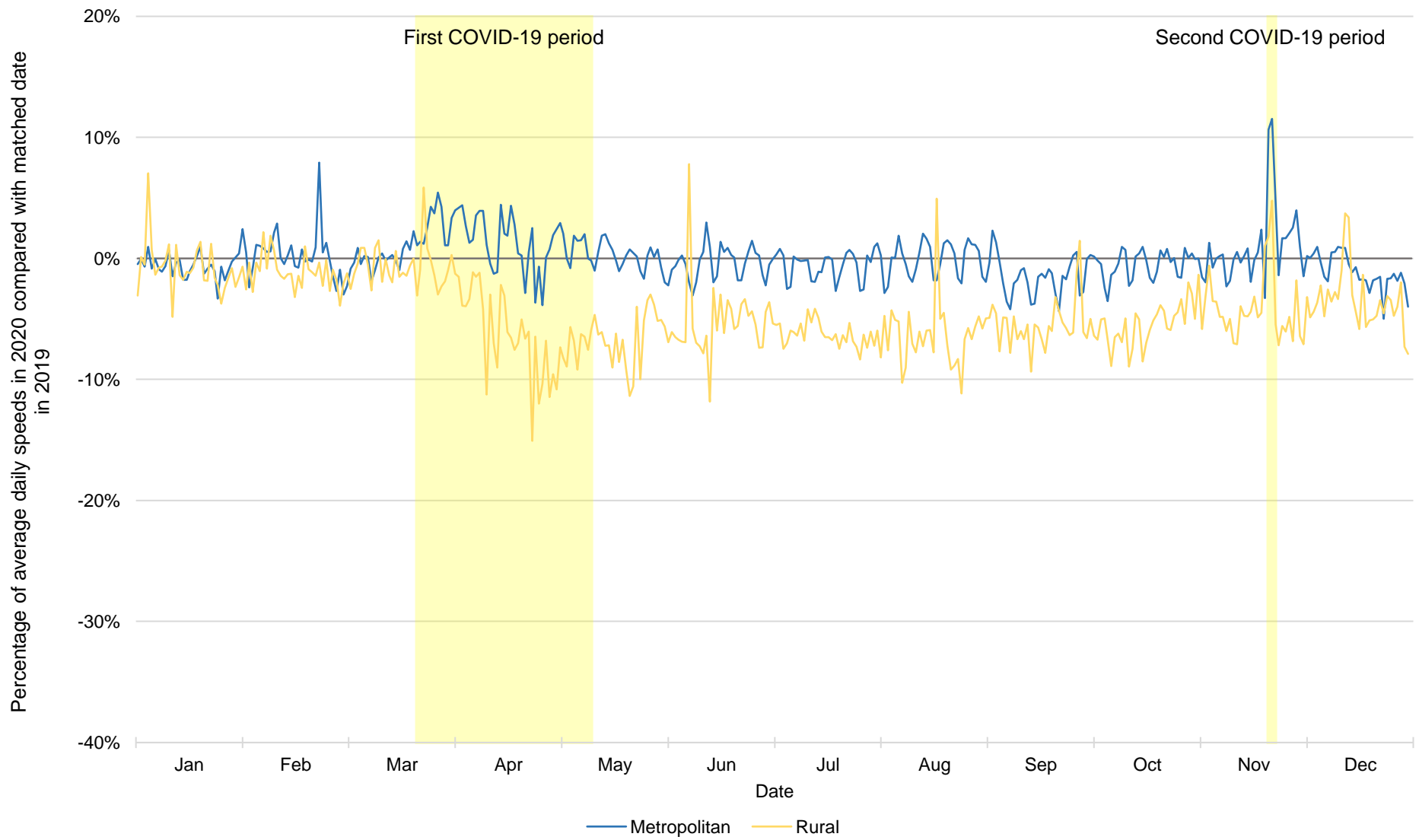


Figure 4.5
 Daily traffic speeds in 2020 compared with matched date in 2019, split by metropolitan and rural areas

5 Injury crashes

The South Australian Traffic Accident Reporting System (TARS) database was used to identify daily crashes during 2018-2020. Two categories of crashes were analysed: all injury crashes and fatal crashes in isolation. An injury crash was classified as a crash where at least one person sustained an injury classified with a severity rating of minor or greater.

5.1 All injury crashes

The daily number of injury crashes for the years 2018, 2019, and 2020 are shown in Figure 5.1. The low number of crashes on a given day means there is considerable day to day random variation in the numbers.

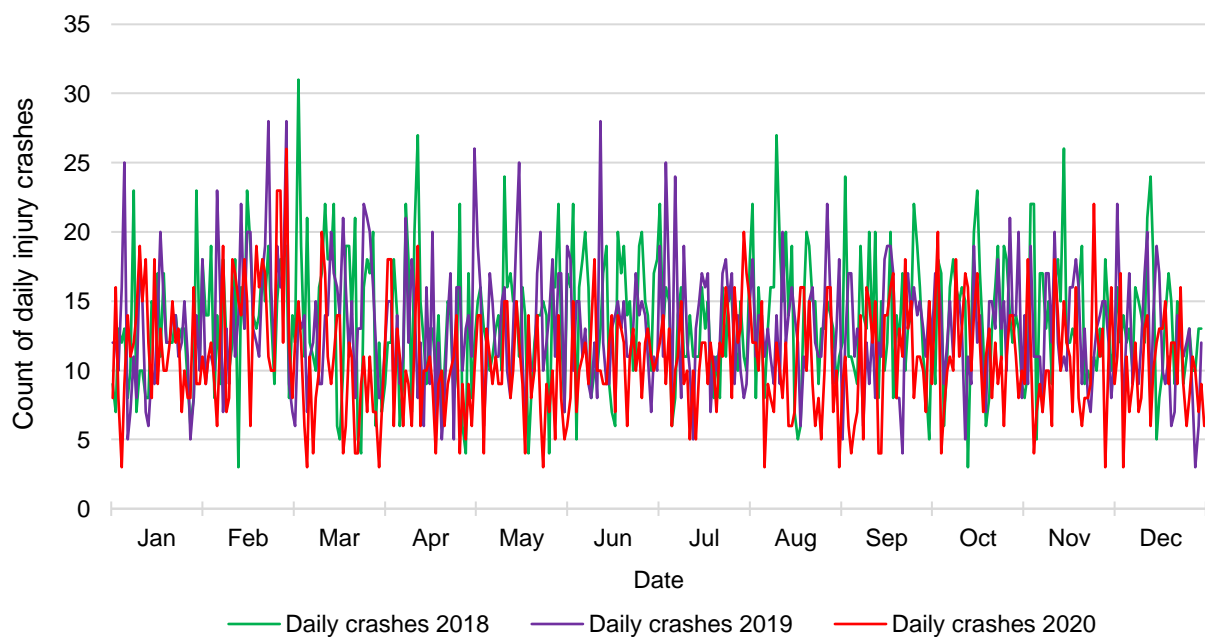


Figure 5.1
Daily injury crashes in South Australia 2018-2020

The matched dates method was used to compare daily injury crashes in 2020 to the average of those in 2018 and 2019, as shown in Figure 5.2. A 7-day filter was applied to the raw data after the matching process to provide a smoother line, which has been shown in black. There is a general trend of 2020 being lower than the average of 2018 and 2019 from March 2020 onwards.

Figure 5.3 shows the rural and Adelaide metropolitan daily injury crashes after applying a 7-day filter and using the matched dates process. The rural counts are more variable than the metropolitan counts due to the lower numbers of injury crashes in rural areas (on average 2.6 per day in 2020).

Over the whole of 2020, there was a decrease in injury crashes of 18.7% compared to the average of 2018 and 2019. Using purely the matched dates method (not using filtered data), injury crashes reduced by 28.1% in the first COVID-19 period and reduced by 24.1% in the second COVID-19 period. Throughout the non-COVID periods, using the matching dates method, injury crashes reduced by 17.0% in 2020 compared to the average of 2018 and 2019. The results for changes in injury crashes are shown in Table 5.1.

Table 5.1
Changes in injury crashes for 2020 (compared to average of 2018 and 2019)

Timeframe	Change in traffic injury crashes
2020	-18.7%
2020 (metropolitan only)	-20.0%
2020 (rural only)	-14.4%
First COVID-19 period – 21 Mar to 10 May	-28.1%
First COVID-19 period (metropolitan only)	-31.7%
First COVID-19 period (rural only)	-18.0%
Second COVID-19 period – 20 Nov to 22 Nov	-24.1%
Second COVID-19 period (metropolitan only)	-36.6%
Second COVID-19 period (rural only)	+5.9%*
Non-COVID periods	-17.0%
Non-COVID periods (metropolitan only)	-18.1%
Non-COVID periods (rural only)	-13.2%

*less than 10 rural crashes per year in the second COVID-19 period

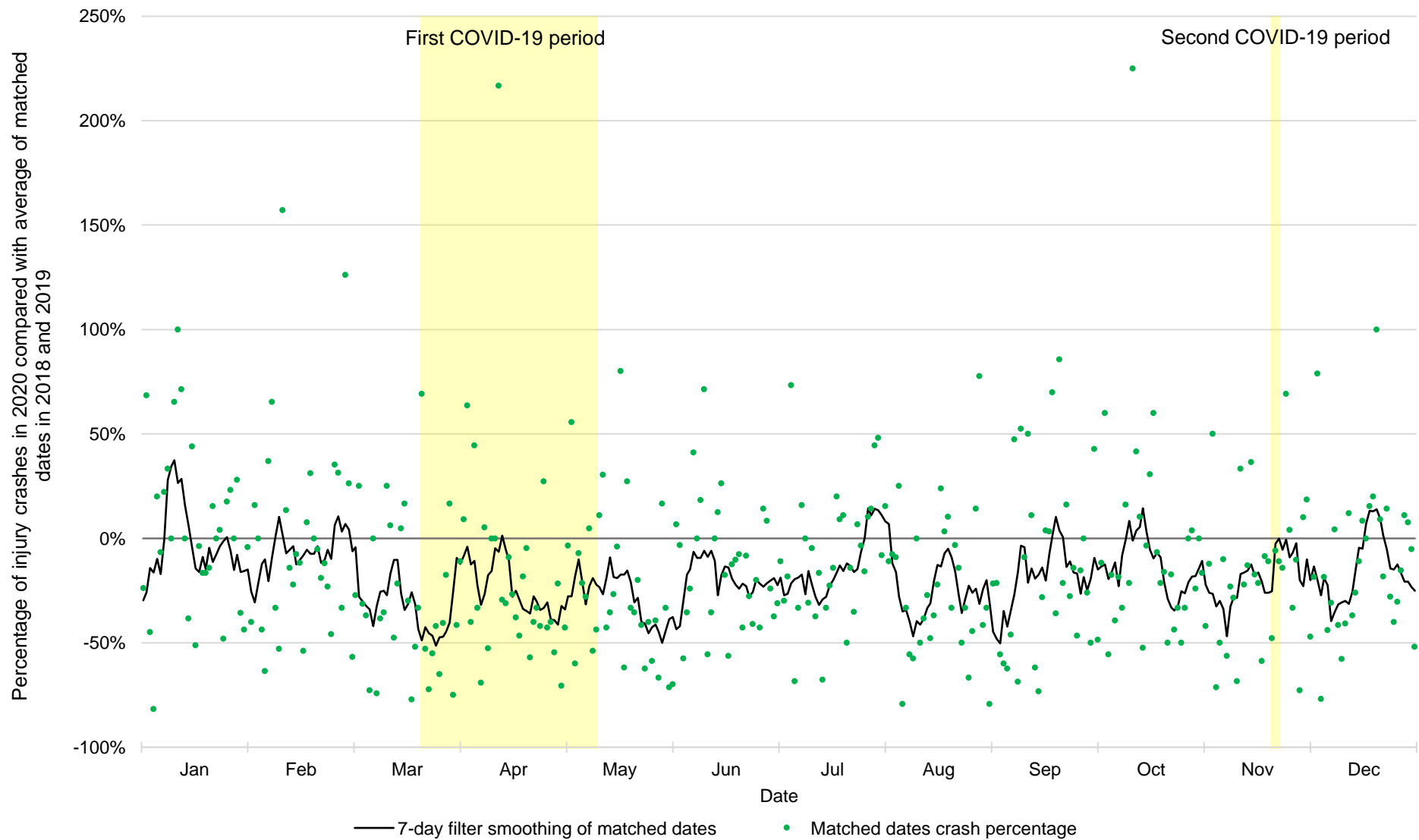


Figure 5.2
 Injury crashes in 2020 compared with average of matched dates in 2018 and 2019, with 7-day filter

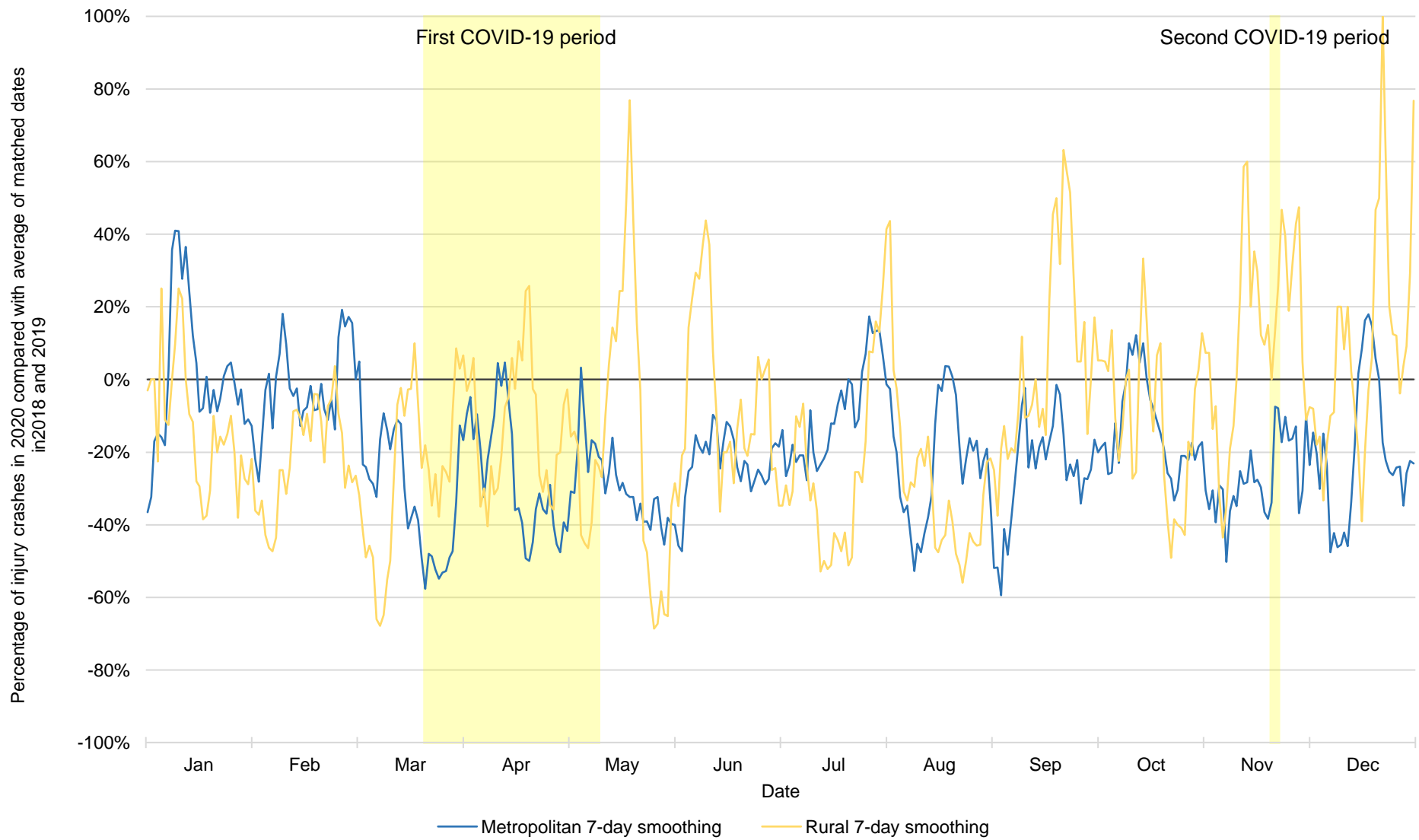


Figure 5.3
 Injury crashes in 2020 compared with average of matched dates in 2018 and 2019 (7-day filter) split by metropolitan and rural areas

5.2 Fatal crashes

In 2018 there were 75 fatal crashes, in 2019 there were 110 fatal crashes, and in 2020 there were 85 fatal crashes. The distribution of fatal crashes for each month for each year is shown in Figure 5.4.

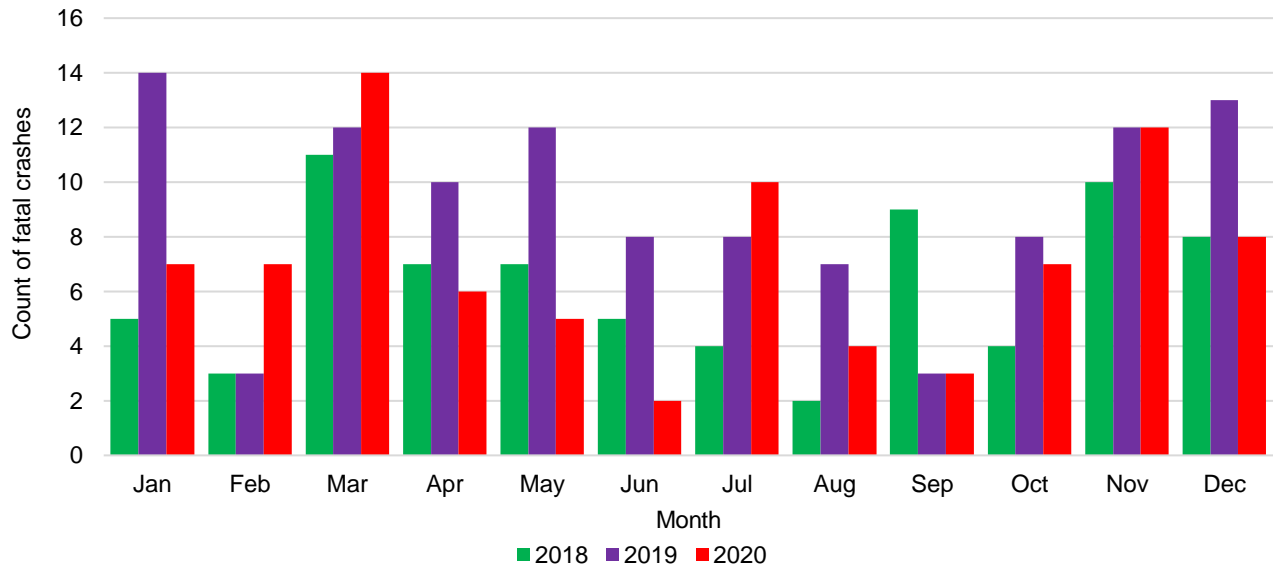


Figure 5.4
Fatal crashes for 2018 to 2020, distributed by month of crash

Throughout the first COVID-19 period, there were 12 fatal crashes throughout South Australia in 2020 compared to 11 and 17 in 2018 and 2019 respectively. During the second COVID-19 period, there were no fatal crashes in 2020, compared to one and three in 2018 and 2019 respectively. Although interesting, the numbers are too small to suggest meaningful results. Nonetheless, they are presented below in Table 5.2.

Table 5.2
Fatal crash statistics in South Australia

Fatal crashes	2018	2019	2020
Year total	75	110	85
First COVID-19 period – 21 Mar to 10 May	11	17	12
Second COVID-19 period – 20 Nov to 22 Nov	1	3	0

6 Discussion

This report has outlined a methodology to compare traffic statistics of 2020 to those of 2018 and 2019 in order to determine the effects of the COVID-19 pandemic on traffic in South Australia. A 'matching dates' process allowed an acceptable comparison between years, accounting for the effects due to public holidays and asynchronous days of week (i.e., Sunday, Monday, Tuesday, etc.). Two COVID-19 periods were determined, in which the traffic volumes decrease by more than 20% of the typical traffic volume and these were analysed individually. The traffic volumes, speeds and injury crashes were analysed in metropolitan and rural areas, both combined and separately. A summary of the results from the analyses is presented in Table 6.1.

For the whole of 2020, an 8.5% reduction in traffic volumes was observed compared to the average of 2018 and 2019, a 0.7% decrease in average traffic speeds was observed compared to 2019, and a 18.7% reduction in injury crashes was observed compared to the average of 2018 and 2019. During the first COVID-19 period, a reduction of 33.8% in traffic volume corresponded with a 0.7% increase in traffic speeds and a reduction in injury crashes of 28.1%. In the second COVID-19 period, a large reduction of 57.0% corresponded to an increase of 8.1% in traffic speeds and a reduction in injury crashes of 24.1%. Smaller changes were observed during the non-COVID periods of 2020, with a 4.2% reduction in traffic, a 1.0% reduction in average traffic speed and a reduction of 17.0% in injury crashes.

Table 6.1
Changes in traffic volume, speed, and injury crashes for 2020 (compared to 2018 and 2019)

Timeframe	Change in traffic volume	Change in traffic speeds	Change in traffic injury crashes
2020	-8.5%	-0.7%	-18.7%
2020 (metropolitan only)	-8.6%	-0.1%	-20.0%
2020 (rural only)	-2.8%	-4.4%	-14.4%
First COVID-19 period – 21 Mar to 10 May	-33.8%	+0.7%	-28.1%
First COVID-19 period (metropolitan only)	-34.0%	+1.5%	-31.7%
First COVID-19 period (rural only)	-24.2%	-5.1%	-18.0%
Second COVID-19 period – 20 Nov to 22 Nov	-57.0%	+8.1%	-24.1%
Second COVID-19 period (metropolitan only)	-57.3%	+8.8%	-36.6%
Second COVID-19 period (rural only)	-39.9%	+0.3%	+5.9%**
Non-COVID periods	-4.2%	-1.0%	-17.0%
Non-COVID periods (metropolitan only)	-4.3%	-0.5%	-18.1%
Non-COVID periods (rural only)	+0.8%	-4.3%	-13.2%

**less than 10 rural crashes per year in the second COVID-19 period

Intuitively, it is reasonable to hypothesise a reduction in traffic volume may lead to an increase in traffic speeds as there would be less congestion and less traffic for vehicles to manoeuvre around. This type of effect was not observed across 2020 as a whole. Conversely, during the specific COVID-19 periods, reductions in traffic volumes were accompanied by increases in traffic speeds.

It may also be reasonable to hypothesise a reduction in traffic volume would lead to a reduction in injury crashes as there would be fewer vehicles on the road and fewer other vehicles to collide with. Although, a counter argument could reason that an increase in traffic speeds due to lower traffic volumes could lead to more injury crashes. While external factors were not controlled for, a reduction in traffic volumes throughout 2020 corresponded to a general decrease in injury crashes despite the increases in traffic speeds.

One limitation of this study was that the process of downloading individual Link data was a computationally and time intensive process, which prevented the extraction of all possible Links for the whole of 2019 and 2020. This affected the average rural traffic speeds as there were only ten rural Links

identified and analysed. The speed data, especially the rural speed data, should be interpreted with caution.

Given that further COVID-19 restrictions are occurring in South Australia in 2021 there would be value in repeating this study for 2021.

Acknowledgements

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The views expressed in this report are those of the authors and do not necessarily represent those of the University of Adelaide or the funding organisations.

Appendix A – Matched dates for 2018, 2019, and 2020

2020 date	2019 matched date	2018 matched date
1/01/2020	1/01/2019	1/01/2018
2/01/2020	2/01/2019	2/01/2018
3/01/2020	4/01/2019	5/01/2018
4/01/2020	5/01/2019	6/01/2018
5/01/2020	6/01/2019	7/01/2018
6/01/2020	7/01/2019	8/01/2018
7/01/2020	8/01/2019	9/01/2018
8/01/2020	9/01/2019	10/01/2018
9/01/2020	10/01/2019	11/01/2018
10/01/2020	11/01/2019	12/01/2018
11/01/2020	12/01/2019	13/01/2018
12/01/2020	13/01/2019	14/01/2018
13/01/2020	14/01/2019	15/01/2018
14/01/2020	15/01/2019	16/01/2018
15/01/2020	16/01/2019	17/01/2018
16/01/2020	17/01/2019	18/01/2018
17/01/2020	18/01/2019	19/01/2018
18/01/2020	19/01/2019	20/01/2018
19/01/2020	20/01/2019	21/01/2018
20/01/2020	21/01/2019	22/01/2018
21/01/2020	22/01/2019	23/01/2018
22/01/2020	23/01/2019	24/01/2018
23/01/2020	24/01/2019	25/01/2018
24/01/2020	25/01/2019	19/01/2018
25/01/2020	26/01/2019	27/01/2018
26/01/2020	27/01/2019	28/01/2018
27/01/2020	28/01/2019	28/01/2018
28/01/2020	29/01/2019	30/01/2018
29/01/2020	30/01/2019	31/01/2018
30/01/2020	31/01/2019	1/02/2018
31/01/2020	1/02/2019	2/02/2018
1/02/2020	2/02/2019	3/02/2018
2/02/2020	3/02/2019	4/02/2018
3/02/2020	4/02/2019	5/02/2018
4/02/2020	5/02/2019	6/02/2018
5/02/2020	6/02/2019	7/02/2018
6/02/2020	7/02/2019	8/02/2018
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27/02/2020	28/02/2019	1/03/2018
28/02/2020	1/03/2019	2/03/2018
29/02/2020	2/03/2019	3/03/2018
1/03/2020	3/03/2019	4/03/2018
2/03/2020	4/03/2019	5/03/2018
3/03/2020	5/03/2019	6/03/2018
4/03/2020	6/03/2019	7/03/2018

2020 date	2019 matched date	2018 matched date
5/03/2020	7/03/2019	8/03/2018
6/03/2020	8/03/2019	9/03/2018
7/03/2020	9/03/2019	10/03/2018
8/03/2020	10/03/2019	11/03/2018
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2/04/2020	4/04/2019	5/04/2018
3/04/2020	5/04/2019	6/04/2018
4/04/2020	6/04/2019	7/04/2018
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28/04/2020	30/04/2019	1/05/2018
29/04/2020	1/05/2019	2/05/2018
30/04/2020	2/05/2019	3/05/2018
1/05/2020	3/05/2019	4/05/2018
2/05/2020	4/05/2019	5/05/2018
3/05/2020	5/05/2019	6/05/2018
4/05/2020	6/05/2019	7/05/2018
5/05/2020	7/05/2019	8/05/2018
6/05/2020	8/05/2019	9/05/2018
7/05/2020	9/05/2019	10/05/2018

8/05/2020	10/05/2019	11/05/2018
9/05/2020	11/05/2019	12/05/2018
10/05/2020	12/05/2019	13/05/2018
11/05/2020	13/05/2019	14/05/2018
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13/05/2020	15/05/2019	16/05/2018
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31/05/2020	2/06/2019	3/06/2018
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4/06/2020	6/06/2019	7/06/2018
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7/07/2020	9/07/2019	10/07/2018
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10/07/2020	12/07/2019	13/07/2018
11/07/2020	13/07/2019	14/07/2018
12/07/2020	14/07/2019	15/07/2018
13/07/2020	15/07/2019	16/07/2018
14/07/2020	16/07/2019	17/07/2018

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14/09/2020	16/09/2019	17/09/2018
15/09/2020	17/09/2019	18/09/2018
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17/09/2020	19/09/2019	20/09/2018
18/09/2020	20/09/2019	21/09/2018
19/09/2020	21/09/2019	22/09/2018
20/09/2020	22/09/2019	23/09/2018

21/09/2020	23/09/2019	24/09/2018
22/09/2020	24/09/2019	25/09/2018
23/09/2020	25/09/2019	26/09/2018
24/09/2020	26/09/2019	27/09/2018
25/09/2020	27/09/2019	28/09/2018
26/09/2020	28/09/2019	29/09/2018
27/09/2020	29/09/2019	30/09/2018
28/09/2020	30/09/2019	8/10/2018
29/09/2020	1/10/2019	2/10/2018
30/09/2020	2/10/2019	3/10/2018
1/10/2020	3/10/2019	4/10/2018
2/10/2020	4/10/2019	5/10/2018
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20/10/2020	22/10/2019	23/10/2018
21/10/2020	23/10/2019	24/10/2018
22/10/2020	24/10/2019	25/10/2018
23/10/2020	25/10/2019	26/10/2018
24/10/2020	26/10/2019	27/10/2018
25/10/2020	27/10/2019	28/10/2018
26/10/2020	28/10/2019	29/10/2018
27/10/2020	29/10/2019	30/10/2018
28/10/2020	30/10/2019	31/10/2018
29/10/2020	31/10/2019	1/11/2018
30/10/2020	1/11/2019	2/11/2018
31/10/2020	2/11/2019	3/11/2018
1/11/2020	3/11/2019	4/11/2018
2/11/2020	4/11/2019	5/11/2018
3/11/2020	5/11/2019	6/11/2018
4/11/2020	6/11/2019	7/11/2018
5/11/2020	7/11/2019	8/11/2018
6/11/2020	8/11/2019	9/11/2018
7/11/2020	9/11/2019	10/11/2018
8/11/2020	10/11/2019	11/11/2018
9/11/2020	11/11/2019	12/11/2018
10/11/2020	12/11/2019	13/11/2018

11/11/2020	13/11/2019	14/11/2018
12/11/2020	14/11/2019	15/11/2018
13/11/2020	15/11/2019	16/11/2018
14/11/2020	16/11/2019	17/11/2018
15/11/2020	17/11/2019	18/11/2018
16/11/2020	18/11/2019	19/11/2018
17/11/2020	19/11/2019	20/11/2018
18/11/2020	20/11/2019	21/11/2018
19/11/2020	21/11/2019	22/11/2018
20/11/2020	22/11/2019	23/11/2018
21/11/2020	23/11/2019	24/11/2018
22/11/2020	24/11/2019	25/11/2018
23/11/2020	25/11/2019	26/11/2018
24/11/2020	26/11/2019	27/11/2018
25/11/2020	27/11/2019	28/11/2018
26/11/2020	28/11/2019	29/11/2018
27/11/2020	29/11/2019	30/11/2018
28/11/2020	30/11/2019	1/12/2018
29/11/2020	1/12/2019	2/12/2018
30/11/2020	2/12/2019	3/12/2018
1/12/2020	3/12/2019	4/12/2018
2/12/2020	4/12/2019	5/12/2018
3/12/2020	5/12/2019	6/12/2018
4/12/2020	6/12/2019	7/12/2018
5/12/2020	7/12/2019	8/12/2018
6/12/2020	8/12/2019	9/12/2018
7/12/2020	9/12/2019	10/12/2018
8/12/2020	10/12/2019	11/12/2018
9/12/2020	11/12/2019	12/12/2018
10/12/2020	12/12/2019	13/12/2018
11/12/2020	13/12/2019	14/12/2018
12/12/2020	14/12/2019	15/12/2018
13/12/2020	15/12/2019	16/12/2018
14/12/2020	16/12/2019	17/12/2018
15/12/2020	17/12/2019	18/12/2018
16/12/2020	18/12/2019	19/12/2018
17/12/2020	19/12/2019	20/12/2018
18/12/2020	20/12/2019	21/12/2018
19/12/2020	21/12/2019	22/12/2018
20/12/2020	22/12/2019	16/12/2018
21/12/2020	23/12/2019	17/12/2018
22/12/2020	24/12/2019	18/12/2018
23/12/2020	23/12/2019	19/12/2018
24/12/2020	24/12/2019	24/12/2018
25/12/2020	25/12/2019	25/12/2018
26/12/2020	26/12/2019	26/12/2018
27/12/2020	27/12/2019	27/12/2018
28/12/2020	28/12/2019	28/12/2018
29/12/2020	29/12/2019	29/12/2018
30/12/2020	30/12/2019	30/12/2018
31/12/2020	31/12/2019	31/12/2018