Evaluation Report

Mobility Data Project – Theme1

How telecommunications data can be used to improve disaster responses

Prepared by: Relational Insights Data Lab (RIDL), Griffith University

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[Insert Partner Organisation's Logo Here]

Queensland Government

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Acknowledgments

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Disclaimer

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1 Abstract

A nine-month pilot was conducted to determine the value of population mobility data for long-term all of government use if a streamlined enablement plan was explored. Five pilots were conducted by a consortium of government departments and associated bodies working together through three Queensland universities. The Queensland Fire and Emergency Services (QFES) and Griffith University were assigned theme 1, which focussed on improving disaster responses.

Utilising DSpark's proprietary telco-sources and anonymised mobility data, QFES and Griffith University's Relational and Insights Data Lab (RIDL) team undertook case studies to determine QFES data gaps and how DSpark mobility intelligence could fill them. The major challenge identified was that QFES had no quantifiable way to assess the movement of people in natural disasters and emergencies.

Working in conjunction with the DSpark data science team, the RIDL team developed a customised "Prepare-Respond" dashboard that geospatially quantified and visualised population movements for the Peregian Fires disaster in September 2019 and the March - May 2020 and 2021 COVID-19 lockdowns. Analysis definitively showed the movement of people in affected areas, lengths of stay, and how people responded to evacuation and lockdown orders. The pilot concluded that securely accessing DSpark data and developing predictive models would provide opportunities for QFES to make more informed, data-driven decisions to better prepare and respond to future emergencies.

2 Executive Summary

As part of a consortium established in 2021, Queensland Fire and Emergency Services (QFES) worked with Griffith University to pilot the application of mobility intelligence data to improve disaster responses. The goal of the pilot was to understand the long-term value of DSpark data to QFES and apply the learnings to a whole-of-government approach to data analytics.

At a departmental level, QFES identified the disaster response challenge of siloed and limited data availability across various government departments and civic organisations. Focusing on the unprecedented bushfire events of 2019 and the COVID-19 lockdowns, the pilot assessed whether DSpark could provide the missing link in QFES data to help quantify the movement of people in natural disasters and emergencies.

The Relational Insights and Design Lab (RIDL) from Griffith University took an innovative, co-design approach and built a customised dashboard that utilised DSpark's proprietary API, and ABS data. The dashboard visualises millions of geo-signals to provide up to date movements of people based on geographic location and time. The granularity of the data insights are showcased by the ability to filter by the smallest available ABS statistical area (SA1)[1], whether people are residents or visitors, and a time-lapse enabled heat map that shows the magnitude of movements over periods of the day.

Using frameworks from the Queensland Bushfires Review 2019-20, Queensland Bushfires State Recovery Plan 2019-2022 and DSpark's state-of-the-art algorithms, further analysis of dashboard observations revealed insights that showcased the practical utility of DSpark data in improving disaster responses.

The pilot demonstrated that DSpark mobility intelligence could fill gaps in QFES data by helping to:

- Quantify movements of disaster affected residents
- Determine the number of visitors in a disaster affected area
- Gauge effectiveness of emergency warnings and lockdown orders
- Develop evidence-based and data driven dashboards to inform decision making
- Provide deeper insights into routes people take and how far they travel in a disaster
- Determine the length of displacement and aid resource planning for disaster affected areas

Recommendations:

- Disaster management entities consider acquiring ongoing access to DSpark mobility data
- QFES develops an ongoing relationship with DSpark data scientists
- Explore predictive modelling tools for disaster management and planning
- Implement an audit of current data, staff access, tools and applications being used to avoid duplication across functional areas and departments
- Develop a standardised methodology and documentation process to allow for accurate interpretation and analysis of outputs
- Establish a rigorous security clearance protocol and register of DSpark and Government department staff with access to sensitive mobility intelligence and government data sets

[1] An SA1 is the smallest ABS statistical area covering a population of between 200 – 800 people.

3 Background

3.1 Introduction

The Queensland Government has identified that leveraging data as a strategic asset is increasingly important and has the potential to improve the management and effectiveness of service delivery across all departments and agencies. In 2020, the Government was confronted with managing the COVID-19 pandemic that saw Queensland borders closed to the world and subsequently the rest of Australia for the first time in 100 years. All across the world, the need to access population movement data became critical for managing the global pandemic. To address this challenge, Queensland Health engaged DSpark, Australia's leading mobility intelligence and insights provider to build an Epidemiology Tool that harnessed telecommunications data to inform evidence-based and data-driven responses to the evolving public health emergency.

Following the success of applying DSpark telecommunications data to the Government's pandemic response, the Government sought to explore how to unlock the value of telecommunications data analytics for the whole of government. This Mobility Data Project is one of the first steps towards that. The overarching aim of the project was to determine the value of DSpark population mobility data for long-term all-of-government use. The project brought together a consortium of government bodies and Queensland universities to pilot the use of telecommunications data in the following five areas:

1. Improved disaster responses, including monitoring COVID-19 restrictions and geographical responses to outbreaks
2. Monitor trends in road usage and traffic movements, including changes during and after the COVID-19 restrictions
3. Understanding movement changes due to COVID-19. Thus, having an impact on the risk of transmission of the virus and the impacts on infrastructure planning.
4. Understanding average activity levels of the population
5. Changes in tourism behaviours in response to COVID-19, and the impacts of transmission risk and infrastructure needs as well as local economies.

This report will focus on theme 1 which was assigned to Queensland Fire and Emergency Services (QFES). Due to the sheer volume of data available (1 December 2018 – 31 December 2021), a case study approach was undertaken to help focus the analysis. In order to address QFES' identified challenge of limited visibility of people movements during a disaster, the Relational Insights and Data Lab (RIDL) custom built a dashboard[2] that visualised the telecommunications data using heat maps and graphs to aid more efficient identification of movements and resource planning for disasters, and in particular, fire evacuations and lockdowns.

In addition, Appendix 1 provides a sample of the type of analysis DSpark can produce to help monitor and understand the movements of people during fires, floods, and pandemics. Overall, the pilot was a success and demonstrated that telecommunications data can be used to improve disaster responses. It is recommended that a streamlined enablement plan across all of government be enacted.

[2] QFES Prepare & Respond - Relational Insights Data Lab. Powered by DSpark. (shinyapps.io)

3.1.1 Research question(s)

The research question initially assigned to QFES was:

> *How telecommunications data can be used to improve disaster responses, including monitoring COVID-19 restrictions and geographical responses to outbreaks.*

In refining the scope of the evaluation, QFES expressed that their primary data challenge was quantifying movement in emergency situations. In addition, whilst COVID-19 lockdowns were topical, exploring how DSpark insights could be applied to assess the movement of people when evacuation orders are given would have greater operational application for the department. Taking this feedback onboard, RIDL in conjunction with DSpark produced a dashboard and analysis that utilised the 2019 Peregian Fires as the main case study. A prototype dashboard was also produced for COVID-19 lockdowns, and while some analysis conducted, the main focus of the report is the 2019 Peregian Springs Fire disaster.

To cater for this, the research question was adjusted to:

> *How telecommunications data can be used to improve disaster responses.*

The QFES' objective was to determine whether telecommunications data could improve disaster responses by addressing the challenge of quantifying the movement of people when an evacuation or lockdown order is given.

To further explore this, the following research sub-questions were also addressed:

1. Where do people go when an evacuation order is given?
2. How long do they take to respond?
3. How far do they travel?
4. What routes were travelled when the evacuation order was given?
5. How long does it take to analyse the data and is there a possibility of real-time application?

3.2 Methodology

The pilot was conducted in two stages and involved a high level of collaboration between Griffith University's RIDL team, QFES and DSpark. The quantitative analysis was experimental and began with RIDL exploring the DSpark data, familiarising the team with its dimensions, attributes, and developing Application Program Interface (API) queries and writing analysis and visualisation scripts.

In the initial access period, pre-written inquiries were submitted to DSpark Data Scientists to assess query logic and ensure the best approach was being used to address the research questions. Another crucial component of the research was establishing context for interpreting the results being pulled from the DSpark Application Program Interface (API). This second stage was comprised of quantitative and qualitative analysis conducted through mini case studies and desktop research. The case studies were guided by stakeholder engagement sessions with QFES and DSpark, ensuring that appropriate examples were chosen and that results were accurately interpreted within context.

3.2.1 Design

3.2.1.1 Engagement Model

The pilot parameters for API access were provided by DSpark and are briefly set out below:

- R and Python were the coding languages utilised
- API tokens were provided to each academic and government user
- User tokens were initially restricted to 2 weeks of data and limited to 10 queries per minute
- Longer time ranges required submission and were run by DSpark
- Query scheduled timing was required to ensure resource availability
- Invite only, virtual fortnightly review sessions were held for users with approved API keys

Data access was opened up to the full range and capability for the researchers from July to December 2021, and at all times DSpark supported query writing and output tables. Further detail can be accessed in the consortium documentation outlining DSpark's processes and advanced API features and queries.

3.2.1.2 Relational Insights and Data Lab (RIDL) Dashboards

Taking into account the large volume of data, exploratory nature of the pilot and QFES' strong operational focus, RIDL chose to devote a significant part of the project to develop a dashboard prototype to showcase the utility and dynamism of the DSpark data. DSpark use high privacy standards and their data is fully anonymised and extends back to 2017 with recency of 60-72hrs.

The dashboards were purpose built to be easy-to-digest for non-technical staff and interdepartmental bodies who may be involved in planning, analysing, or reporting a disaster response.

Some of the dashboard features include:

- Side by side comparison of resident and visitor heat maps
- The ability to filter by year, time-period, and 80 geographical locations (SA1)
- Bar and line graphs showing resident and visitor counts per SA1
- A 2016 census comparison for resident counts on the line graphs
- Evacuation centre locations where applicable
- Time-lapse that shows the magnitude of movements over periods of the day during the fire

The dashboards are available via QFES Prepare & Respond - Relational Insights Data Lab. Powered by DSpark. (shinyapps.io). For privacy and security reasons dashboard access requires authentication to review, this can be requested from RIDL.

3.2.2 Analysis

3.2.2.1 QFES Challenge and DSpark Insights

An initial audit revealed that QFES was unable to adequately quantify movement during disasters and relied on sparse siloed data from, their own staff, the Department of Transport and Main Roads, Queensland Police, Evacuation Centres, and the Australian Red Cross.

Secondary desktop research was also conducted and included reviews of media announcements, press conferences, DSpark case studies, and reports from the Inspector General Emergency Management, Sunshine Coast District Disaster Management Plan, and the Queensland Reconstruction Bushfires State Recovery Plan.

The analysis conducted during the pilot demonstrated that DSpark mobility intelligence data has the capability to bridge the identified data gap. The following table summarises the APIs utilised in the dashboard build and analysis to monitor the movement of people.

API	Capability
Discrete Visit	• How many people are at a certain location? • How does this fluctuate over time? • How many unique people are observed in a given location at a given time? • Identify moving and stationary individuals (any observation in area) • Can give a snapshot of an individual every 15 minutes • Can count the same person multiple times with each new discrete visit calculated • Overlooks the difference between moving and stationary agents
Stay Point	• Where do people stop to spend time? • How many people do that for a location and for how long in average? • A Staypoint is generated when a person is stationary (within a small threshold) for 15 minutes or more they are indexed on start time of Staypoint The implication is querying by hour returns how many stays started that hour, not everyone staying in that hour. Behaviour changes between indoor* and outdoor - Indoor cells = 5 mins to generate a Staypoint - Outdoor cells = 15 mins to generate a Staypoint *Not everyone indoors connects to indoor cell
Origin Destination Matrix and Through Links	• Where do people come from & where do they go next? • What mode* of transport did they use? • What route did they take? • Query is possible by origin time or the destination time

API	Capability
	*The dominant mode is allocated to the trip across all legs
Links Meta	• What links are in a given area? • What links match a road name?

3.2.2.2 Overview of Dashboard Analysis

In 2019, devastating bushfires swept across southern Queensland with Queensland Fire and Emergency services having to deal with more than 90 bushfires at one time at the height of the season.

As communities were recovering from the fires, the human, social and economic suffering was further exacerbated by the COVID-19 pandemic that closely followed. Queensland was the first state to declare a public health emergency in late January 2020 and began to restrict movement of people, business activities and social gatherings in March.

The following section provides an overview of the dashboards produced in the pilot. Sample screenshots of the COVID-19 Lockdown and Peregian Fires dashboard outputs are provided in section 4 of the report.

Both dashboards provide the ability to investigate the data by the following SA2s[3].

Statistical Area 2	Number of SA1s
Noosaville	19
Noosa Heads	12
Peregian Springs – Marcus Beach	6
Peregian Springs	8
Sunshine Beach	17
Tewantin	18

2021 COVID-19 Lockdowns

The COVID dashboard visualises mean visitor and resident counts per day and compares the mean counts of residents and visitors per day, over the four lockdown periods.

The 2021 lockdowns analysed are included in the table below:

Dashboard 2021 Lockdown Period	Date Range
January	January 8-11

[3] SA2s generally have a population between 3,000 and 25,000, and unlike SA1s have both a code and recognisable name.

Dashboard 2021 Lockdown Period	Date Range
March - April	March 29 -April 11
June – July	June 29 – July 2
July - August	July 31 – August 8

Peregian Fires – September 2019

The Peregian Fires Dashboard visualises:

- The sum of unique agents per day for residents and visitors in Peregian Springs during the fire period and similar periods in 2020 and 2021.
- Aggregated sums of daily totals of residents and visitors (unique agents) in Peregian Springs during the fire and similar periods in 2020 and 2021.

4 Findings

To address the theme, QFES and RIDL chose the Peregian Fires disaster and the March- May 2020 and 2021 COVID-19 lockdowns as case studies to develop the “Prepare-Respond” dashboard prototype.

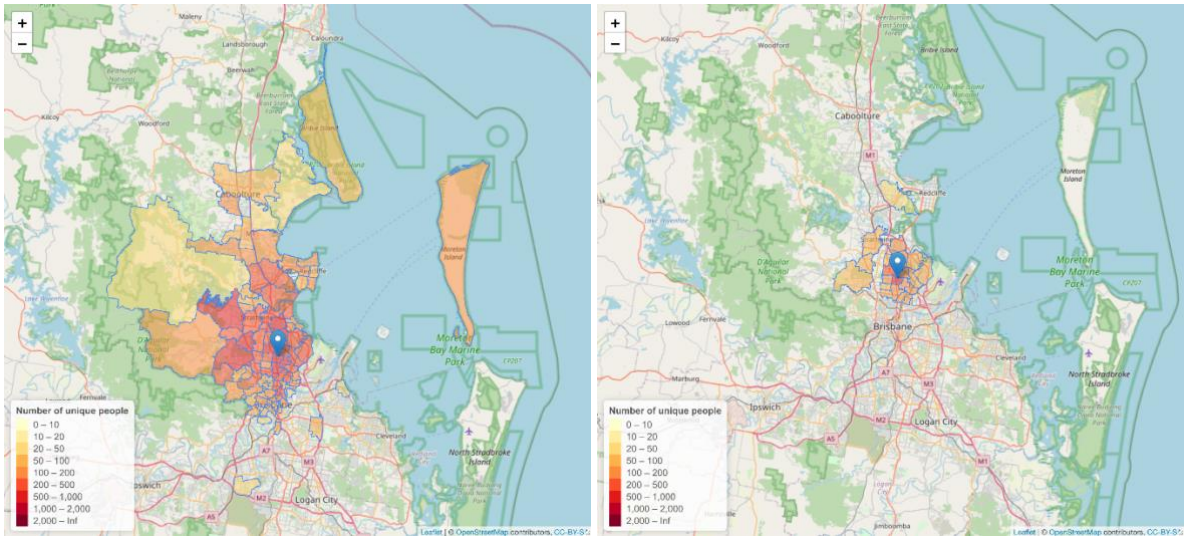
This section is designed to showcase the utility of telecommunications data through sample visualisations and insights gained. It will begin with the more recent COVID Lockdowns and end with the Peregian fires evacuation. Appendix A contains further detailed analysis, including the fire timeline, additional maps, and graphs.

4.1 COVID Lockdowns

Chermside Shopping Centre: March – April 2021 Lockdown

How long do people take to respond and how far do people travel when a lockdown order is given?

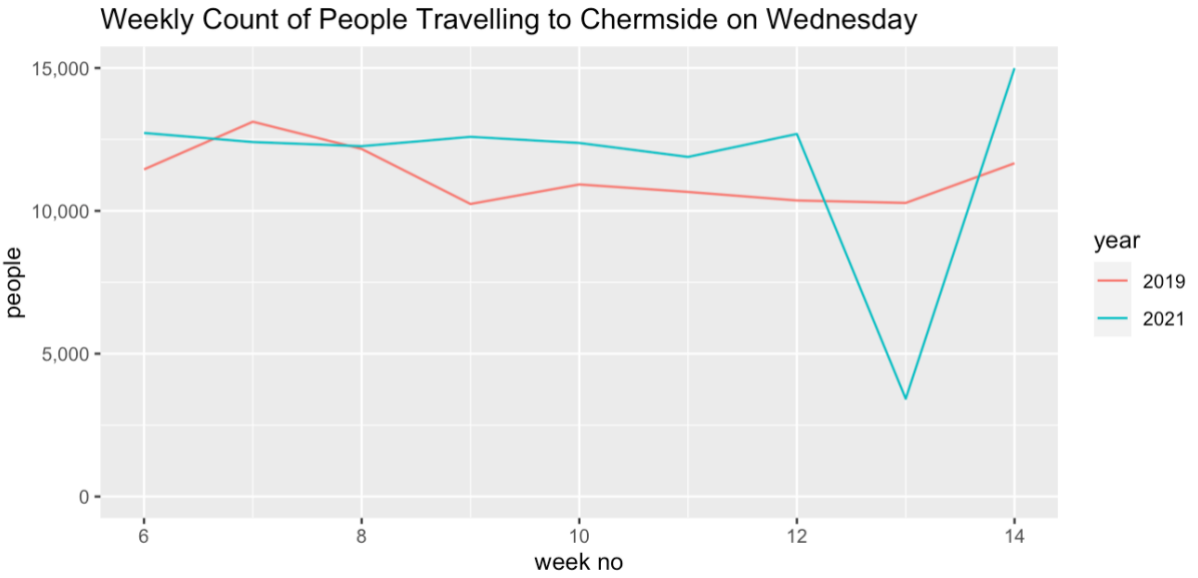
An early piece of exploratory analysis involved mapping DSpark data to determine change in movement behaviour when a lockdown order is given. The screenshots below show movement data presented as a heat map with the colour density illustrating the magnitude of people seen at Chermside shopping centre based on their home location. The map on the left from Saturday 28 March, the day before the lockdown order was given, and the map on the right is Wednesday 1 April, two days after the lockdown order.



The maps show a dramatic contraction in the volume of people and distance travelled. However, care needed to be taken in inferring the cause of the reduced catchment size. The change could have been caused by the lockdown order or could simply be because it is a different day of the week, or other events occurring.

In order to establish further context, the team zeroed in on the day of the contraction and plotted the people and median distance travelled to Chermside on equivalent Wednesdays going back two months in 2021, and 2019 when there was no lockdown.

The graph shows that the number of people dropped significantly on the lockdown Wednesday (week 13) in 2021. The median distance travelled to the shopping centre also dropped from a median distance of 3km at the longest median distance to 2km on lockdown day.



Noosa – Year on Year Comparisons

Later in the pilot, the "Prepare-Respond" COVID dashboard was developed to better understand the movement of residents and visitors in Noosa during the lockdown periods. Additional analysis in Appendix A reveals that in 2020, there was a 4% increase in residents at home during that period and a 46% decrease in visitor numbers.

Comparing 2020 and 2021 the graphs also show a marked difference in the number of residents staying at home, possibly indicating compliance fatigue and perhaps people taking advantage of the lifted lockdown order on April 11.

Again, context is important when interpreting mobility data outputs. For this kind of analysis, an area of complementary research could be a meta-analysis of the types of alerts, mediums of communication, severity of language and whether that affects how people respond.

4.2 Peregian Fire Evacuations

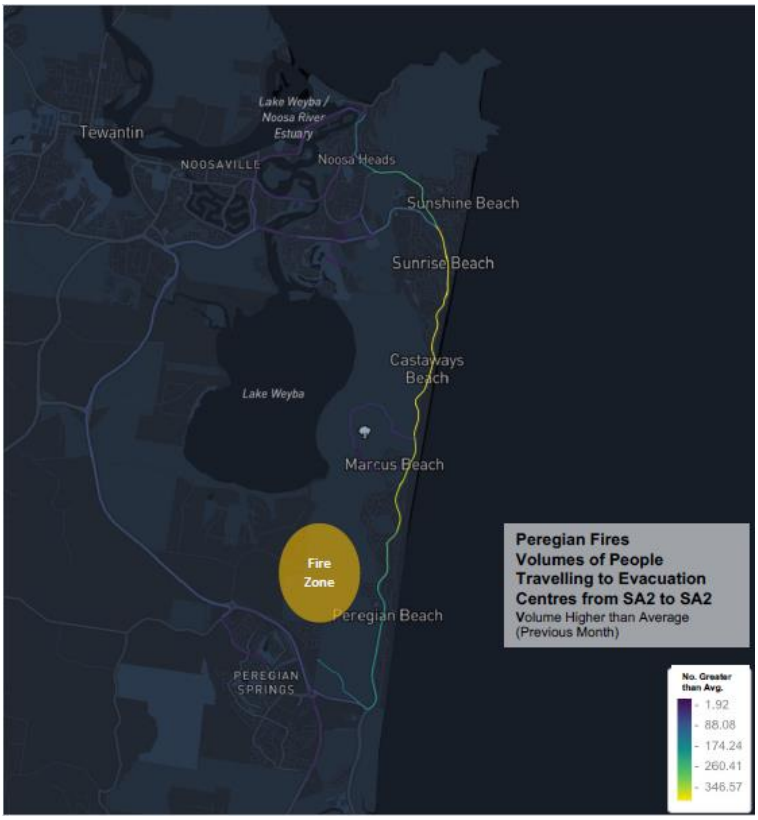
The Peregian fires occurred in Noosa Shire Council between September 9 – 11, impacting property, public infrastructure, small businesses, and the local environment. Approximately 2000 people were evacuated and evacuation centres provided refuge for 570 people over the fire period.

Where do people go when an evacuation order is given?

One of the crucial missing links in QFES data was how and where people moved when an evacuation order is given. As evidenced by the difference in evacuation registrations and the total number evacuated, over two thirds of evacuees are “data invisible” and unaccounted for.

With mobility data, this changes. Analysis conducted for movement on the 9th of September, the first day of the fires, found that 96 people more than average stayed in the Noosa Evacuation Centre Area and stayed 3.5 hours more than average.

What routes were travelled when the evacuation order was given?



On the day of the fires over 300 more unique agents were seen travelling north towards Noosa from Peregian Beach and Springs. Analysis of traffic flows shows above average road usage in the direction of evacuation centres.

Consistent with QFES directions and evacuation centre registrations, the majority travelled north towards Noosa along David Low Way with the remainder travelling along Emu Mountain Road in the direction of Noosa Leisure Centre.

This however does not account for the missing two thirds. Further analysis showed that many people from the evacuated suburbs spent the night in surrounding areas, likely with friends and family, rather than in evacuation centres. This is consistent with QFES messaging to utilise evacuation centres as a last resort.

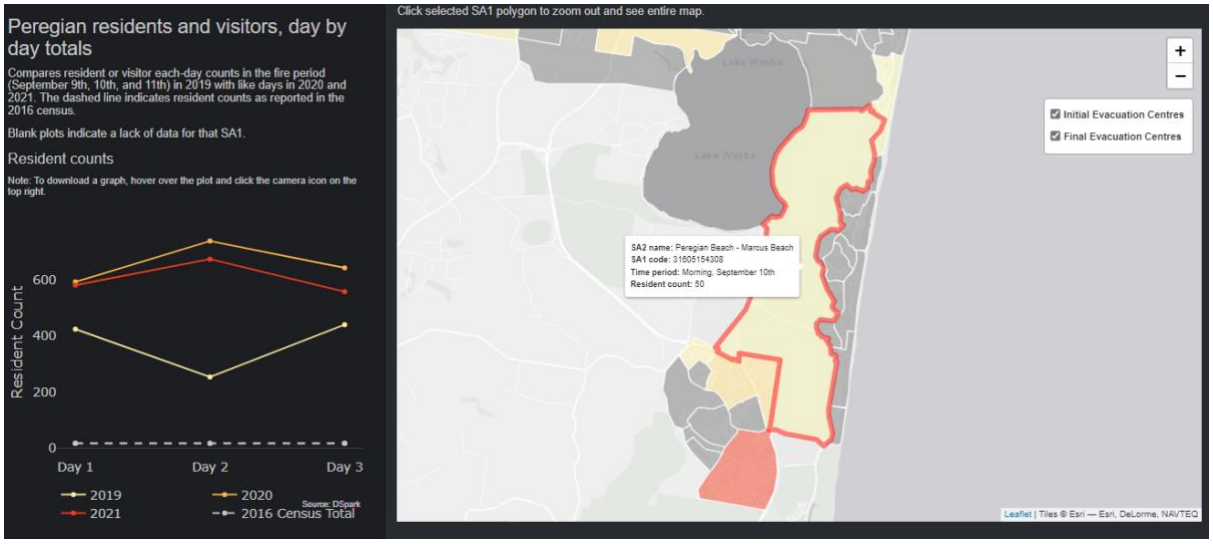
Another less significant factor to the discrepancy would be the exclusion of individuals below 20 from the DSpark data for privacy reasons. Meaning if a family of two adults and two children evacuated, the mobility data outputs could understate the movement of people to only include the two adults. This needs to be considered if the pilot is further developed for resource planning. Models can be built to account for the discrepancy, and even with this shortcoming, as showcased by the dashboard, mobility data is still more dynamic and reliable than out-dated census data for disaster response and recovery planning.

How long do they take to respond?

In the case of bushfires and other natural disasters, community members may evacuate in the following circumstances:

1. Self-initiated evacuation based on forecasts
2. Voluntary evacuation in response to information provided by QFES, local government or other stakeholders
3. Directed evacuation issued by authorised officers pursuant to legislation such as the Fire and Emergency Act 1990, Disaster Management Act 2003, and the Public Safety Preservation Act 1986.

As can be seen from the preceding analysis, people started evacuating on the 9th of September. The dashboard heat map and graph below visually shows the dip in residents on day two of the fire after evacuation orders had been given. Using the filter function comparing periods of the day, it is possible to quantify that there was a 49.5% decline in residents at home compared to the previous morning, indicating that evacuation orders were promptly heeded.



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5 Conclusions

5.1 Summary of Key Findings

Queensland Fire and Emergency Services deals with a myriad of natural disasters and emergencies that impact communities across the state every year. The ability to fill the current data gap in quantifying people movement during emergency situations would be a key to improving disaster responses.

The pilot demonstrated that telecommunications data can bridge some of the data silos and help fill the data and evidence gap faced by QFES to improve disaster responses and assist in the recovery, rebuild and reconnection of resilient Queensland communities after a disaster.

The pilot demonstrated that DSpark mobility intelligence could fill gaps in QFES data by helping to:

- Quantify movements of disaster affected residents
- Determine the number of visitors in a disaster affected area
- Gauge effectiveness of emergency warnings and lockdown orders
- Develop evidence-based and data driven dashboards to inform decision making
- Provide deeper insights into routes people take and how far they travel in a disaster
- Determine the length of displacement and resourcing requirements for disaster affected areas

The table below provides a summary overview of QFES current data sources and DSpark capability:

Short Term Emergency Response	Current QFES Methodology	DSpark Mobility Data Pilot
Where do people go when an evacuation order or lockdown order is given?	COVID Lockdowns – No visibility Evacuation Centre or Family/Friends. Evacuation Centre registration. Some who go to family/friends may register with Red Cross – Register/Find/Reunite but this is not always the case	✓ Data available via: Origin Destination Matrix and Through Link API Discrete Visit API Staypoint API
How long do they take to respond?	Monitored on the ground by the QPS undertaking the evacuation. Unsure if this is currently captured.	✓ Data available via: Origin Destination Matrix and Through Link API Staypoint API

Short Term Emergency Response	Current QFES Methodology	DSpark Mobility Data Pilot
How far do they travel and what routes do they take?	This can be manually found out at evacuation centre or the Red Cross database	✓ Data available Origin Destination Matrix and Through Links API Links Meta API
How long does it take to analyse the data? **i.e. Is there a possibility of real-time use of the data?**	Depends on the event and data available.	There are current legislative constraints on live data and recency is limited to 60-72hrs. The current API data is best placed to assist in disaster response reviews and predictive modelling

In conclusion, the dashboard created in collaboration with QFES, RIDL and DSpark, and findings illustrate that telecommunications data can bridge data silos and fill the data and evidence gaps to improve disaster responses, and help to build resilient communities after a disaster.

5.2 Implications for Policy, Practice and Research

The pilot findings and learnings have shown that there is a significant opportunity for DSpark data analytics to improve efficiency, improve disaster response and reduce the impact of future disasters.

It is recommended that:

1. Disaster management entities consider acquiring ongoing access to DSpark mobility data
2. QFES develop an ongoing relationship with DSpark data scientists
3. Build upon the dashboard pilot and explore the creation of predictive modelling tools for disaster management and planning
4. Implement an audit of current data, staff access, tools and applications being developed to avoid duplication across functional areas and departments
5. Develop a standardised methodology and documentation process to allow for accurate interpretation and analysis of outputs
6. Establish a rigorous security clearance protocol and register of DSpark and Government department staff with access to sensitive mobility intelligence and government data sets

Using the state recovery measures of success outlined in the State Recovery Plan 2019-2022, the following table summarises the key stakeholders, next steps, and potential legislative considerations for each recommendation.

Recommendation	Disaster Recovery Measure of Success	Key Stakeholders	Next Steps	Legislative Considerations
QFES acquires ongoing access to DSpark mobility data	Human and social Economic Environment Roads and Transport	QFES, whole of government committee	Whole of government review of pilot findings	Disaster Management Act 2003
QFES develop an ongoing relationship with DSpark data scientists	Human and Social Economic	QFES and DSpark	Coordination and consultation with key stakeholders involved in disaster response to identify additional data gaps	Privacy Act 1988, Information Privacy Act 2009 and Disaster Management Act 2003
Explore the creation of predictive modelling tools for disaster	Human and social	QFES, DSpark, RIDL	Identify departmental challenges that	Disaster Management Act 2003

Recommendation	Disaster Recovery Measure of Success	Key Stakeholders	Next Steps	Legislative Considerations
management and planning	Economic Environment		could benefit from predictive modelling and build upon the dashboard pilot	
Develop a standardised methodology and documentation process to allow for accurate interpretation and analysis of outputs	Human and social Economic Environment Roads and Transport	QFES, Queensland Police, Department of Transport and Main Roads	Share pilot findings and identify areas of collaboration	Fire and Emergency Services Act 1990
Implement an audit of current data, staff access, tools and applications being developed to duplication across functional areas and departments.	Economic	Health and Wellbeing Queensland, Whole of Government Committee, QFES, DSpark	Review current sensitive data sets and tools being utilised to determine government data sets that would be helpful to merge, and identify any constraints that may need to be addressed	Disaster Management Act 2003
Establish a rigorous security clearance protocol and register of DSpark and Government department staff with access to sensitive mobility intelligence and government data sets	Human and Social	Whole of Government Committee, QFES, DSpark	Review current security and legislative constraints on data access and sharing.	Privacy Act 1988; Public Safety Preservation Act 1986 and Information Privacy Act 2009

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Appendix 1

DSpark Additional Analysis

QLD Govt COVID-19 Economic Recovery to Pandemic

Theme 1: Improved disaster strategy, monitoring COVID-19 change & responses to outbreaks. Fires (Peregian Beach)

Key Events:

On the 9th September 2019 a bushfire broke out west of the Sunshine Motorway in Peregian Beach, Sunshine Coast QLD. The following summary slides have been put together to explore DSpark data being utilized to understand movement on the day and how it might be used for mitigating bushfires in the future such as backburns and response planning.

9th September 2019
5.30pm winds carried fire east
Residents were warned to evacuate north towards Noosa

5.30pm Residents of southern section of potential impact zone advised to leave to go
To Evac Centres at Coolum Beach Surf Club & Multisport Centre at Coolum Beach

6.30pm Evacuated areas extended and evacuation centre opened at The J Theatre Noosa

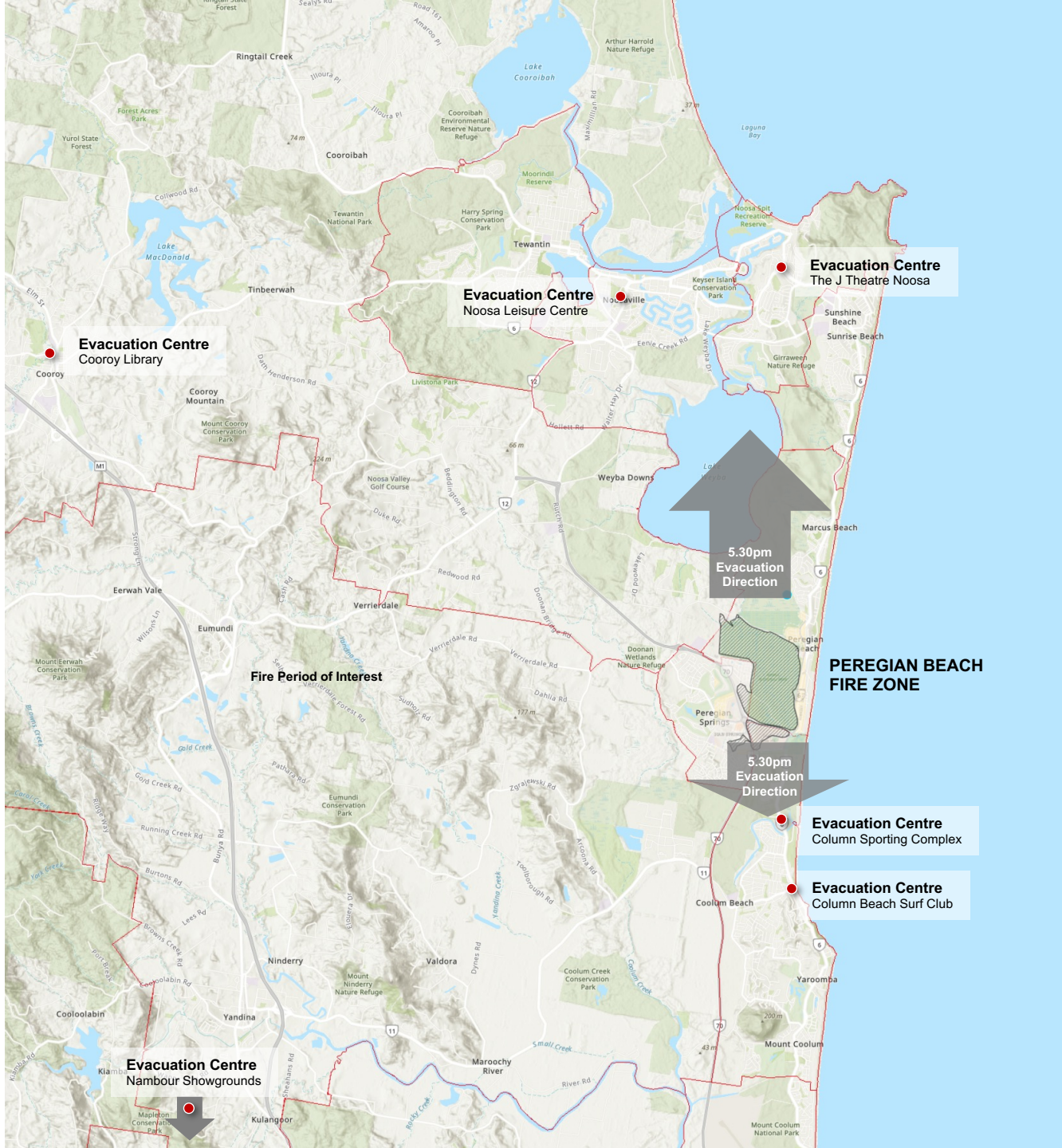
6.30pm Peregian Beach and Marcus Beach also evacuated

10th September 2019
1.15 am Weyaba also evacuated towards Cooroy Library, Noosa Leisure Centre Nambour Showgrounds

11th September 2019
Residents Peregian Beach, Marcus Beach and Castaways Beach were able to return 11th September

Questions:

a) How many visitors to Peregian regions would we expect at this time?
b) Did people from effected areas go to the evacuation site?
c) Are they local or are they visitors?
d) Did they stay overnight?
e) What routes were taken and was this higher than average?
f) Return time and rate



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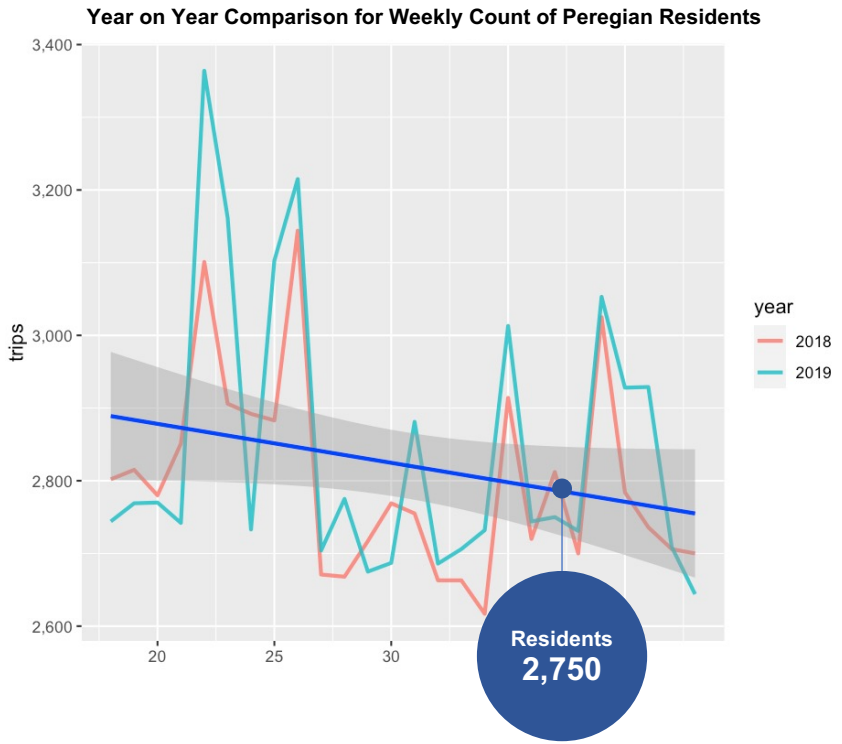

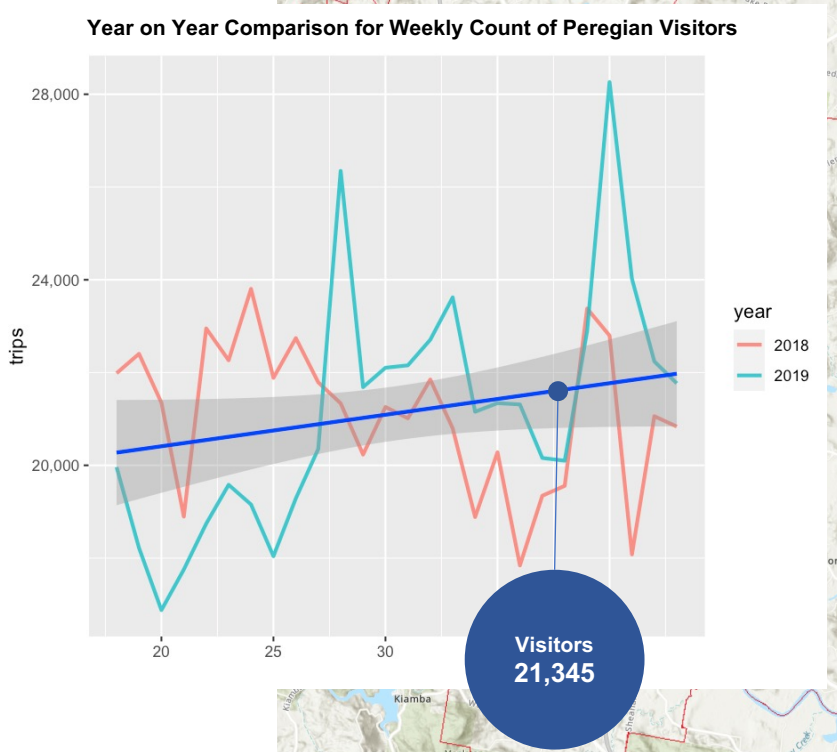

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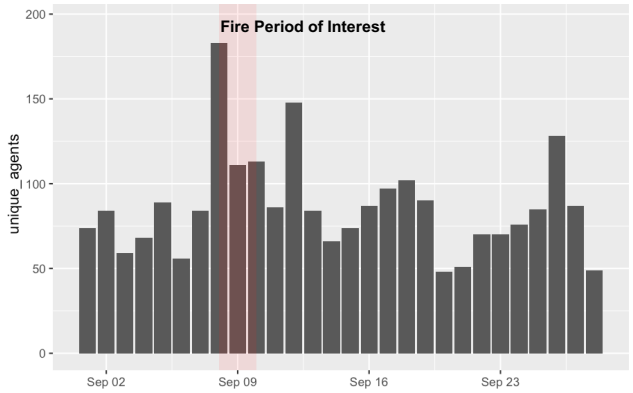
Affected Areas:

Peregian Beach
Marcus Beach
Castaways Beach

Evacuation Areas:

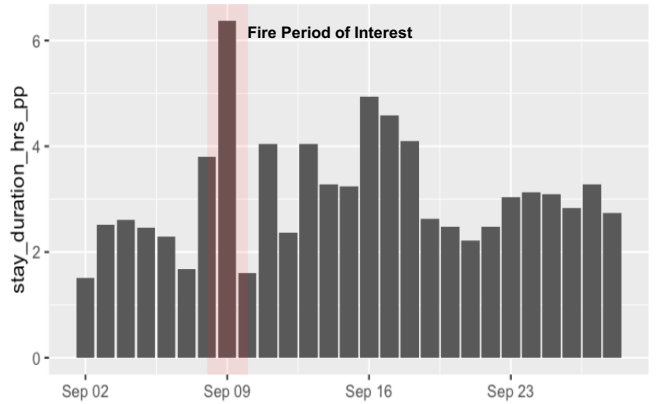
a) Coolum Beach Surf Club
b) Multisport Centre Coolum Beach
c) The J Theatre Noosa
d) Cooroy Library
d) Noosa Leisure Centre
e) Nambour Showgrounds

Unique People From Fire Region Seen at Noosa Evac Centre Area



96
More Than Avg. *

Stay Duration PP From Fire Region Noosa Evac Centre Area



3.5
Hrs More Than Avg.

* Compared to a month before and a month after

QLD Govt COVID-19 Economic Recovery to Pandemic

Theme 1: Improved disaster strategy, monitoring COVID-19 change & responses to outbreaks

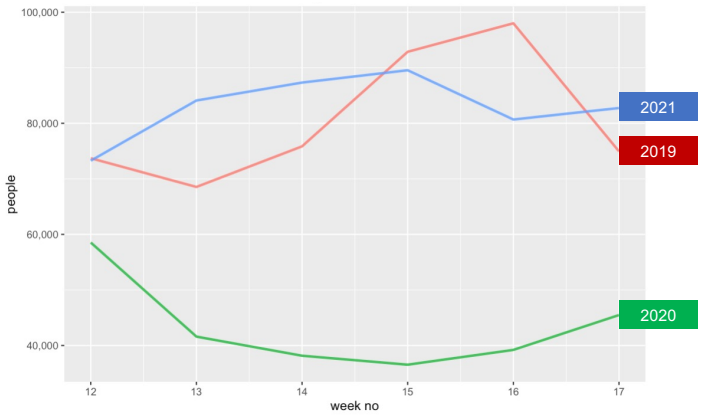
Use of Mobility Data For Monitoring and Strategic Planning:

- As well as understanding how many people might be in the affected area in a disaster, another need by first responders such as QLD Fire and Emergency Services is planning mitigation activity like burning-off
- Here mobility data is used for understanding visitors and resident numbers in lock-down periods

Noosa SA3: 31605

COVID-19 Lockdown Time Comparison
1: 23 Mar 2019 to 01 May 2019
2: 23 Mar 2020 to 01 May 2020
3: 23 Mar 2021 to 01 May 2021

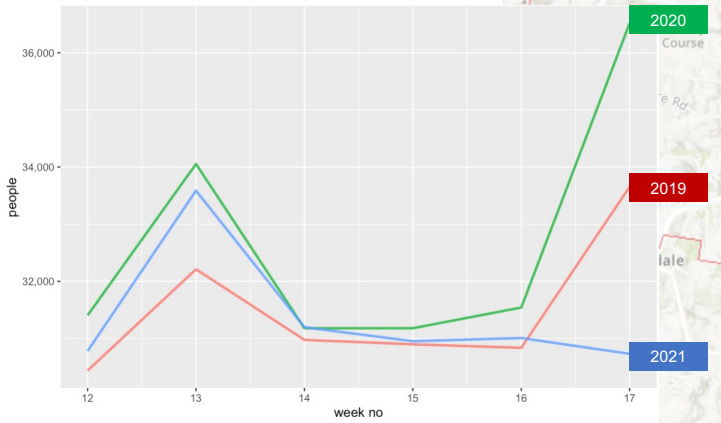
YoY Visitors to Noosa



- In the lock down in 2020 less visitors were seen in Noosa SA3

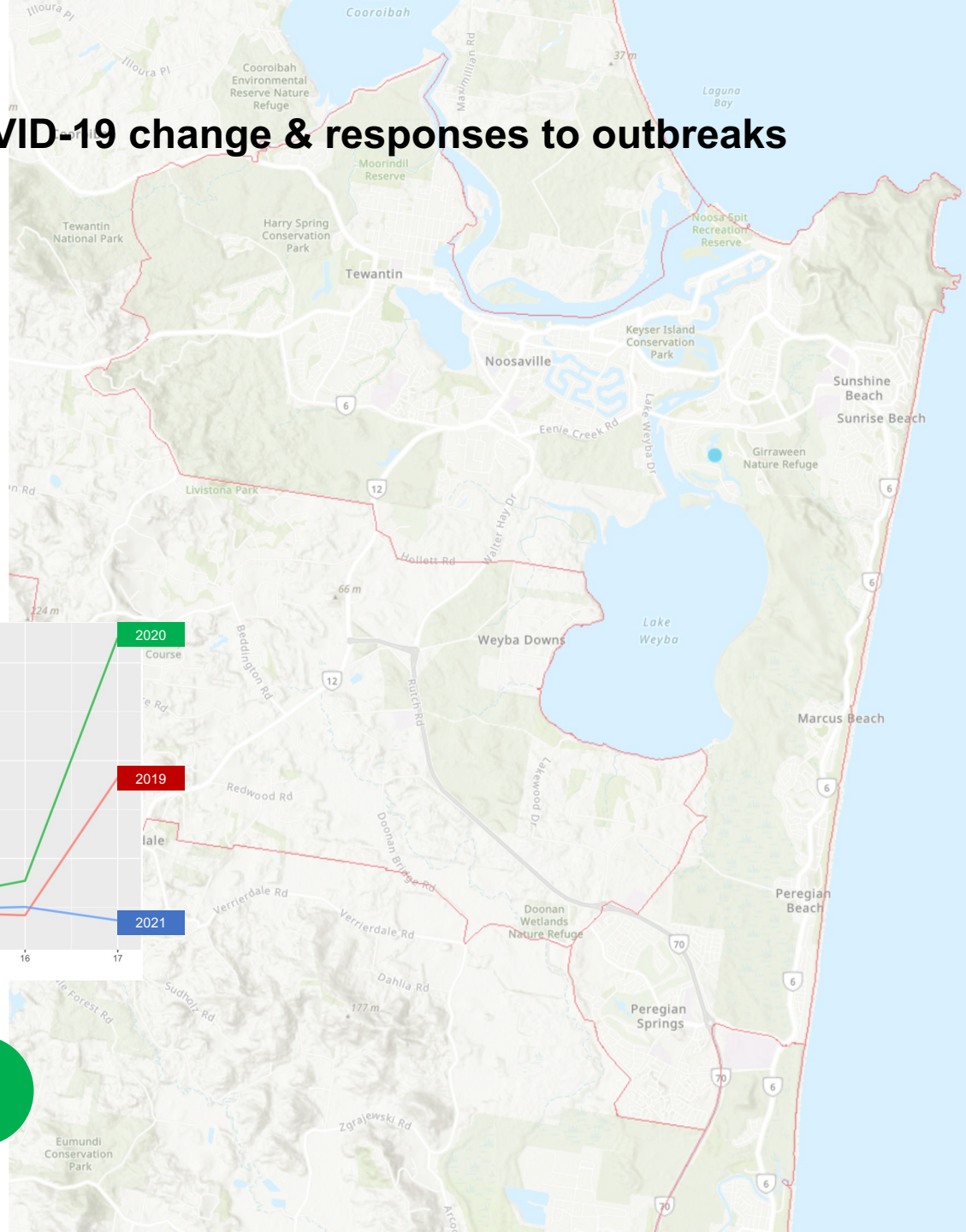
-46%

YoY Residents of Noosa



- In the lock down in 2020 more residents were seen at home (not travelling away)

4%



QLD Govt COVID-19 Economic Recovery to Pandemic

Theme 1: Improved disaster strategy, monitoring COVID-19 change & responses to outbreaks. Fires (Peregian Beach)

Questions:

a) How many visitors to (Peregian) regions would we expect at this time?
b) Did people from effected areas go to the evacuation site?
c) Are they local or are they visitors?
d) Did they stay overnight?
e) What routes were taken and was this higher than average?
f) Return time and rate

Key Events:

9th September 2019
Afternoon
Danger Rating Very High
Bushfire broke out west of the Sunshine Motorway

5.30pm winds carried fire east
Residents were warned to evacuate north towards Noosa

5.30pm Residents of southern section of potential Impact zone advised to leave to go
To Evac Centres at Coolum Beach Surf Club
Multisport Centre at Coolum Beach

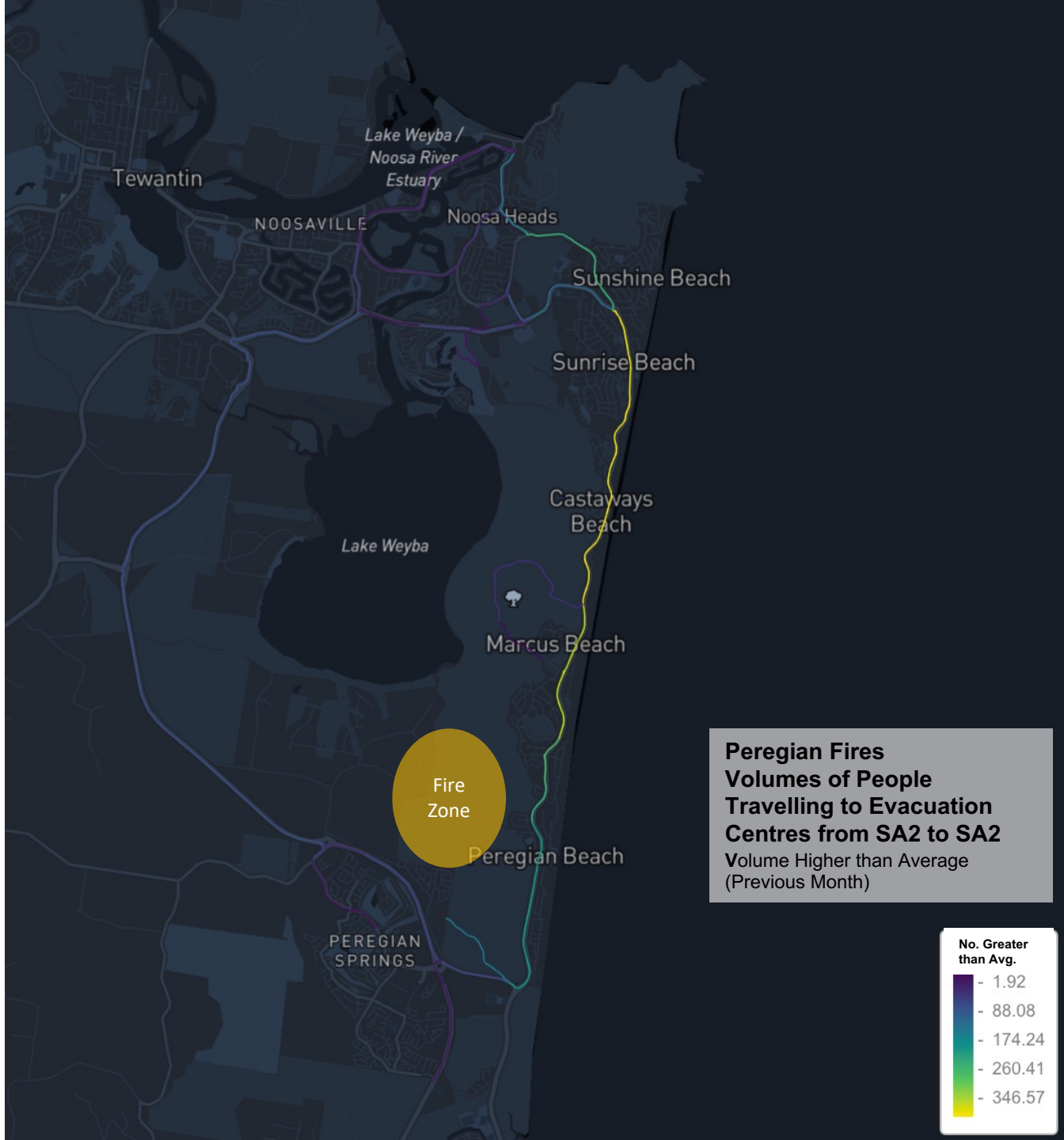
6.30pm Evacuated areas extended to
And another evacuation centre opened at The J Theatre Noosa

6.30pm Peregian Beach and Marcus Beach also evacuated

10th September 2019
1.15 am Weyaba also evacuated towards Cooroy Library, Noosa Leisure Centre Nambour Showgrounds

11th September 2019
Residents Peregian Beach, Marcus Beach and Castaways Beach were able to return 11th September

On the day of the fires there were more than 300+ more unique agents seen travelling north towards Noosa from Peregian Beach and Peregian Springs



QLD Govt COVID-19 Economic Recovery to Pandemic

Theme 1: Improved disaster strategy, monitoring COVID-19 change & responses to outbreaks. Floods (Townsville)

NATIONAL QUEENSLAND TOWNSVILLE FLOODS

Queensland's floods are so huge the only way to track them is from space

By **Linlin Ge**
February 6, 2019 — 12.03pm

Many parts of Queensland have been declared disaster zones and thousands of residents evacuated due to a one-in-100-year flood. Townsville is at the epicentre of the "unprecedented"

Townsville flooding continues as hundreds wait for waters to recede

Updated 5 Feb 2019, 11:36pm

Hundreds housed at Lavarack Barracks during flood crisis

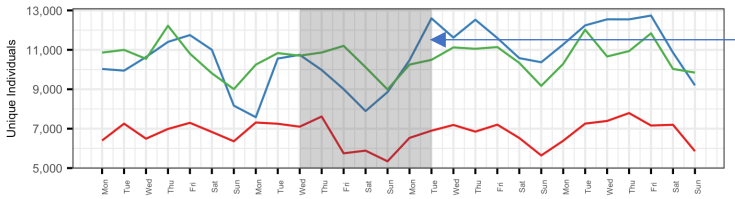
DSpark

Townsville Floods: Key moments of mobility movements in flood period

1

Heatley
Townsville Residents

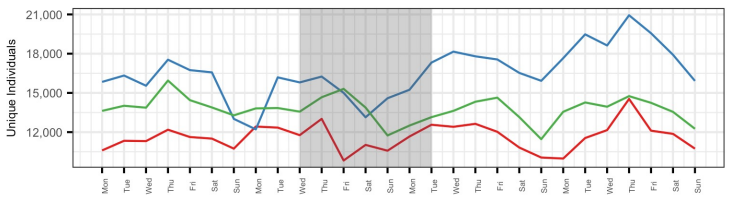
SHELTER REGION



SHELTER SAW RISE IN NUMBERS

2

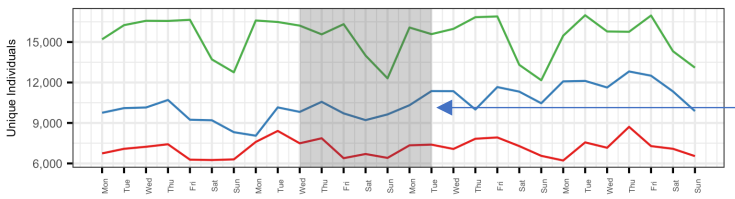
Kirwan - East
Townsville Residents



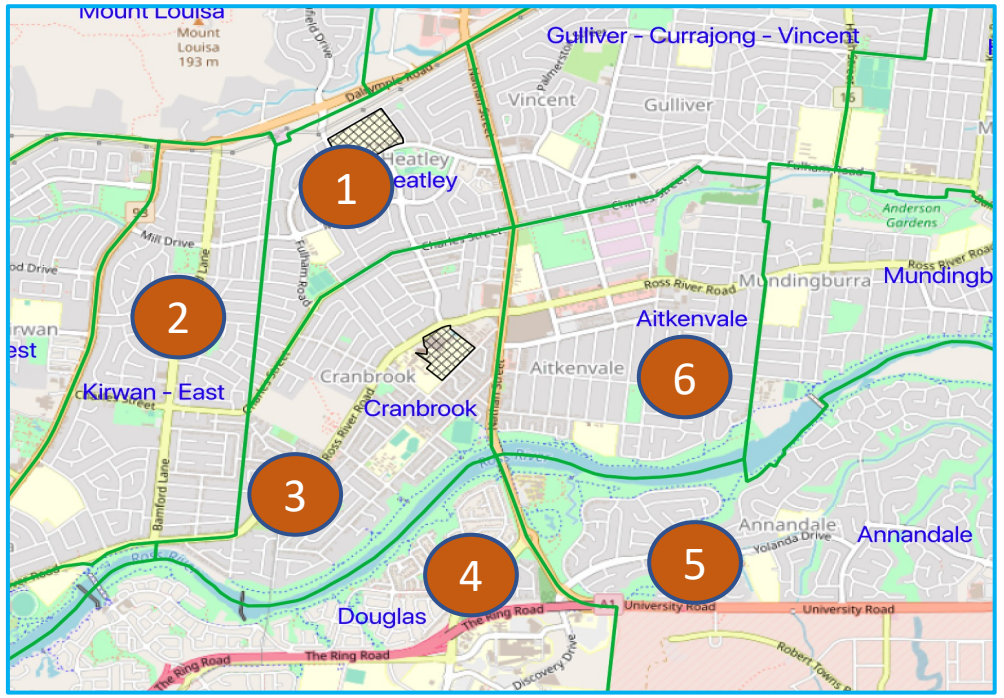
3

Cranbrook
Townsville Residents

SHELTER REGION



SHELTER QUICKLY REACHED MAX NUMBERS AND OVERFLOW DIRECTED TO HEATLEY



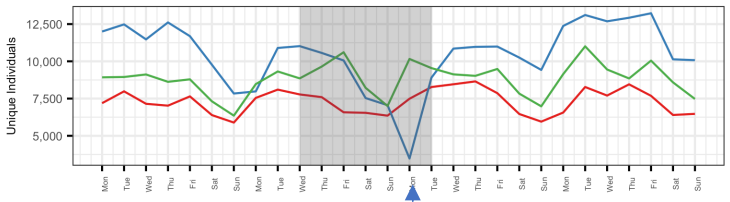
15th Jan - 11st Feb 2018 **Previous Year Comparison**

21st Jan - 17th Feb 2019 **Flood Period**

4th Mar - 24th Mar 2019 **Recovery**

4

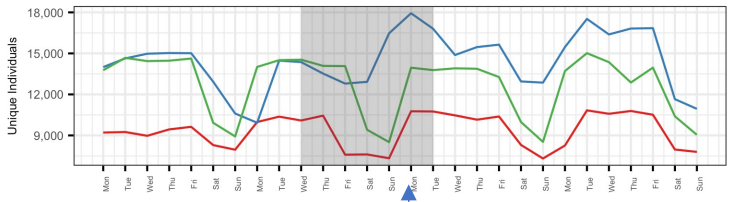
Douglas
Townsville Residents



FLOOD IMPACT

5

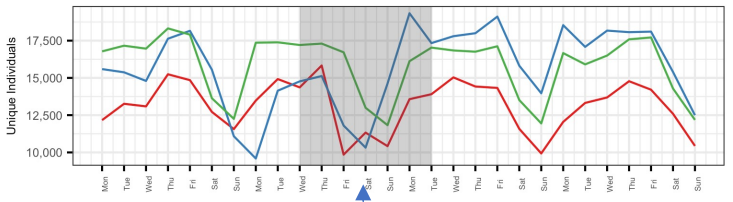
Annandale
Townsville Residents



ARMY PERSONNEL (From Home / Work Location)

6

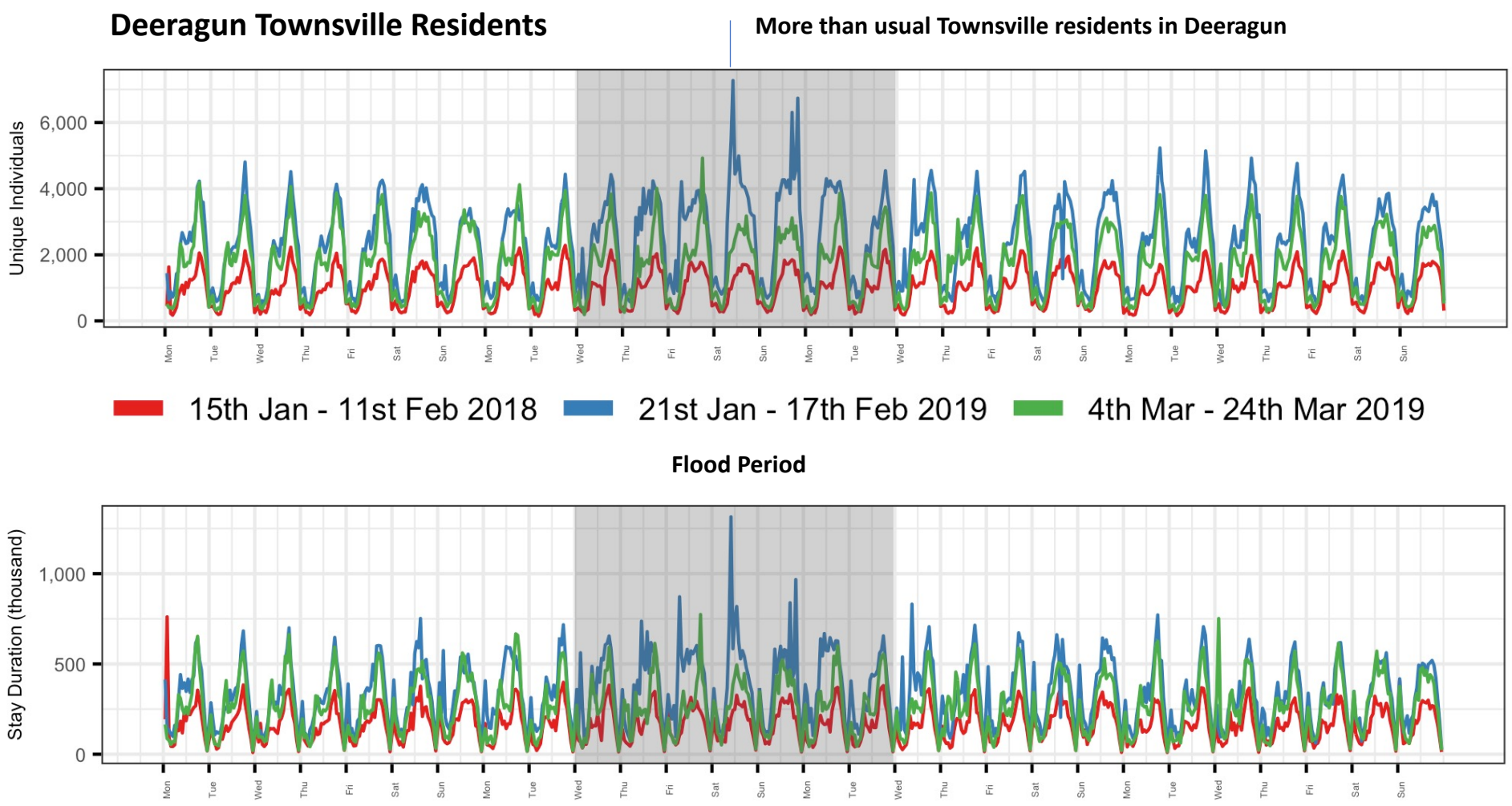
Aitkenvale
Townsville Residents



FLOOD IMPACT

DSpark

Townsville Floods: Hourly Trends Confirms Impact on Deeragun Region

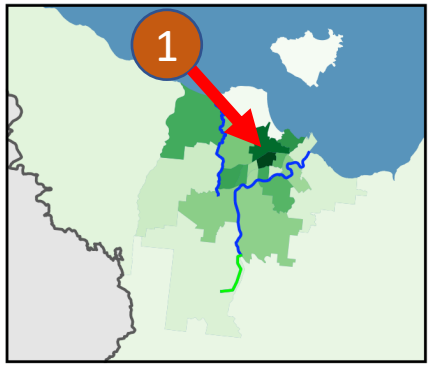


DSpark

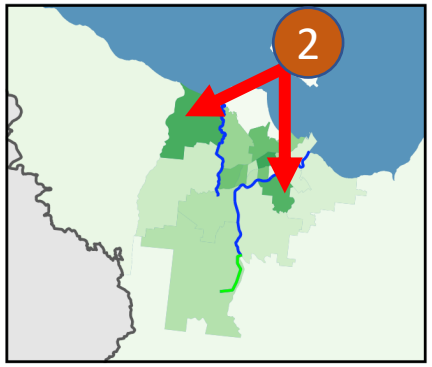
Townsville Floods: Town Center and Riverbank Areas Impacted the Most

Unique Individuals Observed in Town

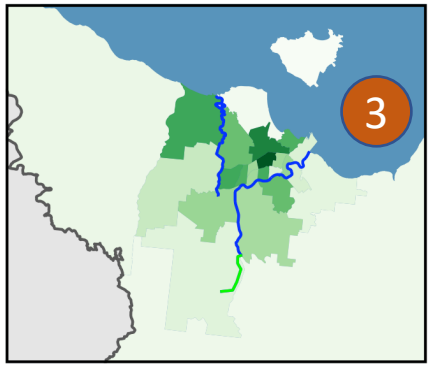
2019-01-24



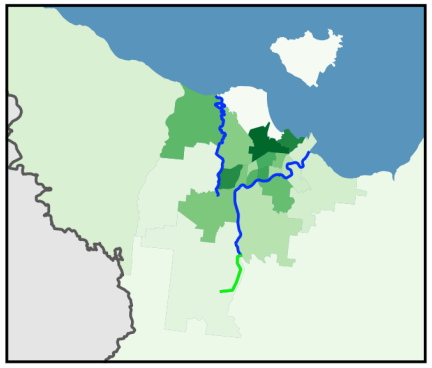
2019-02-03



2019-02-06

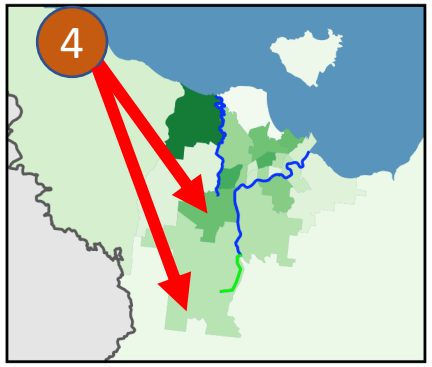


2019-03-05



Stay Duration

2019-01-24



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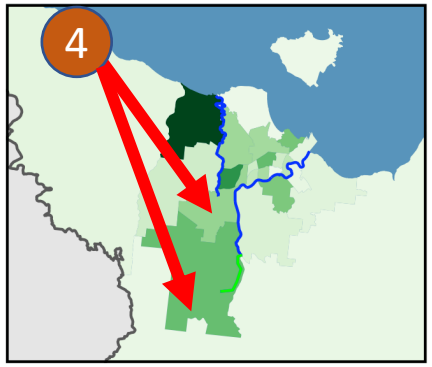

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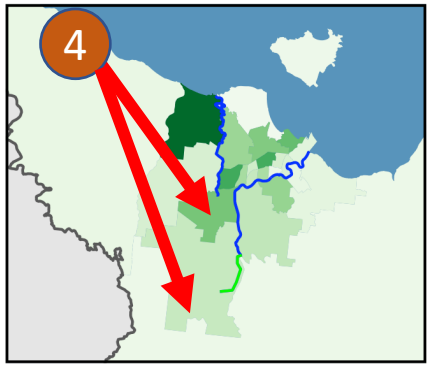

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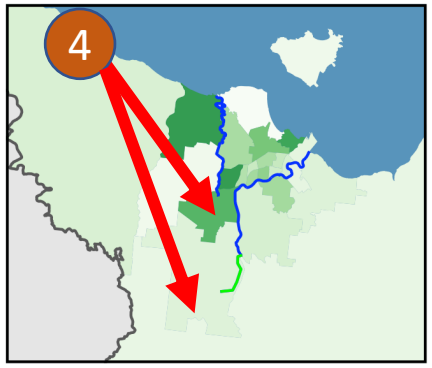

DSpark