The Impact of Vehicles on Northern Pegasus Bay Beaches

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EXECUTIVE SUMMARY

1. INTRODUCTION

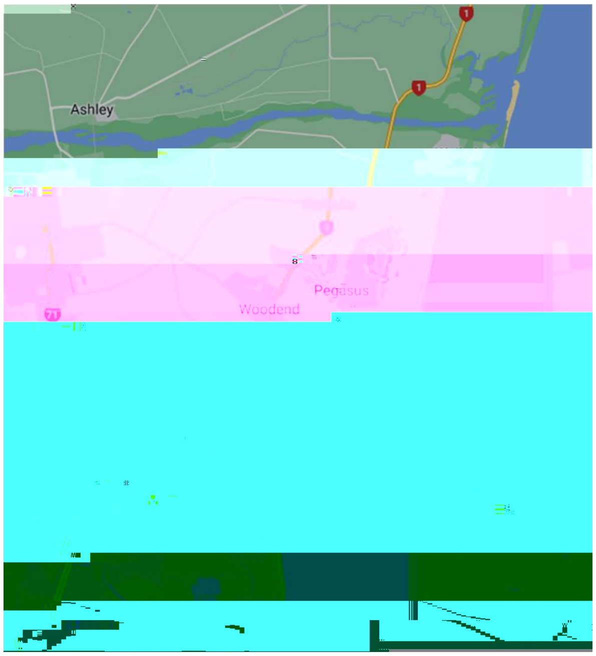
The Northern Pegasus Bay beaches (NPBB) are used for recreational activities such as fishing, whitebaiting, watersports, and other leisure activities. Growing popularity of the beaches has led the Waimakariri District Council (WDC) to create a Bylaw, regulating vehicle use at the NPBB. The Bylaw imposed restrictions on vehicle use of NPBB to improve environmental health and promote safety at the beach.

The Bylaw (Northern Pegasus Bay Bylaw, 2016) was introduced in 2010 and reviewed in 2016. The key rules are as follows:

- Recreational driving is prohibited
- Driving above the high tide mark is prohibited
- Speed limit 30 km/hour, reduced to 10 km/hour within 50m of pedestrians

The aim of this project is to analyse and address the social and physical impacts of vehicle use on the NPBB. The results of this study are significant as they will assist the WDC with recommendations for the upcoming 2021 Bylaw review.

There is consensus in the literature of the physical and social impacts of vehicle use on beaches. This study builds on local research surrounding vehicle use on New Zealand beaches. The results of this report provide insight into the values of beach users of Pegasus Bay, which, alongside an understanding of environmental impacts, will assist in the effective management of vehicle use on NPBB.



The NPBB are located north of Christchurch, from the Waimakariri River to the Ashley-Rakahuri Estuary (Waimakariri District Council, 2020). This area includes Kairaki Beach, Pines Beach, Woodend Beach, and the Ashley-Rakahuri Estuary, the confluence of the Ashley River and Pegasus Bay (Figure 1). The main vehicle access point is at Kairaki Beach, where the Bylaws permits driving north, to a point between Pines and Woodend Beach. The Ashley-Rakahuri Estuary entrance is gated and requires a permit to gain beach access. All other beaches along the coastline are pedestrian access only. There are also varying degrees of dune protection along the study area, with the dunes north of Pines Beach, and at the Ashley-Rakahuri Estuary protected with cable fencing.

2. LITERATURE REVIEW

There has been extensive research that shows vehicle use on beaches has adverse physical and social effects. Within this project, there are several key themes. These include, but are not limited to, the impact of vehicles on sand dunes, vegetation, ecology, and community enjoyment.

Sand dunes are natural features that protect the land, people and houses from flooding and erosion. The taller the dune, the more protection they provide against coastal hazards. They also provide a habitat to many insects, birds, and lizards (Hoiser & Eaton, 1980). The two most important features of sand dunes are the height, which provides protection from flooding and storm events, and the sand-binding vegetation that helps prevent erosion (Stephenson, 1999). These features are jeopardised when driven over by vehicles, as the weight and tires destroy the vegetation and compact the dunes. This promotes erosion, which decreases their height and alters their form (Spence, 2014).

The overall stability of a dune system can be compromised from the degradation of vegetation (Schlacher, 2008) The damage to vegetation results in an unstable dune system, thus promoting erosion and providing a higher vulnerability to coastal hazards. After an initial disruption of the dunes, winds drive erosion processes. This generates more gaps in vegetation and therefore less coastal protection. Increased storminess will impact the overall protection of vegetation and dunes. Anthropogenic disturbances on the vegetation will further degrade their ability to support coastal environments.

Tuatua, among other invertebrate species, are filter feeders that live below the sand of the intertidal zone. They play a key role in the food chain as they support higher consumers like birds and fish and contribute to nutrient recycling on beaches (McLean et al., 2018). According to the Northern Pegasus Bay Bylaw, vehicles are only allowed to drive on the intertidal zone. This impacts the tuatua population as they are crushed when driven over her

3. METHODS

The issues surrounding vehicle use at the beach have both environmental and social impacts, therefore the methods section of this research has been separated into two parts. The social proportion focusses on beach users' perceptions, and the physical portion focusses on environmental impacts.

4. RESULTS

4.1.1 Traffic Counter Data

During the observation period, 1,960 vehicles entered Kairaki Beach via the carpark. This was approximately 40% of the traffic volume of t

4.1.3 Historical Aerial Imagery

Figure 4 shows the temporal variations of the dunes through different regulatory periods at Kairaki Beach. Figure 4a shows sparse and heavily eroded dunes by the river mouth, with sporadic vegetation. This was before the Bylaw was implemented. Further up the coast the dunes are in similar condition, with little vegetation and vehicle tracks throughout. Figure 4b shows some regeneration of dunes both at the river mouth and along the coast. Developed vehicle tracks separate the dunes and only a small area of foredune is visible. This was after

4.2.1 Demographics

The demographics of the respondents are outlined in Tables 2, 3 and 4. There was a diverse age range, and a slight gender skew to the data. The majority of respondents were local to the Waimakariri region, with approximately one-fifth visiting from Christchurch.

	24	13	21	19	7	6	90

56	34	90

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30	**12**	**11**	**37**

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4.2.6 Spatial Distribution of Respondents

The research has revealed a spatial relationship between where respondents were from and their preference for restriction. Figure 2 shows an approximately even number of people preferring ‘uncontrolled’ and ‘prohibited’ with regards to vehicle restrictions (section 4.2.2). However, analysing the spatial structure of these preferr mat cleion

5. DISCUSSION

Comparing the aerial photography of the two vehicle access points over time highlights the impacts of different management strategies on the regeneration of dunes and vegetation (section 4.2.3). The Ashley-Rakahuri Estuary entrance has a gate and permit system. Greater restriction of access has led to a faster regeneration of the dunes and vegetation compared to the ungated entrance at Kairaki Beach. This is partially due to the lower traffic volumes (Table 1), leading to a lower physical impact. However, dune health is disproportionately better at the Ashley-Rakahuri Estuary, which saw approximately two-thirds of the vehicle activity at Kairaki Beach through the observation period. The accelerated regeneration of the Ashley-Rakahuri Estuary may- tst enhow tcoer viga

https://www.waimakariri.govt.nz/__data/assets/pdf_file/0018/24138/Northern-Pegasus-Bay-Bylaw-2016.pdf

Waimakariri District Council. (2020). Beach and Estuary. Retrieved from Waimakariri District Council: https://www.waimakariri.govt.nz/leisure-and-