

Port Otago Limited  
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# Surf Survey Summary Report

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## Summary of Surf Locations of Interest

Port Otago Ltd is undertaking monitoring of changes in surf quality and ground-truthing of the models of surf dynamics at Aramoana Beach and Whareakeake Beach. These beaches are key concerns as their wave breaks could be affected by the dredged sediment from Otago Harbour that is relocated to the dumping ground off Hayward Point.

In order to acquire the information needed, two cameras were set up to take photos of the surf every five minutes during daylight hours. One camera over looks Whareakeake Beach and the second overlooks Aramoana Beach. Both cameras have solar panels that power the camera batteries. A beacon at Farewell Point records environmental conditions including, wind speed (knots), wind direction (degrees), maximum wave height (m), significant wave height (m), and peak wave period (s). A surf survey is used to gather information on the public opinion of the surf quality. By combining these datasets, the overall quality and amenity value of the surf and associated trends can be analysed.

By summarising the information in the surf surveys, the public perception of the surf can be used to gauge what constitutes as good surf, and then cross reference this with the surf models and photos.

Aramoana Beach is a more popular surf break, and has a higher profile due to its status as a nationally significant natural feature. The higher profile of the beach is the likely cause for the larger number of surf reports describing the surf at Aramoana Beach. Table 1 summarises the number of surf surveys submitted for each surf location. Three surveys did not define the surf location.

<i>Location</i>	<i>Number of Surveys</i>
<i>Aramoana Beach</i>	48
<i>North</i>	15
<i>Mid</i>	31
<i>South</i>	2
<i>Whareakeake Beach</i>	14
<i>Undefined</i>	3
<i>Total</i>	65

Table 1: Overview of the number of surf surveys completed for each beach area.

The different sample sizes for each surf location can cause complexity for comparing the surf. A trend seen in Aramoana cannot be as easily compared with a trend at Whareakeake Beach, as the number of surveys describing Whareakeake Beach is only 29% of those describing surf at Aramoana.

As mentioned above, it could also be an indication of popularity or awareness of the influence dredging may have on the surf. It is likely that the surfers completing the surf survey are more aware of the implications that the relocation of sediment has on surf. This may skew the number of surveys completed for each surf location. Those who are concerned about the protection of the Aramoana surf break, may therefore, be likely to complete the surf survey. The higher awareness may also equal a higher degree of emotive influence on the answers given in the survey.

## Repeat Surf Survey Submissions

Before carrying out any analysis it is important to acknowledge the source of the data. For this reason, Table 2 has summarised the repeat actors in the surf survey. An entry was also made by MetServices Otago during the early stages of implementing the surf survey online. This entry has also been added to Table 2 to be acknowledged when assessing further data analysis.

<i>Submitter</i>	<i>Number of Submissions</i>	<i>Location of Surf Reported</i>	<i>Rating</i>	<i>Comments</i>
<i>1</i>	2	Mid Aramoana	Average	-
		Whareakeake	Bad	Swell too big? Not breaking like it should.
<i>2</i>	2	Mid Aramoana	Good	Good swell, lots of people. Some nice rides but not barrelling conditions like you would expect at Aramoana
		Whareakeake	Bad	Big swell poor banks not very surf-able at all.
<i>3</i>	2	South Aramoana	Good	I was the only surfer out at the time I was there. Most report models stated it was not good. But using the Port Otago web cam and wind gauge I determined it to be good.
		North Aramoana	Average	-
<i>4</i>	2	Mid Aramoana	Average	-
		Whareakeake	Average	-
<i>5</i>	2	Mid Aramoana	Average	-
		North Aramoana	Good	-
<i>6</i>	3	Mid Aramoana	Average	Small swell, borderline conditions, 3 yellow eyed penguins.
		Whareakeake	Average	-
		Whareakeake	Average	-
<i>7</i>	2	Whareakeake	Average	Powerful swell no waves breaking right through though.
		Undefined	Average	Powerful swell but wasn't breaking through.
<i>8</i>	2	Mid Aramoana	Good	Still not very hollow and not peaking in spots.
		Mid Aramoana	Average	Odd peak but, gutless and not hollow. :(
<i>Met Ocean Services</i>	1	North Aramoana	Good	Some fun waves coming through!

Table 2: A summary of actors who submitted a surf survey more than once. The table shows the location of surf reported on, the quality of the surf reported and any further comments made to assess the motives and further insight for the reporter. The entry made by Met Services Otago has been included in the table. The reporter names have been coded for anonymity.

Two surveys reported observations for 2015 and one survey reported on surf from 2012. These observations are not consistent with the period the survey has been implemented for so far. These inconsistencies should be taken into account while looking at further analysis. The entries have been left in the dataset in order to include the information from them.

## Summarising Surf Ratings

The quality of the surf reported by the public in surf surveys has been summarised in Table 3 and Figure 1. It is demonstrated that Mid Aramoana has the most surf reports and overall the best surf. Mid Aramoana had the most reports of surf rated as good and epic, and the most reports of average surf. North Aramoana had the second most reports of good surf but no

reports of epic surf. The larger number of surf reports describing Mid Aramoana may indicate a higher popularity with surfers, possibly due to better surf. It must be noted that surfers are more likely to go surfing in good surfing conditions, meaning that the quality of surf observed is likely to be skewed.

<i>Surf Rating</i>	<i>Recurrence</i>	<i>Location Reported On</i>	<i>Number of Beaches Rated</i>	<i>% Of Ratings at Each Location</i>
<i>Epic</i>	6	North Aramoana	0	0
		Mid Aramoana	3	9.6%
		South Aramoana	1	50%
		Whareakeake	2	14.3%
		Undefined	0	0
<i>Good</i>	22	North Aramoana	6	40%
		Mid Aramoana	13	42%
		South Aramoana	1	50%
		Whareakeake	2	14.3%
		Undefined	0	0
<i>Average</i>	23	North Aramoana	5	33%
		Mid Aramoana	11	35.5%
		South Aramoana	0	0
		Whareakeake	6	43%
		Undefined	1	33%
<i>Bad</i>	7	North Aramoana	0	0
		Mid Aramoana	4	13%
		South Aramoana	0	0
		Whareakeake	3	21%
		Undefined	0	0
<i>Terrible</i>	5	North Aramoana	3	20%
		Mid Aramoana	0	0
		South Aramoana	0	0
		Wharakeake	1	7%
		Undefined	1	33%
<i>Undefined</i>	2	North Aramoana	1	6%
		Mid Aramoana	0	0
		South Aramoana	0	0
		Whareakeake	0	0
		Undefined	1	33%

Table 3: A table summary of surf quality reported and the location of the surf.

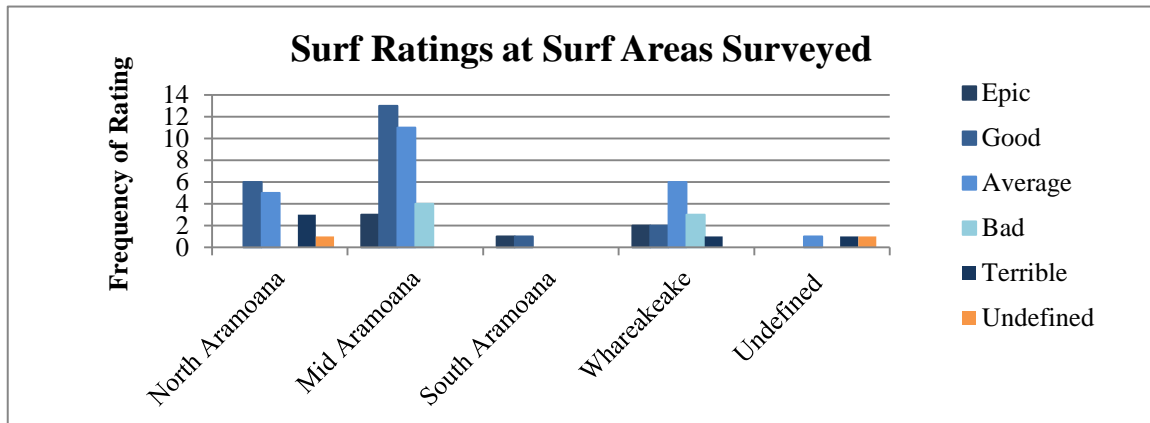


Figure 1: A visual summary of surf ratings at the different surf locations. The surf ratings were recorded by the public in surf surveys.

The days of surf rated as epic were cross referenced with photos from the surf cameras to ground truth the survey observations. Of the four epic surf events, an observation showed that Mid Aramoana had good surf earlier in the day. However, photos from this times period were missing. Epic surf was also observed at Whareakeake Beach by one actor. Photos showed that the waves were not energetic but did have long linear crests that are well suited for surfing. The third day rated as epic surf, also at Mid Aramoana, had clearly defined offset wave crests. The fourth day of epic surf, also at Mid Aramoana had messy choppy waves, low quality for surfing, and no comment had been left.

### Summary of Wave Heights as given by Surf Surveys

The wave height at the Aramoana surf areas surveyed have been revised in Table 4 and graphed in Figure 2. Mid Aramoana had the most reports of waves categorised as head and a half, head and shoulder high (Table 4 and Figure 2). In light of wave heights, North Aramoana had the tallest waves followed by South Aramoana and lastly undefined areas which had the shortest waves.

<i>Wave Heights at Different Areas of Aramoana Beach</i>							
	<i>Double overhead</i>	<i>Head and a half</i>	<i>Head</i>	<i>Shoulder</i>	<i>Waist</i>	<i>Undefined</i>	<i>Total</i>
<i>North Aramoana</i>		2	4	2	6		14
<i>Mid Aramoana</i>	1	7	14	7	1	1	31
<i>South Aramoana</i>		1		1			2
<i>Undefined</i>			2		1		3
<b><i>Total</i></b>	<b>1</b>	<b>10</b>	<b>20</b>	<b>10</b>	<b>8</b>	<b>1</b>	<b>50</b>

Table 4: A summary of the wave heights reported across Aramoana Beach. Wave heights were recorded by the public in surf surveys. Each wave height category is relative to the reporter's body.

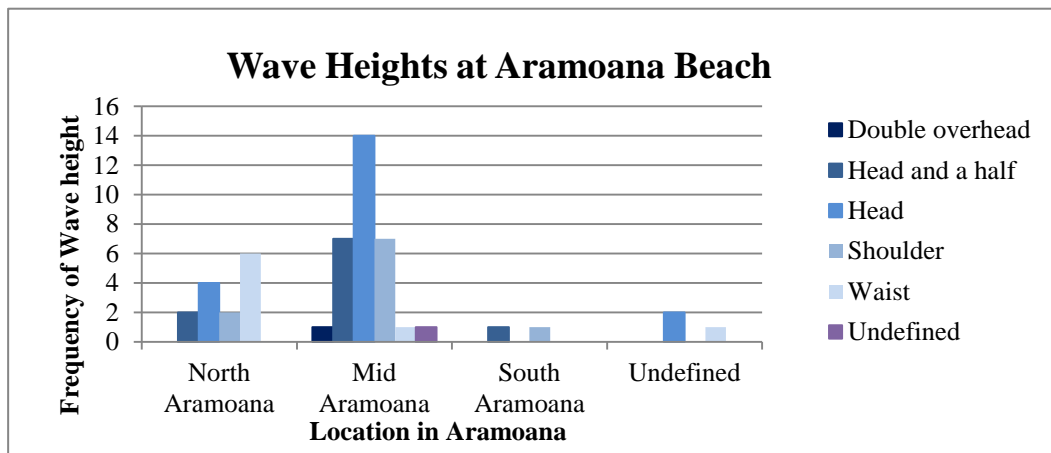


Figure 2: A visual depiction of the wave heights occurring across Aramoana Beach. The wave heights were recorded by the public in surf surveys. Each bar colour corresponds to a wave height relative to the reporter’s body height. Undefined locations are included in the figure.

Whareakeake Beach mostly had waves categorised as being a head and a half high. The proportions of wave heights occurring at Whareakeake Beach are summarised in Table 5 and Figure 3. The wave height is relative to the reporter’s body making for subjective categories.

<i>Wave Height at Whareakeake Beach</i>							
	<i>Double overhead</i>	<i>Head and a half</i>	<i>Head</i>	<i>Shoulder</i>	<i>Waist</i>	<i>Undefined</i>	<i>Total</i>
<i>Whareakeake</i>	1	4	2	3	3		13
<b>Total</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>3</b>		<b>13</b>

Table 5: Summary of wave height at Whareakeake Beach. The wave heights were reported by the public in surf surveys. The wave heights are in relation to the reporter’s body height.

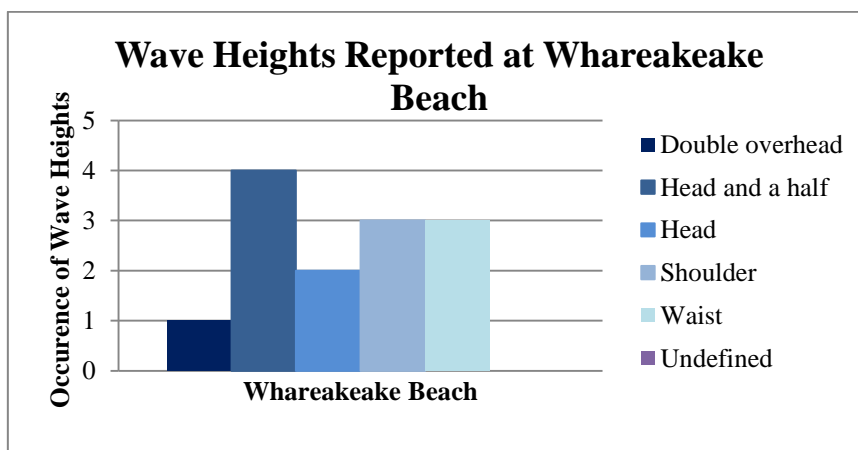


Figure 3: A graphic summary of the wave heights at Whareakeake Beach reported by the public in surf surveys. The wave heights are in relation to the body height of the reporters.

### Wave Heights and Number of Reports of Locations

The higher popularity of Aramoana Beach made for a higher number of surveys to be completed for it, making comparison of wave heights more difficult. For clarifying wave

heights occurring at each location, Table 6 summarises the percentage of wave heights at the given locations.

	<i>% Double Overhead</i>	<i>% Head and a half</i>	<i>% Head</i>	<i>% Shoulder</i>	<i>%Waist</i>	<i>% Undefined</i>
<i>North Aramoana</i>	0	14.3	28.6	14.3	42.9	0
<i>Mid Aramoana</i>	3.2	22.6	45.2	22.6	3.2	3.2
<i>South Aramoana</i>	0	50	0	50	0	0
<i>Whareakeake</i>	7.7	15.4	26	19.5	15.4	0
<i>Undefined</i>	0	0	66.7	0	33.3	0

Table 6: A percentage view of wave height at different surf locations to remove bias from the number of surf reports for Mid Aramoana

South Aramoana has the largest proportion of the highest waves. However, only two reports were submitted for this location so it is not a reliable indication of trends in wave heights at this point in time. Mid Aramoana had the next highest waves, followed by Whareakeake Beach and North Aramoana.

### Summarising Closing Out Surf

Closing out waves are undesirable to surfers as they break sooner resulting in shorter surf. Surfers prefer waves which maintain their shape for a long period of time. Most surveys reported closing out to occur sometimes, which is ambiguous and does not provide a strong indication of the frequency of waves closing out (Table 7). Aramoana Beach had the most reports of no closing out waves indicating a higher quality of waves for surfing.

<i>Closing Out</i>	<i>Recurrence</i>	<i>Location Reported On</i>	<i>Proportion of Beaches within each Rating</i>	<i>Percentage of Closing out Waves at each Location</i>
<i>Always</i>	4	North Aramoana	0	0
		Mid Aramoana	2	6%
		South Aramoana	0	0
		Whareakeake	2	15%
		Undefined	0	0
<i>Sometimes</i>	43	North Aramoana	7	46%
		Mid Aramoana	25	81%
		South Aramoana	1	50%
		Whareakeake	8	53%
		Undefined	1	50%
<i>None</i>	15	North Aramoana	7	46%
		Mid Aramoana	4	13%
		South Aramoana	1	50%
		Whareakeake	2	15%
		Undefined	1	50%
<i>Undefined</i>	3	North Aramoana	1	6%
		Mid Aramoana	1	3%
		South Aramoana	0	0
		Whareakeake	1	6%
		Undefined	0	0

Table 7: A summary of closing out waves at the different surf areas surveyed.

The percentage of closing out waves at each location has been calculated to improve comparison between locations. South Aramoana only had two reports submitted, and two surveys did not define the locations observed. Proportionately, North Aramoana and Mid Aramoana were most commonly classed as always closing out and sometimes closing out. These beaches would subsequently be expected to have lower surf ratings.

**The Relationship between Tide Level and Surf Ratings**

An investigation into the relationship between surf ratings and tide level was carried out to find whether the tide had an influence on the quality of the surf. Aramoana Beach was found to have better surf at low tide, (Fig. 4) while Whareakeake Beach had more epic surf at low tide (Fig. 5).

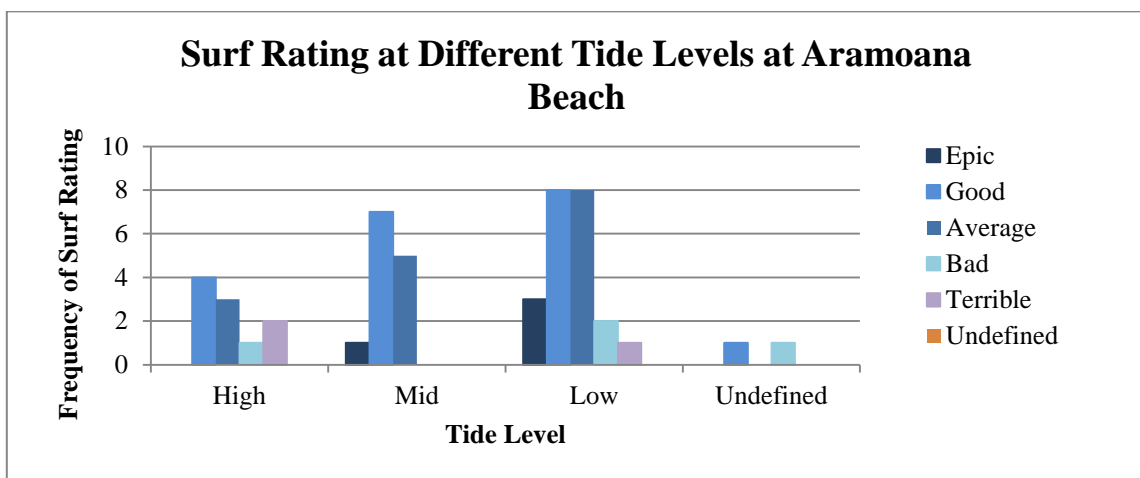


Figure 4: Surf ratings given by surf surveys during different tide levels at Aramoana Beach.

Low tide sees the optimal surf reported in the surf surveys for Whareakeake Beach, and has the highest number of epic surf events. However, it also has the highest number of terrible surf events, with this in mind it is necessary to recognise the number of reports submitted. The sample size is not large enough to justify a relationship between tide levels and quality of surf at Whareakeake Beach.

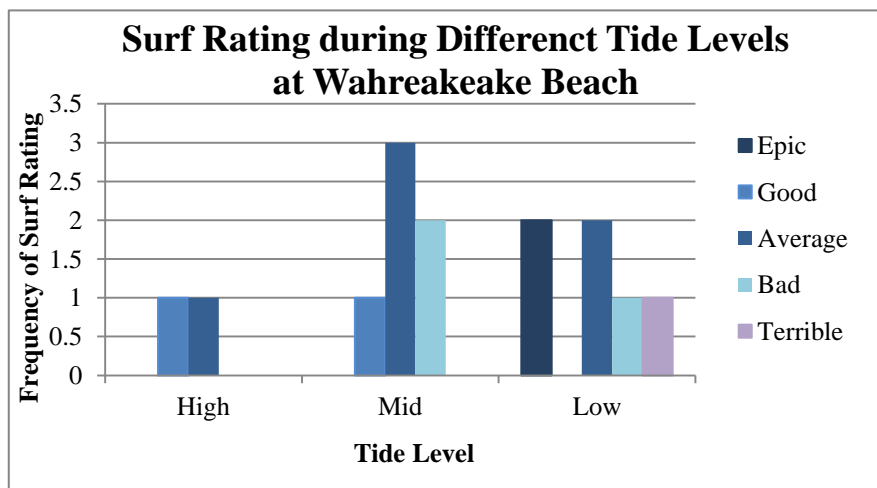


Figure 5: Visual summary of the surf ratings given by surf surveys during different tide levels at Whareakeake Beach.



## Quantifying Surf Barrelling out

Most surveys reported ‘no barrelling’ waves at the different surf locations. Barrelling waves are desirable for surfers as it means a longer lasting wave to surf. ‘Sometimes barrelling’ was the second most reported overall. Table 8 shows the division of surveys between barrelling frequency and location of surf. Figure 6 shows the number of reports of barrelling waves at each location along Aramoana Beach.

<i>Barrelling</i>	<i>Recurrence</i>	<i>Location Reported On</i>	<i>Proportion of Beaches within each Rating</i>	<i>Percentage of Barrelling at each surf location</i>
<i>Yes</i>	10	North Aramoana	2	20%
		Mid Aramoana	4	40%
		South Aramoana	1	10%
		Whareakeake	3	30%
		Undefined	0	0
<i>Sometimes</i>	24	North Aramoana	7	29%
		Mid Aramoana	10	42%
		South Aramoana	0	0
		Whareakeake	6	25%
		Undefined	1	4%
<i>No</i>	30	North Aramoana	5	17%
		Mid Aramoana	17	57%
		South Aramoana	1	3%
		Whareakeake	5	17%
		Undefined	2	7%
<i>Undefined</i>	1	North Aramoana	1	100%
		Mid Aramoana	0	0
		South Aramoana	0	0
		Whareakeake	0	0
		Undefined	0	0

Table 8: Occurrence of barrelling waves as reported in surf surveys at the different surf areas.

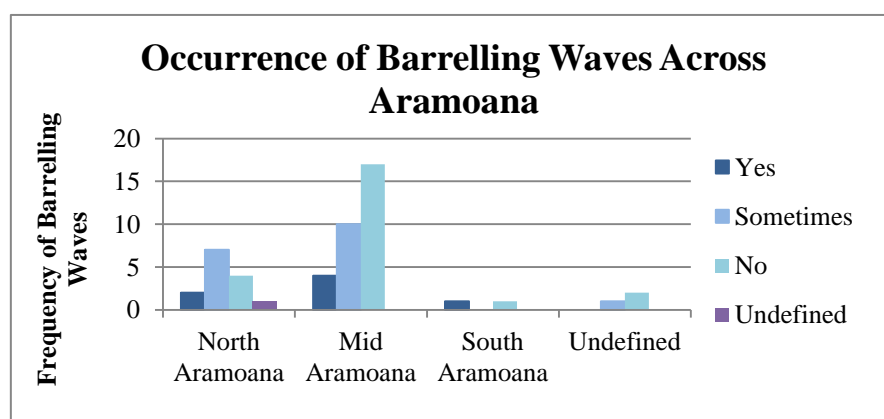


Figure 6: A visual representation of the occurrence of barrelling waves across Aramoana Beach, as reported in surf surveys. Undefined locations are included in this figure.

Whareakeake Beach has been mostly reported to have barrelling waves ‘sometimes’. ‘No barrelling’ was reported as the second most common category of waves. The frequency of barrelling waves at Whareakeake Beach are indicated in the figure below.

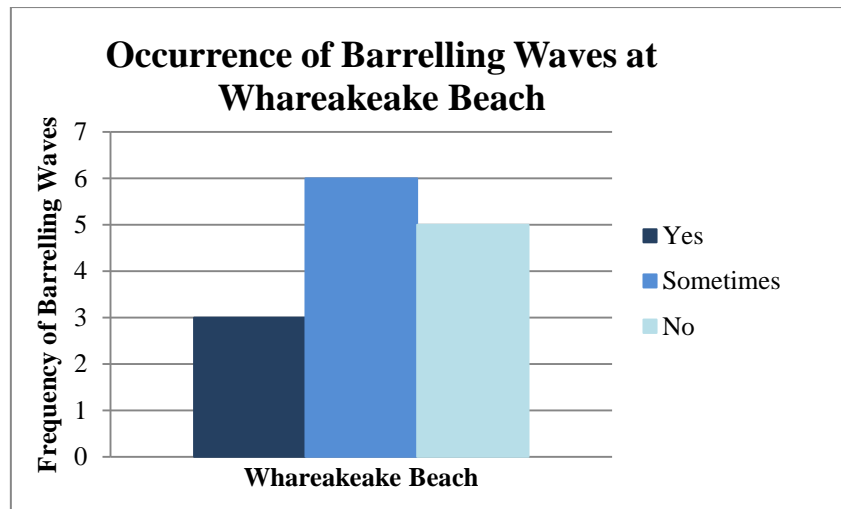


Figure 7: A visual representation of the occurrence of barrelling waves at Whareakeake Beach as reported by the public in surf surveys.

The different sample sizes must be noted when comparing the frequency of barrelling waves at both beaches. Reports on Aramoana Beach make up 74% of the surveys completed, while Whareakeake Beach makes up 22% of surveys completed. The remaining 5% of the surveys submitted did not have a location defined. The inconsistency in sample sizes means the comparison is not robust as more data is required to form a substantive conclusion.

### The Effect of Barrelling Waves on Surf Ratings as Recorded in Surf Surveys

The relationship between the occurrence of barrelling waves and surf ratings at Aramoana Beach is explored in Table 9. It is noted that surf ratings were found to be higher when barrelling waves were reported, with most reports of bad and terrible surf occurring when there were ‘no barrelling’ waves.

	<i>Epic</i>	<i>Good</i>	<i>Average</i>	<i>Bad</i>	<i>Terrible</i>	<i>Undefined</i>	<i>Total</i>
<i>Yes</i>	2	4	1				7
<i>Sometimes</i>	2	7	7			2	18
<i>No</i>		9	8	4	4		25
<i>Undefined</i>			1				1
<i>Total</i>	4	20	17	4	4	2	51

Table 9: A summary of surf ratings in relation to occurrences of barrelling waves

The relationship between the rating of surf and occurrences of barrelling waves at Whareakeake Beach is similar to that of Aramoana Beach. Surf was rated as ‘epic’ more when barrelling waves were occurring (Table 10). Surf with no barrelling waves was mostly described as terrible or bad. However, it must be noted that there are fewer reports of this occurrence at Whareakeake Beach than at Aramoana Beach.

<i>Relationship between the occurrence of Barrelling Waves and Surf-rating at Whareakeake Beach</i>						
	<i>Epic</i>	<i>Good</i>	<i>Average</i>	<i>Bad</i>	<i>Terrible</i>	<i>Total</i>
<i>Yes</i>	2	1				3
<i>Sometimes</i>		1	4	1		6
<i>No</i>			2	2	1	5
<i>Total</i>	2	2	6	3	1	14

Table 10: A summary of the relationship between the occurrence of barrelling waves and surf quality at Whareakeake Beach as reported by the public in surf surveys.

The surf ratings for both beaches reflect the public’s preference for barrelling waves, which provide a longer surf.

The percentage of surf ratings for each category used to describe the frequency of barrelling waves at Aramoana and Whareakeake Beach is summarised in Table 11 and 12 to assess the ratings without the difference in sample sizes. The percentage has been accumulated in the table to indicate which category of barrelling surf attains the larger proportion of better surf ratings. The rows which accumulate 100.0% in the good and epic columns show higher surfing ratings than rows which accumulate 100% in the bad and terrible columns.

<i>Relationship between surf-rating and occurrence of barrelling waves at Aramoana Beach</i>							
	<i>Epic</i>	<i>Good</i>	<i>Average</i>	<i>Bad</i>	<i>Terrible</i>	<i>Undefined</i>	<i>Total</i>
<i>Yes</i>	28.6%	85.7%	100.0%	100.0%	100.0%	100.0%	100.0%
<i>Sometimes</i>	11 %	49.9%	88.8%	88.8%	88.8%	100.0%	100.0%
<i>No</i>	0 %	36.0%	68.0%	84.0%	100.0%	100.0%	100.0%
<i>Undefined</i>	0 %	0.0%	100.0%	0.0%	0.0%	0.0%	10.00%

Table 11: The percentage of surf ratings for each category of barrelling waves used to describe the surf.

Table 11 shows all barrelling surf was rated as epic and good. As the occurrence of barrelling surf decreased, the proportion of surf rated as good and epic decreased.

<i>Surf-ratings at Whareakeake Beach of each Frequency of Barrelling Waves</i>						
	<i>Epic</i>	<i>Good</i>	<i>Average</i>	<i>Bad</i>	<i>Terrible</i>	<i>Total</i>
<i>Yes</i>	66.7%	100.0%	100.0%	100.0%	100.0%	100.0%
<i>Sometimes</i>	0.0%	16.7%	83.34%	100.0%	100.0%	100.0%
<i>No</i>	0.00%	0.00%	40.0%	80.0%	100.0%	100.0%

Table 12: The percentage of surf ratings for each category used to describe the frequency of barrelling waves at Whareakeake Beach.

In Table 12 it is shown that surf which had barrelling waves reported at Whareakeake Beach had higher surf ratings than surf with no barrelling waves as expected.

### Frequency of Barrelling Waves with Wind Direction

The effect of wind direction on barrelling waves was investigated to find whether better surf could be predicted from particular wind conditions. Table 13 and Figure 8 summarise the

reports of barrelling waves and the associated wind direction at Aramoana Beach as reported by the public. Barrelling waves had a larger occurrence with offshore winds at Aramoana Beach.

	<i>Yes</i>	<i>Sometimes</i>	<i>No</i>	<i>Undefined</i>	<i>Total</i>
<i>Onshore</i>	1		3		4
<i>Cross-shore</i>	2	1	6	1	10
<i>Offshore</i>	4	14	15		33
<i>Undefined</i>		3	1		4
<i>Total</i>	<b>7</b>	<b>18</b>	<b>25</b>	<b>1</b>	<b>51</b>

Table 13: Summary of the frequency of barrelling waves in different wind directions at Aramoana Beach

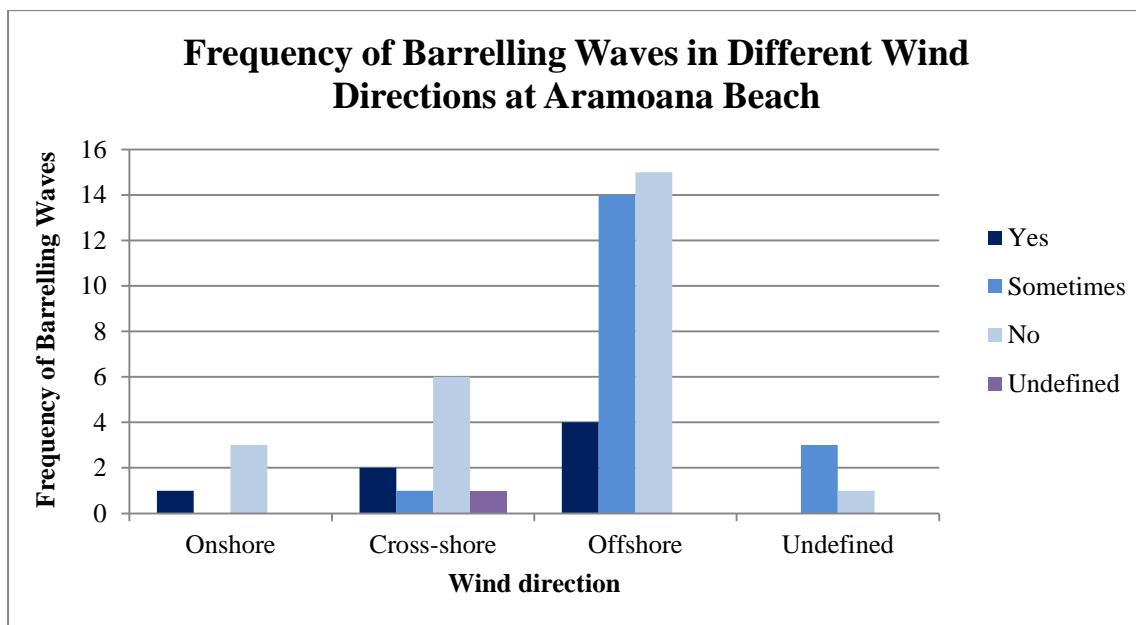


Figure 8: A visual summary of the frequency of barrelling waves in different wind directions at Aramoana Beach. The frequency and wind directions are as reported by the public in surf surveys.

The ‘sometimes’ category was still the most commonly used to describe the occurrence of barrelling waves. The description is ambiguous and does not signify whether the waves were barrelling frequently but not always occasionally but still present. The survey could be improved by including more categories to be selected from such as ‘often barrelling’ and ‘rarely barrelling’ or similar.

Whareakeake Beach saw the same trend as Aramoana Beach in that barrelling waves occurred more in offshore winds. The trend may be due to an offshore wind driving against the direction of the waves, supporting their shape for longer and delaying the waves from breaking. Table 14 and Figure 9 indicate the trend.

<b>Frequency of Barrelling Waves in Different Wind Directions at Whareakeake Beach</b>				
	<i>Yes</i>	<i>Sometimes</i>	<i>No</i>	<i>Total</i>
<i>Onshore</i>			1	1
<i>Cross-shore</i>		1	1	2
<i>Offshore</i>	3	4	2	9
<i>Variable</i>		1	1	2
<i>Total</i>	<b>3</b>	<b>6</b>	<b>5</b>	<b>14</b>

Table 14: A summary of barrelling waves in different wind directions. The frequency of barrelling waves and wind direction are as reported by the public in surf surveys.

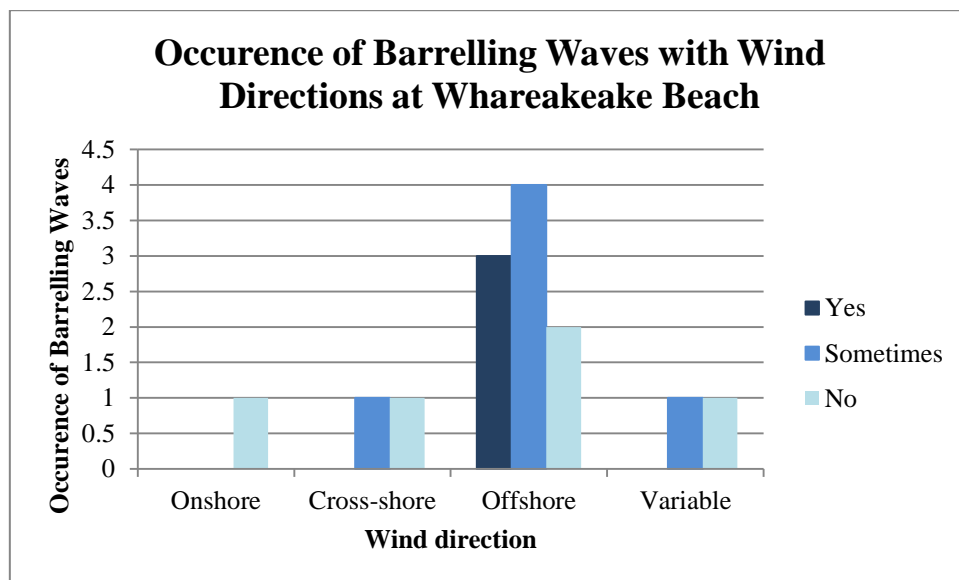


Figure 9: The frequency of barrelling waves at Whareakeake Beach in different wind directions. The wind direction and frequency of barrelling waves is as reported by the public in surf surveys.

The ‘sometimes’ category was also most commonly used to describe the wind direction, which limits the trend that can be extracted from the data. Again it is recommended that the categories are made more specific by enhancing the spectrum of descriptions for the reporter to choose from. By doing so, the categories will most likely be representative of the actual wave conditions more closely.

### **Relationship between Wind Speed and Direction at Aramoana and Whareakeake Beach**

The influence of wind direction on wind speed was investigated to find whether a stronger wind resulted mostly from a particular direction, possibly indicating a dominant wind direction. From this, better surf conditions may be able to be predicted.

As seen in Table 15 and Figure 10, an offshore wind at Aramoana Beach was more commonly categorised as strong and moderate. As the surveys tend to be observing daylight hours such a trend is unexpected. It is well established that onshore winds are more common during the day as the sun warms the land causing air to rise. A low pressure zone then results, and air from offshore comes into land and replaces it. The reverse occurs at night time when the land cools more quickly than the ocean. The relatively warmer air over the ocean rises

leaving a low pressure zone. The air from land moves in to replace it, resulting in an offshore wind. With this in mind, topography and larger scale atmospheric cells also play a strong role in the complex atmospheric circulation system which could explain the persistent offshore winds.

The trend seen in the surf surveys do not reflect prevailing South Westerly winds common in Dunedin. The lie of Aramoana Beach means South Westerly winds would create cross shore and onshore winds.

The offshore winds are possibly a reflection of the dominant Foehn winds from the North West. Assessing the lie of the beach, a prevailing North Westerly wind could cause offshore winds at Aramoana. It must be noted that the prevailing wind direction does not necessarily equal stronger winds. More energetic winds which are stronger could originate from the South while possibly more common, less energetic wind could arrive from the North.

The days people go surfing is also a likely factor in the observations recorded in the surf surveys as the public are more likely to go surfing in good surf conditions. Good surfing conditions have been found to correlate with offshore winds, as shown in Figures 8 and 9, and Tables 13 and 14. Therefore, more surf observations will be made of days with these conditions. The higher number of observations during offshore winds is apparent at Aramoana Beach in Table 15 and Figure 10, also in Table 16 and Figure 11 of Whareakeake Beach.

<i>Wind-speed and Wind direction at Aramoana Beach</i>					
	<i>Light</i>	<i>Moderate</i>	<i>Strong</i>	<i>Undefined</i>	<i>Total</i>
<i>Cross-shore</i>	1	8	1		10
<i>Offshore</i>	15	14	4		33
<i>Onshore</i>	3	1			4
<i>Undefined</i>	3			1	4
<i>Total</i>	<b>22</b>	<b>23</b>	<b>5</b>	<b>1</b>	<b>51</b>

Table 15: A summary of the wind direction and associated wind speeds at Aramoana Beach.

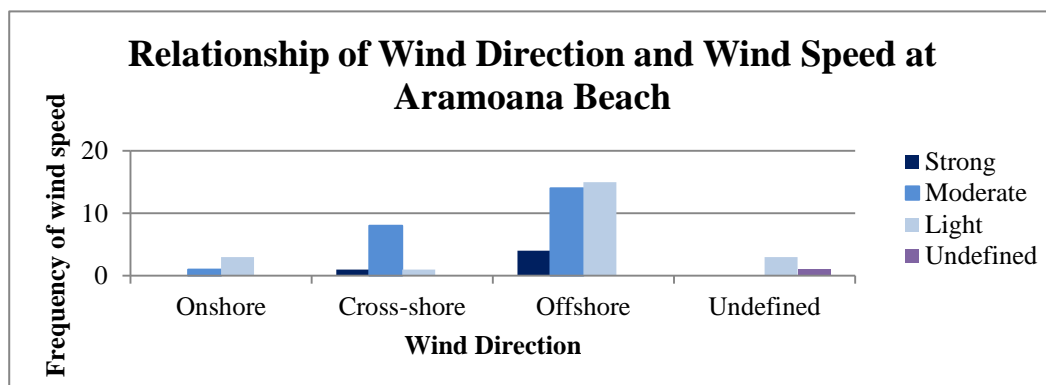


Figure 10: A visual summary of the relationship between wind speed and wind direction at Aramoana Beach. Both wind speed and direction are as recorded by the public in surf surveys.

The same assessment of wind direction and wind speed was repeated for Whareakeake Beach. The strength of offshore winds were most commonly categorised as light, followed by moderate and strong. This is similar to the trend as seen at Aramoana Beach.

<i>Wind Speed and Wind Direction at Whareakeake Beach</i>					
	<i>Strong</i>	<i>Moderate</i>	<i>Light</i>	<i>Variable</i>	<i>Total</i>
<i>Onshore</i>	1				1
<i>Cross-shore</i>		3			3
<i>Offshore</i>	2	3	4		9
<i>Variable</i>			1	1	2
<i>Undefined</i>			2		2
<i>Total</i>	3	6	7	1	17

Table 16: A summary of the wind speeds in different directions at Whareakeake Beach. Wind speed and direction are as reported by the public in surf surveys.

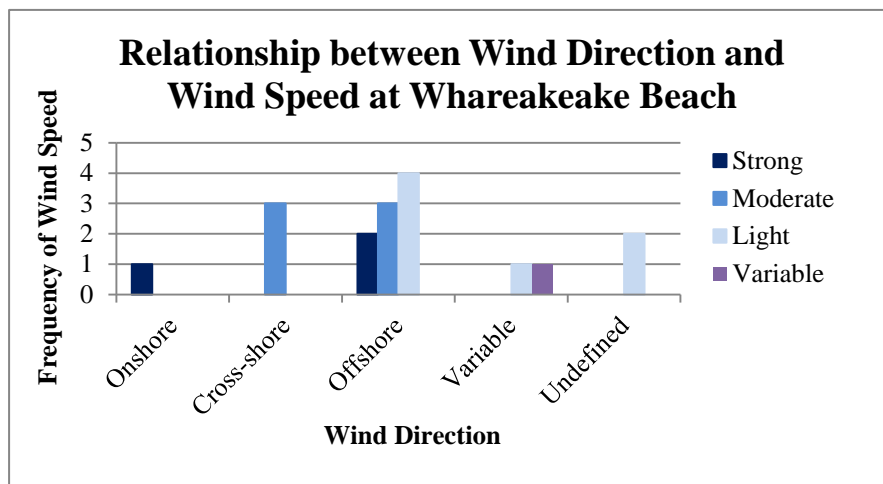


Figure 11: A visual representation of the relationship between wind speed and direction at Whareakeake Beach. Both wind speed and direction are as recorded by the public in surf surveys.

### Comments on Surf Quality

An investigation to the kinds of comments made in the surf surveys was carried out. Most comments were made about Aramoana Beach, particularly at Mid Aramoana. The larger number of comments made about this part of the beach is likely to be a reflection of the larger number of surveys submitted in regards to Mid Aramoana surf. Table 17 and Figure 12 indicate the relative number of comments made about each surf location. The types of comments made have been categorised into further surf detail, survey feedback, emotive feedback and no comment. Comments that discuss the history of the surf break were classed as emotive as they were not related to the surf observed in the report. Most comments made provided further insight to the detail of the surf, followed by emotive feedback. Mid Aramoana had more emotive feedback than all other surf locations, with the most comments giving further insight to surf quality. The larger numbers of these types of categories may be a reflection of the higher popularity of Aramoana Beach with surfers. It is also a more

contentious surf break as it is a nationally significant feature so people may have a stronger sense of affiliation associated with it than Whareakeake Beach.

<i>Location of Surf Commented On</i>					
	<i>Further surf detail</i>	<i>Survey feedback</i>	<i>Emotive feedback</i>	<i>No Comment</i>	<i>Total</i>
<i>North Aramoana</i>	2	1		12	15
<i>Mid Aramoana</i>	8		5	18	31
<i>South Aramoana</i>	1			1	2
<i>Whareakeake</i>	5		1	8	14
<i>Undefined</i>	1			2	3
<b>Total</b>	<b>17</b>	<b>1</b>	<b>6</b>	<b>41</b>	<b>65</b>

Table 17: Summary of the locations of surf that has been commented on by the public

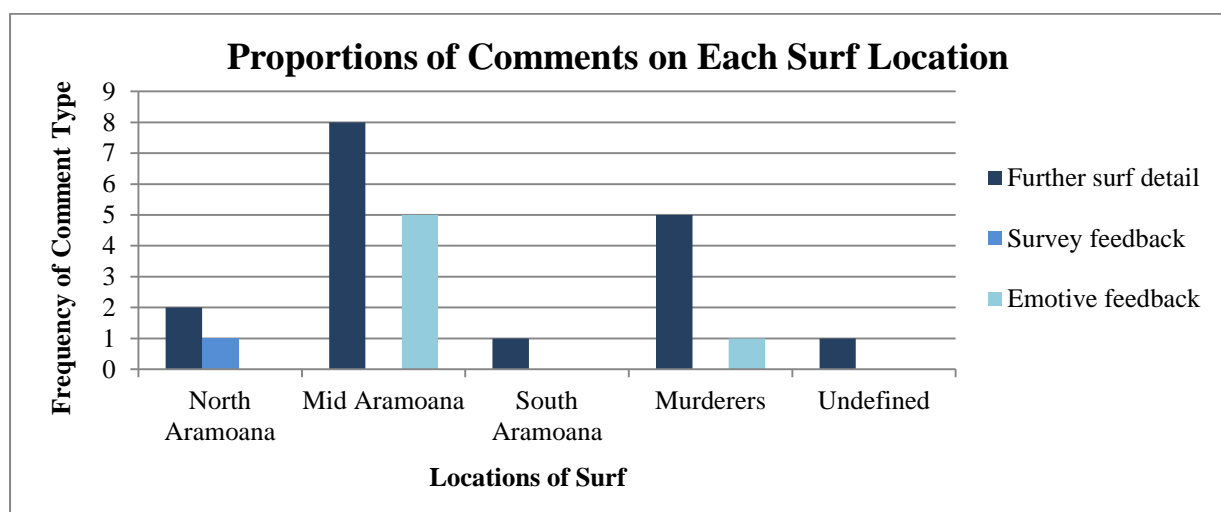


Figure 12: A visual representation of the number of comments written about each surf location in the surf location. Entries with no comments have been excluded from the graph to clarify the feedback given.

The relationship between the type of comments made and the occurrence of barrelling waves has been summarised in Table 18. Most of the comments made provided further detail into the quality of the surf. It can be seen that Mid Aramoana had the highest proportion of emotive feedback, and the lowest occurrence of barrelling waves. This relationship was studied in Table 18. It is possible this indicates more emotive feedback is given when the surf is lower quality.

<i>Count of Comment Types Related to Frequency of Barrelling Waves</i>					
	<i>No Comment</i>	<i>Emotive feedback</i>	<i>Further surf detail</i>	<i>Survey feedback</i>	<i>Total</i>
<i>North Aramoana</i>	12		2	1	15
<i>No</i>	4		1		5
<i>Sometimes</i>	6		1		7
<i>Yes</i>	2				2
<i>Undefined</i>				1	1
<i>Mid Aramoana</i>	18	5	8		31
<i>No</i>	9	4	4		17



<i>Sometimes</i>	7		3		10
<i>Yes</i>	2	1	1		4
<b>South Aramoana</b>	<b>1</b>		<b>1</b>		<b>2</b>
<i>No</i>			1		1
<i>Yes</i>	1				1
<b>Whareakeake</b>	<b>8</b>	<b>1</b>	<b>5</b>		<b>14</b>
<i>No</i>	2		3		5
<i>Sometimes</i>	5		1		6
<i>Yes</i>	1	1	1		3
<i>Undefined</i>	<b>1</b>		<b>1</b>		<b>2</b>
<i>No</i>	1		1		2
<b>Total</b>	<b>40</b>	<b>6</b>	<b>17</b>	<b>1</b>	<b>64</b>

Table 18: By relating the occurrence of barrelling waves with the type of comment left, an indication of the emotive component in surf rating can be gained.

### Summary of Comments

Making the comment section compulsory to fill out would ensure more feedback is given. Emotive feedback mostly discussed how important the surf break at Aramoana is to the community, and remarked how the surf is not as good as it has been previously.

The comments giving further detail into the surf gave information into how powerful the waves were, the frequency of peaks, the size of swell, width of waves, whether waves were closing out, wave speed, chopping of surf by current, features of bathymetry such as holes and changes to sand banks. Of the 17 comments categorised as giving further detail of the surf, 12 comments were negative and four were positive. A further two comments were neutral with one comment about a large hole offshore, and another that mentioned the surf had been better the day before. One of the negative comments observed three yellow eyed penguins.

A single comment gave feedback on the survey and remarked that surfers only go out in good surfing conditions leading to the survey attaining skewed results.

### Conclusion

The purpose of this report is to attain an insight to the public view of surf at Aramoana and Whareakeake Beaches. Aramoana Beach had more surveys completed than Whareakeake Beach. The Aramoana surveys completed could be a result of higher popularity, better surf, stronger affiliation or a heightened awareness of the beach due to its status as a nationally significant surf break. Those who completed the survey more than once were noted to be taken into account while assessing further analysis.

Mid Aramoana had the most surf events categorised as ‘good’ and Whareakeake had the highest proportion of ‘epic’ surf. Whareakeake Beach also had the highest proportion of bad surf while Mid Aramoana had no reports of bad or terrible surf.

Aramoana had reports of highest waves relative to the reporter’s body height most consistently. South Aramoana had a higher proportion of waves of the same height as Mid

Aramoana. However, as only two surveys were completed for South Aramoana, it is therefore, not a reliable indication to height of waves at the location.

The 'sometimes' category was the most commonly used category for describing the frequency of closing out waves. This ambiguous description does not provide a clear indication to the frequency of the waves closing out. Aramoana Beach had the most reports of no waves closing out indicating a higher quality of surf.

Aramoana was found to have better surf ratings from the public at low tide. This could be a coincidence or the tide level may have an effect on when the waves break.

Barrelling waves are better for surfers as they provide longer breaks for riding. Most of the surveys completed reported 'no barrelling waves' at all surf locations. However, the mid Aramoana break indicated there were more reports of waves barrelling 'sometimes'. This category of wave break was the second most common occurrence across all beaches.

Two key relationships were observed at Aramoana and Whareakeake Beaches. The first of these relationships was higher surf ratings with a greater occurrence of barrelling waves. The second relationship was between the occurrence of barrelling waves and the type of feedback given in the surf surveys.

The occurrence of barrelling waves at each surf location was related to the type of comment given. It was found that more emotive feedback was given for Mid Aramoana when surf had less barrelling waves. This showed that when the waves were not good for surfing, the public gave more reflection on what the surf has been like previously and how much the wave break means to them.

The surf survey could be improved to attain more information from each entry. By defining more categories for the reporter to choose from a more specific indication to the quality of the surf and the reporter's motivations for filling in the survey could be achieved. For example, 'sometimes' is a category used to describe the frequency of barrelling and closing out waves. If 'sometimes' was replaced with descriptions such as 'often barrelling', 'occasionally barrelling' and 'rarely barrelling' then a better indication of the surf conditions could be provided. Adding to this, making the comments section compulsory would force the actor to provide further observations.

One comment in the surf questionnaire remarked on the bias information the survey will be attaining due to the public only surfing in good conditions, and therefore, will be missing days of bad surf. Perhaps the surf survey needs to be supplemented with an explanation of why the surf survey is instigated, and what other monitoring the survey is adding to.

The four epic surf ratings from the surveys were cross referenced to find whether the observations were representative or not. The surf observations in the survey must be taken with variation in mind as they are formed from opinions.

- 1) The first report, of Mid Aramoana, had excellent surf earlier in the day although the dataset was missing photos of the actual time reported. The problem of missing

photos in the camera dataset is being solved by adding to the battery power for each camera.

- 2) The second day of 'epic' surf, at Whareakeake Beach, had good wave form for surfing but was not very energetic.
- 3) The third observation, of Mid Aramoana, correctly recalled good wave crests for surfing.
- 4) The fourth day of 'epic' surf, observed at Mid Aramoana, was conflicting with the photos which showed the surf to be choppy and low quality for surfing.