

Port Otago Limited  
15 Beach Street  
Port Chalmers

# Summary Report of Surf Surveys

September 2014- May 2015

Leigh McKenzie



## Purpose of Surf Survey Summary Report

Port Otago Ltd is monitoring changes in surf quality and validating models of surf dynamics at Aramoana and Murderers Beach. These beaches are key concerns as their wave formations could be affected by the dredged sediment from Otago Harbour that is relocated to the disposal ground off Heyward Point.

In order to acquire the information needed, three cameras have been set up to take photos of the surf every five minutes during daylight hours. Two cameras over look Aramoana Beach, and another over looks Murderers Beach. All cameras have solar panels that power the camera batteries. A surf survey is used to gather information on the public opinion of the surf quality.

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.

This report follows the initial surf summary report written in December 2014. As the second report, its purpose is to provide an updated summary on results from surf surveys, to compare submissions made since the first report was written, and to identify any changes in submissions.

## Survey Submissions

Aramoana Beach is a more popular surf break than Murderers, and has a higher profile due to its contentious past and status as a nationally significant natural feature. Aramoana is also easier to access and has better quality waves more regularly than Murderers Beach. Aramoana's higher profile may be the 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. Seven surveys did not define the surf location.

<i>Location</i>	<i>Number of Surveys</i>
<i>Aramoana Beach</i>	91
<i>North</i>	26
<i>Mid</i>	58
<i>South</i>	7
<i>Murderers Beach</i>	26
<i>Undefined</i>	7
<i>Total</i>	124

Table 1: Summary of total surveys submitted for each location. Both reported periods have been included in this table.

The initial surf report had 65 submissions, since then there have been 124, an increase of 59 submissions over 6 months. 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 Murderers Beach, as the number of surveys describing Murderers Beach is only 28% of those describing surf at Aramoana.

As mentioned above, it could also be an indication of popularity or awareness of the influence dredging has 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 be more 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.

As the sample sizes for each surf location are so different and submitted at different times it is difficult to make representative comparisons. In consequence, this report will focus on differences since the original report. Not all sections of the initial report have been repeated in this report as some were found to be invaluable.

### Repeat 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. The entry made by Met Ocean Services during the early stages of implementing the surf survey online has also been included in Table 2 to be acknowledged when assessing further data analysis.

<b>Submitter</b>	<b>Number of Submissions</b>	<b>Location of Surf Reported</b>	<b>Rating</b>
<i>1</i>	2	Mid Aramoana	Average
		Murderers Beach	Bad
<i>2</i>	4	Mid Aramoana	Good
		Mid Aramoana	Good
		Murderers Beach	Bad
		Murderers Beach	Good
<i>3</i>	3	-	-
		-	-
		-	-
<i>4</i>	3	Mid Aramoana	Average
		North Aramoana	Bad
		North Aramoana	Good
<i>5</i>	2	Mid Aramoana	Good
		Mid Aramoana	Average
<i>6</i>	2	South Aramoana	-
		-	-
<i>7</i>	2	Mid Aramoana	Good
		South Aramoana	Terrible
<i>8</i>	2	Murderers Beach	Good
		Murderers Beach	Epic
<i>9</i>	3	South Aramoana	Good
		Mid Aramoana	Good
		North Aramoana	Average
<i>10</i>	3	Mid Aramoana	Average
		Murderers Beach	Average
		Mid Aramoana	Average
<i>11</i>	2	Mid Aramoana	Average
		Mid Aramoana	Bad
<i>12</i>	2	Murderers Beach	Average
		-	Average
<i>13</i>	7	Mid Aramoana	Average
		Mid Aramoana	Good
		Mid Aramoana	Average
		Mid Aramoana	Average
		North Aramoana	Good
		North Aramoana	Average
		North Aramoana	Good
<i>14</i>	5	Mid Aramoana	Good
		Mid Aramoana	Average
		Mid Aramoana	Average
		Murderers Beach	Average
		Murderers Beach	Average

<i>15</i>	2	Mid Aramoana	Average		
		Mid Aramoana	Good		
<i>16</i>	2	South Aramoana	Average		
		Murderers Beach	Average		
<i>17</i>	2	Mid Aramoana	Average		
		Mid Aramoana	Good		
<i>18</i>	4	Mid Aramoana	Good		
		Mid Aramoana	Average		
		Mid Aramoana	Good		
		South Aramoana	Average		
<i>19</i>	2	Murderers	-		
		Mid Aramoana	Average		
<i>20</i>	2	Murderers	Bad		
		Murderers	Average		
<i>Met Ocean Services</i>	1	North Aramoana	Good		
<b>Total</b>	<b>57</b>	<b>North Aramoana</b>	<b>7</b>	<b>Epic</b>	<b>1</b>
		<b>Murderers</b>	<b>13</b>	<b>Good</b>	<b>18</b>
		<b>Mid Aramoana</b>	<b>27</b>	<b>Average</b>	<b>26</b>
		<b>South Aramoana</b>	<b>5</b>	<b>Bad</b>	<b>5</b>
		<b>Undefined</b>	<b>5</b>	<b>Terrible</b>	<b>1</b>
				<b>Undefined</b>	<b>6</b>

Table 2: A summary of all those who submitted more than once. The table shows the number of submissions made, the location of surf reported on and the rating of the surf reported. The names of participants have been coded for anonymity. Both reporting periods are included.

Two surveys submitted in 2014 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.

The list of repeat submitters has increased by 12 participants since the original surf report. It is interesting to note that there has been an increase in the number of people who have submitted surveys more than once but only 59 submissions more have been entered.

Since the original report there has been a decrease in the number of submissions per month. In the first three months of the survey being open we had 65 submissions, meaning an average of 21 submissions per month. However, since December we have had 59 entries submitted meaning an average of 12 submissions per month.

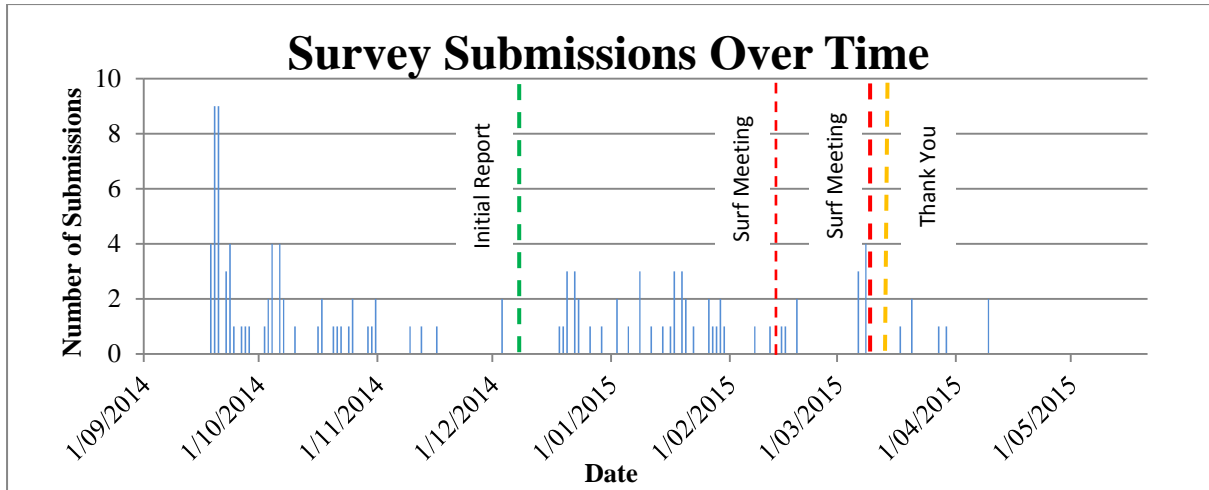


Figure 1: The number of submissions has been graphed over time to show a timeline of when submissions were made. The red lines indicate the day of public surf meetings, the thickness of the line indicates the size of the meeting. The green line indicates the last report written and the yellow indicates when the thank you message was sent.

The initial peak in submissions could be a result of surfers taking advantage of the opportunity to express their thoughts to the port. Over time since the surveys were opened, the submissions have diminished. The decrease in submissions over the Christmas period can be seen in Figure 1. The decrease could correlate with people leaving the city for holiday, especially students leaving at the end of the academic year, who are in the age group more likely to use the online survey. Secondly, one would have expected an increase in submissions around the time of surf meetings; however, this has not been the case. Since the last survey report, submissions have been fewer but more consistent.

### Summarising Surf Ratings

As found in the previous report, Mid Aramoana has the highest number of ‘epic’ surf events, Murderers has increased to being equal to Aramoana with three epic surf events. South Aramoana has changed to having the second most epic surf events. The higher number of submissions entered for Mid Aramoana may be contributing to the apparent higher quality of surf. The submissions also rated Mid Aramoana as having the most ‘good’ surf and the most ‘bad’ surf. The ratings of surf reported on has been summarised in Figure 2.

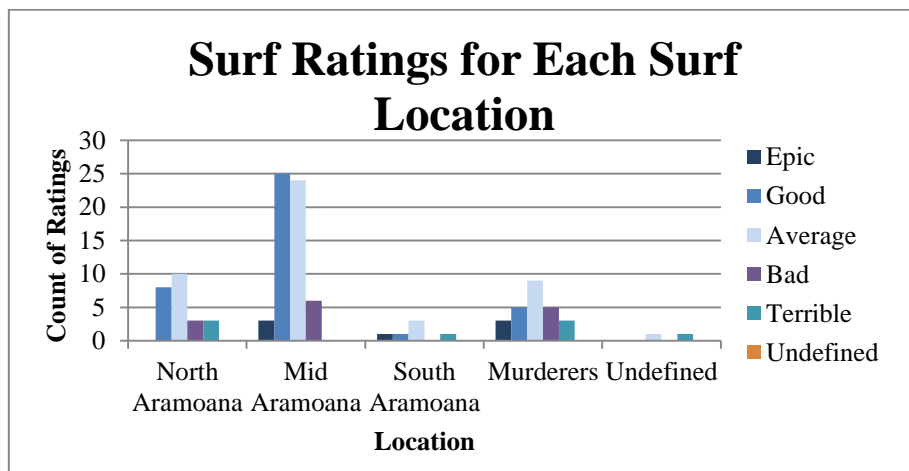


Figure 2: A summary chart presenting the surf ratings for each location.

North Aramoana and Murderers Beach have the highest occurrence of ‘terrible’ surf. Mid Aramoana mostly had ‘good’ and ‘average’ surf. To make comparisons between different sample sizes clearer, the percentages have been calculated and are shown in Figure 3.

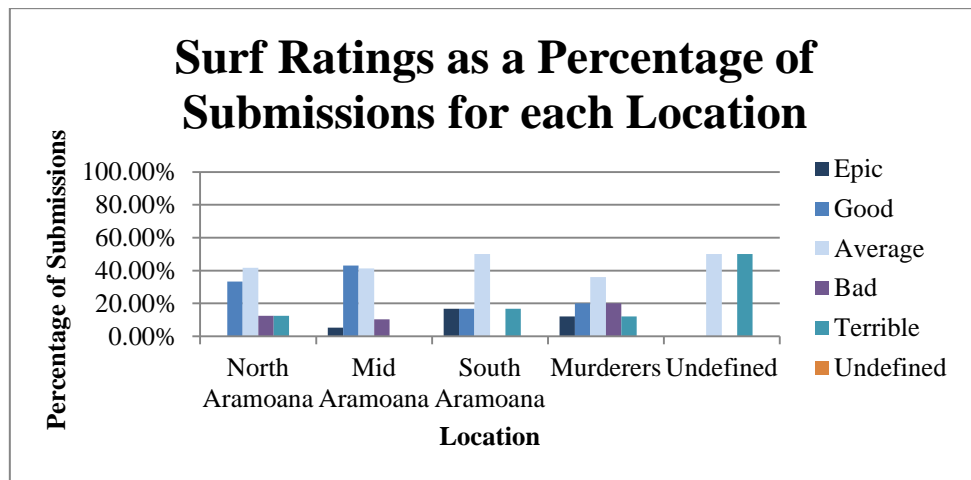


Figure 3: Each rating shows the percentage for each surf location to make comparing surf quality between locations easier by removing the issue of different sample sizes.

When assessing the ratings as a percentage of the submissions made, South Aramoana becomes the surf break with the largest proportion of ‘epic’ surf events, followed by Murderers Beach. ‘Good’ surf occurs at Mid Aramoana the most and South Aramoana has the highest proportion of ‘average’ surf, along with the submissions left undefined. ‘Bad’ surf was more prevalent in submissions for Murderers Beach than any other surf break and South Aramoana shows the largest proportion of ‘terrible’ surf rather than at North Aramoana and Murderers Beach when viewed as a simple count.

It must be noted that South Aramoana has only had seven surveys submitted so the sample may not be as representative as Mid Aramoana which has 58. People may not surf South Aramoana unless conditions are fitting. Such a bias is applicable to all the survey submissions as people are more likely to surf when they think conditions are favourable. However, a small sample size of seven may magnify the bias while a sample size of 58 is likely to represent a larger range of conditions.

### Surf Ratings Over Time

In order to gauge whether the public have changed their perception in the quality of waves, the surf ratings were graphed over time to identify trends. Figure 4 and 5 show the qualitative assessment.

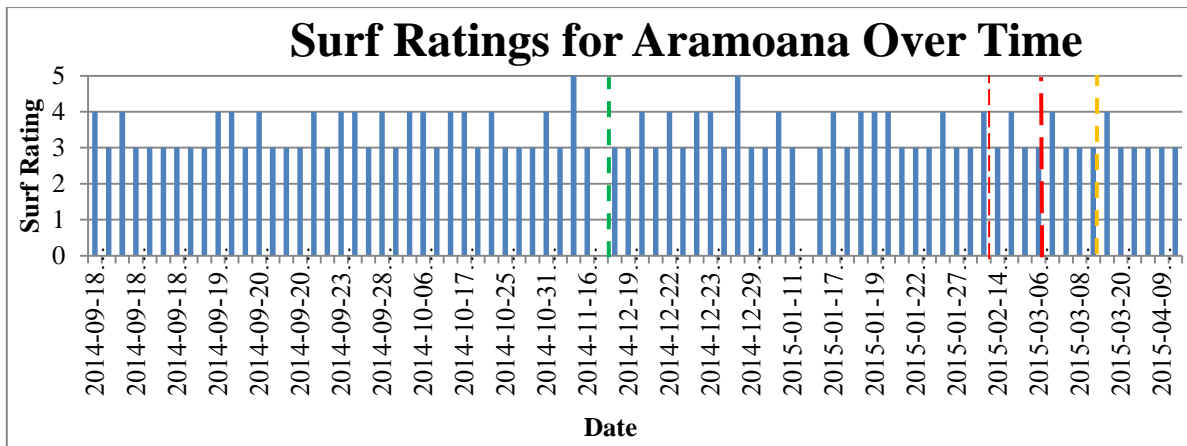


Figure 4: All submissions for Aramoana have been included in this figure. The surf ratings have been translated into a numeric value for ease of graphing against time. The ratings are 5='epic', 4='good', 3='average', 2='bad' and 1='terrible'. The green line indicates when the last report was written, the red indicates the public surf meetings. The thickness of the lines indicates the size of the meetings. The yellow indicates when the thank you message was sent to submitters. The submission for 2013 has been removed as the survey was not open at that time.

No obvious change in surf ratings can be seen in either Aramoana Beach or for Murderers Beach in Figure 4 and Figure 5. The surf surveys have only been open since September 2014 which may not be long enough to show any trends. Seasonal trends may not become clear until after a full year has been surveyed, although the uneven timing of submissions may make trends more difficult to identify. Similarly, there is no obvious difference in surf ratings since the last report.

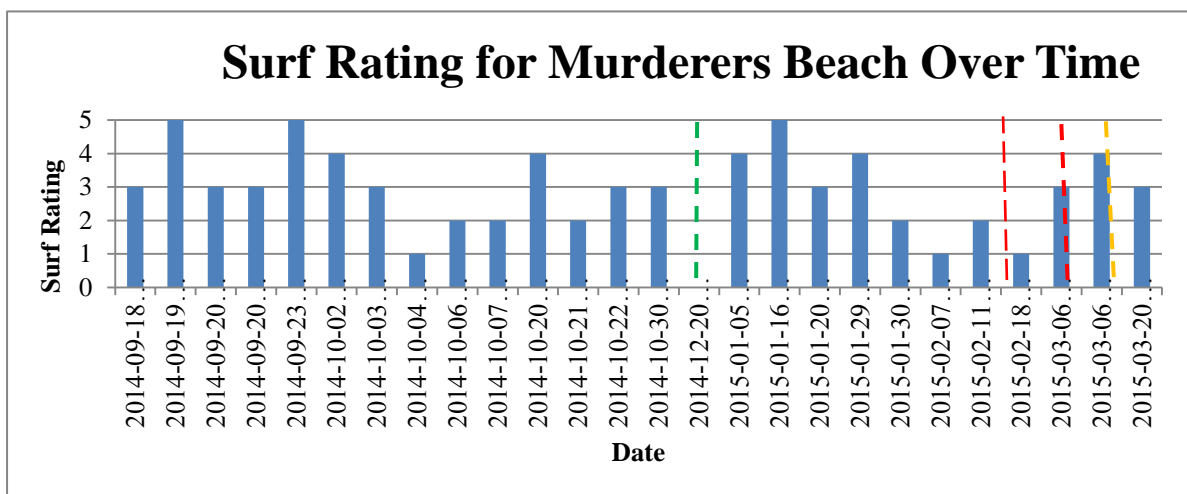


Figure 5: The surf ratings for Murderers Beach have been translated into a numeric value for simplified graphing against time. The ratings are 5='epic', 4='good', 3='average', 2='bad' and 1='terrible'. The green line indicates when the last report was written, the red indicates the public surf meetings, and the yellow line indicates when the thank you message was sent. The thickness of the lines indicates the size of the meetings.

Surf ratings following the meetings are higher than those immediately prior to the meetings. However, the ratings are within the normal range, not exceptionally different. It cannot be confirmed whether the ratings were influenced by the meeting or not.

### Surf Ratings and Barrelling Waves

Barrelling waves are beneficial for surferers as they make for better rides. Therefore one would expect surf ratings to improve with the occurance of barrelling waves. The initial report found this to be true

and the correlation has continued. As found in the previous surf survey report, surf ratings are higher when surf is barrelling.

Table 3 and 5 show the number of submissions, Table 4 and 6 show the submissions in percentages to make comparing between the different sample sizes more clear. At Aramoana Beach barrelling surf was rated as ‘good’ in 80% of the submissions (Table 4). This is a decrease from the previous report of 85.7%. The decrease in rating for barrelling waves may be due to the larger sample size capturing a wider range of conditions.

	<b>Epic</b>	<b>Good</b>	<b>Average</b>	<b>Bad</b>	<b>Terrible</b>	<b>Undefined</b>	<b>Total</b>
<b>Yes</b>	2	6	1	1	0	0	<b>10</b>
<b>Sometimes</b>	2	15	14	0	0	2	<b>33</b>
<b>No</b>	0	11	13	8	0	0	<b>32</b>
<b>Undefined</b>	0	0	1	0	0	6	<b>7</b>
<b>Total</b>	<b>4</b>	<b>32</b>	<b>29</b>	<b>9</b>	<b>0</b>	<b>8</b>	

Table 3: A summary of barrelling waves and surf ratings for Aramoana Beach.

The most prevalent category for barrelling waves at Aramoana is ‘sometimes’ barrelling, followed closely by ‘no barrelling’ waves occurring. The category for ‘yes barrelling’ waves is left with a small sample number.

	<b>Epic</b>	<b>Good</b>	<b>Average</b>	<b>Bad</b>	<b>Terrible</b>	<b>Undefined</b>	<b>Total</b>
<b>Yes</b>	20%	80%	90%	100%	0	0	<b>12.2%</b>
<b>Sometimes</b>	6.0%	51.4%	93.8%	0	0	100.0%	<b>52.4%</b>
<b>No</b>	0	34.4%	75%	100%	0	0	<b>91.4%</b>
<b>Undefined</b>	0	0	14.3%	0	0	100%	<b>100.0%</b>
<b>Total</b>	<b>4.9%</b>	<b>43.9%</b>	<b>79.26%</b>	<b>90.23%</b>	<b>0</b>	<b>100.0%</b>	

Table 4: A summary of barrelling waves and related surf ratings for Aramoana Beach in percentages.

Table 3 and 4 show barrelling surf is rated more highly at Aramoana than surf which does not have barrelling waves. A higher proportion of the submissions with barrelling waves occurring and ‘sometimes’ occurring is rated as ‘good’ and ‘epic’ than when barrelling waves are not occurring.

	<b>Epic</b>	<b>Good</b>	<b>Average</b>	<b>Bad</b>	<b>Terrible</b>	<b>Undefined</b>	<b>Total</b>
<b>Yes</b>	3	1	0	0	0	0	<b>4</b>
<b>Sometimes</b>	0	2	4	1	0	0	<b>7</b>
<b>No</b>	0	1	3	4	3	1	<b>12</b>
<b>Undefined</b>	0	0	0	0	0	0	<b>0</b>
<b>Total</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>0</b>

Table 5: Barrelling waves and surf ratings for Murderers Beach.

The most prevalent category for barrelling waves at Murderers Beach is ‘no barrelling’ waves, followed by ‘sometimes barrelling’. This trend is similar to what was submitted for Aramoana Beach although the sample sizes for Murderers Beach are smaller than at Aramoana Beach.

Table 6 reinforces that barrelling surf is rated more highly at Murderers Beach. Larger proportions of surveys which had barrelling waves occurring categorised the surf as ‘epic’ and ‘good’. Similarly More surveys with ‘no barrelling’ waves were categorised as bad and terrible.



	<b>Epic</b>	<b>Good</b>	<b>Average</b>	<b>Bad</b>	<b>Terrible</b>	<b>Undefined</b>	<b>Grand Total</b>
<b>Yes</b>	75.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
<b>Sometimes</b>	0.0%	25.0%	87.5%	100.0%	0.0%	0.0%	100.0%
<b>No</b>	0.0%	15.38%	46.15%	76.92%	100.0%	0.0%	100.0%
<b>Grand Total</b>	12.0%	32.0%	68.0%	88.0%	100.0%	0.0%	100.0%

Table 6: A summary of barrelling waves and surf ratings for Murderers Beach in accumulative percentages.

As the submissions show, waves at both locations are rated more highly by surfers when there are barrelling waves present. This is a continuing trend from the initial report. It is also interesting to see that both Aramoana and Murderers Beach were mostly noted as having no barrelling waves and sometimes occurring despite the different sample sizes.

### Correlating Surf Photos with Surf Ratings

Surf sessions described in the survey submissions have been matched with the corresponding surf photos to gain an insight to the judgements made on the surf by the public. An attempt was also made to match the wave crests in the photos with models of different incidence angles in Figures 3.5 through to Figure 3.9 of a report by Met Ocean Solutions Ltd in 2011. The match was made by comparing the wave lengths and their setting along the coastline to areas indicated in the models. The exercise of matching photos with surveys and the models was not carried out in the initial report, however, rough notes found that approximately 50% of submissions described the quality of the surf well.

#### *Aramoana Surf Rated as Epic with Barrelling Waves Occurring*



Figure 6: A survey submitted described Aramoana as having barrelling waves and rated the surf as epic. The surf session described was at 4.10.2014 15.45, however, there is no photo for that time so 13.00 of the same day is shown which is the closest photo to that time.



Figure 7: Aramoana had a survey submitted describing barrelling waves and rated the surf as epic. The photo matches the surf session described in the survey. Surf photo and session is of 1.11.2014 17.00.



Figure 6: An Aramoana survey rated surf as epic surf with barrelling waves occurring. The photo matches the time of surf session described at 14.09.2014 13.00

Surveys which identified epic surf and barrelling waves all have varying surf quality in the database of surf photos. One more survey was submitted which described epic surf with barrelling waves but had no photo to correlate with. These surveys described South Aramoana in 2012, the surf cameras were not set up in 2012 so there is no photo record of this event.

Figure 6 shows excellent surf quality at 13.00 on the 4.10.2014. The submission for this photo refers to 15.45. However, there was no photo of this time on the day so the closest time photographed has been included instead.

Both Figure 6 and 8 shows offset linear crests which are favoured by surfers. Each has different wave lengths and periods but offset linear waves are present. The variation will be a result of different swell strengths and incoming directions. Figure 6 resembles the surf with 45° incidence, as modelled by Met Ocean Solutions Ltd in 2011. The longer wave at the eastern side of the photo with two shorter waves toward the west.

The surf shown in Figure 8 has long offset linear wave crests resembling surf of a 90° incidence angle as shown in a model by Met Ocean Ltd in 2011. The resemblance can be seen by observing the longer waves at the western end of Aramoana followed with shorter waves towards the eastern side of the photo.

Figure 7 shows average surf with no clear pattern to the waves with small swells which break close to shore. This is less desirable for surfing. The survey submitted for Figure 7 was given by a one off submitter who has not submitted a survey since. It is possible that the surfer was less experienced in this area.

***Aramoana Surf Rated as Good with Barrelling Waves***



Figure 9: A photo of the surf at Aramoana described in a survey which occurred at 29.3.2015 12.30.



Figure 10: A photo of the surf at Aramoana described in a survey which occurred at 17.3.2015 17.00.



Figure 11: A photo of the surf described in a survey which occurred at 23.9.2014 0.00. There was no photo of 00:00 as the cameras stop at sunset so the assumption has been made the submitter meant 12.00. This photo is of surf at 12.00 of the appropriate day.

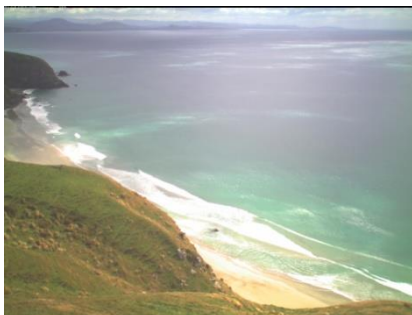


Figure 12: A photo of the surf described in a survey which occurred at 27.10.2014 0.00. There was no photo of 00:00 as the cameras stop at sunset so the assumption has been made the submitter meant 12.00. This photo is of surf at 12.00 of the appropriate day.



Figure 13: A photo of the surf described in a survey which occurred at 19.01.2015 0.00. There was no photo of 00:00 as the cameras stop at sunset so the assumption has been made the submitter meant 12.00. This photo is of surf at 12.00 of the appropriate day.

The surveys which gave good surf ratings also mostly have high quality of surf shown in the photos of the surf session. The submissions represented by photos in Figure 11, 12 and 13 indicated a surf session at midnight. The assumption has been made that the submitter meant 12.00pm and the surf photo has been selected accordingly.

Figure 9 shows high quality surf with well spaced wave crests which begin breaking further from shore in organised columns. When compared to models by Met Ocean Solutions Ltd, the waves appear to resemble surf predicted to have a 60° incidence angle. The lengths of waves are short in the western end of Aramoana and longer wave crests in the middle of the photo followed by shorter waves in the eastern part of the photo.

Figure 10 has well organised columns of offset waves, however, the waves are small and break close to shore. The waves are small making it difficult to pick the likely angle of incidence. By observing the longer wave breaking at the eastern end of the photo it is possible the photo shows surf with an incidence angle of approximately 60°.

Figure 11 has disorganised small surf which breaks close to shore. Such conditions are less favourable for surfers. There are some offset waves in the western end of Aramoana, however they are curved and break close to shore.

Figure 12 also has low quality surf. The flat conditions make it poor for surfing, although two waves with a short wave length can be seen in the eastern end of the photo. The 27<sup>th</sup> of October in 2014 is likely to have had low wind or wind in a direction which left Aramoana sheltered resulting in flatter conditions.

The surf in Figure 13 has organised columns of offset waves, more so in the eastern end of the photo. The wave lengths are quite short along the coastline but with slightly longer wave crests also in the eastern end of the photo. Such a set of wave crests resemble an incidence angle of 45°.

#### ***Surf at Murderers Beach Rated As Epic with Barrelling Waves***

The survey submissions for Murderers Beach which described epic surf with barrelling waves have been picked out and the associated surf photos have been identified to assess the quality of surf.



Figure 14: A photo of the surf which occurred at 19.09.2014 14.55. The time of the surf session was not defined and the survey was submitted at 02.58 so there is no photo of the time submitted. The best surf photo of the appropriate day was chosen.



Figure 15: A photo of the surf described in a survey which occurred at 16.09.2014 8.25.



Figure 16: A photo of the surf described in a survey which occurred at 16.01.2015 16.00.

The surf in Figure 14 shows long linear wave crests which break close to shore. Further from the shore, the waves appear to bend around the headland which could be a result of a 60° incidence angle. The survey submitted for 19.09.2014 had not defined the time of the surf session so the photo of best quality surf has been selected for that day which occurred at 1455

Figure 15 has long linear wave crests which are favourable for surfing. The wave crests form further from shore than seen in Figure 14. The long wave lengths could be a result of a 30° incidence angle.

Figure 16 shows linear wave crests breaking close to shore. The waves are smaller and have a smaller period as the waves are more closely spaced. These characteristics are less favourable for surfers but the linear wave crests improves the quality of the surf. The waves occurring may also be a result of a 30° incidence angle.

***Surf Rated as Good with Barrelling waves Occurring and Sometimes Occurring at Murderers Beach***



Figure 17: A photo of the surf described in a survey which occurred at 18.10.2014 6.00. The survey described the presence of barreling waves.



Figure 18: A photo of the surf described in a survey which occurred at 3.10.2014 10.15. The survey described barreling waves sometimes occurring.

The surf shown in Figure 17 is an example of small swell, likely from an incidence angle of 45 degrees as the waves approach shore in two columns as predicted in the model by Met Ocean Solutions Ltd. The surf in this photo is less favoured by surfers as the waves are breaking close to shore.

The surf in Figure 18 has long linear wave crests which are favoured by surfers. However, the waves are also breaking close to shore. The angle of incidence may be 30° as two columns of waves seem to approach the shore, one column approaches the western end of Murderers Beach while the second is spreading along the length of Murderers Beach. A third column of waves, more narrow than the first two is approaching the eastern headland at the end of Murderers Beach, a similar set of waves as modelled by Met Ocean Solutions Ltd.

### *Surf Rated as Good with No Barrelling Waves*

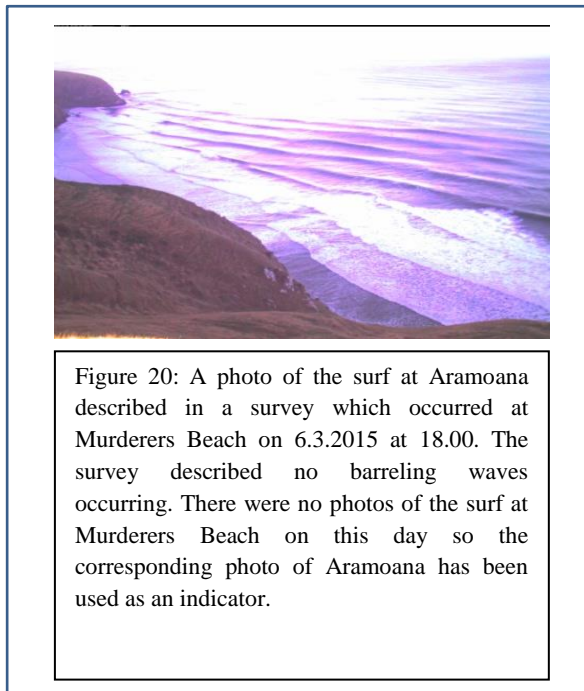


Figure 20 is a photo of surf at Aramoana which occurred at the same time as a surf session at Murderers Beach described in a survey submission. There was no photo of Murderers Beach at the time described in the survey so the corresponding photo at Aramoana has been chosen as it may be indicative of the broader conditions at the time. The surf at Aramoana is excellent quality. Barrelling waves are represented in the photo and the crests are long with a slight offset at the eastern end of the photo. Figure 20 could be an example of surf resulting from a 45° incidence angle. If this is the case, according to the model by Met Ocean Solutions Ltd Murderers Beach is likely to have had two columns of waves approaching the shore resulting in good surf, depending on where the crests break.

The survey describing surf in the 29<sup>th</sup> of January, 2015 at 1800 had very foggy conditions so no surf was able to be seen in the photos.

In summary the surveys provided mixed insight to the true quality of surf occurring. Some surveys did not define the time of surf experienced or there was not a photo of the exact surf session specified which has limited the results of the qualitative correlation. Despite this limitation the exercise has found that surf rated as good and epic was mostly associated with photos of higher quality surf. Eight out of the 14 photos compared to surveys show surf which is of reasonably good quality for surfers.

### Surf Survey Comments

The comments in the recent submissions are more focussed on describing the surf than found in the initial report. All comments made in survey submissions since the initial report provided further detail into the conditions at the beaches. Not all comments were surf related but gave detail on phenomenon such as presence of weed in the water, beach erosion and water temperature. No submissions commented on changes to be made to the survey, and no comments were clearly emotive. Out of the 45 submissions made since the first report, 20 comments were left; meaning 44% of submissions had comments, an increase from 37% found in the initial report. The initial report also had more emotive feedback recorded than the updated report.

<i>Location</i>	<i>No Comment</i>	<i>Further detail</i>	<i>Total</i>
<i>North Aramoana</i>	6	3	9
<i>Mid Aramoana</i>	10	9	19
<i>South Aramoana</i>	3	1	4
<i>Murderers Beach</i>	4	5	9
<i>Total</i>	23	18	41

Table 7: Summary of the comments in submissions since the initial report.

The increase in comments detailing the surf could be a result of the thank you message and surf meetings sent to all submitters to encourage the surf to be described as those comments are more useful for monitoring the surf. Otherwise, perhaps those who see value in the survey submit more than those who do not, therefore less feedback on the survey and a stronger focus on the surf.

The comments left can be seen in Table 8 below. For transparency, comments have been copied in as they were submitted.

<b>Date &amp; time</b>	<b>Where</b>	<b>Surf Rating</b>	<b>Comments</b>
23/08/2013 15:44	North Aramoana	Good	Some fun waves coming through!
3/01/2014 10:00	Mid Aramoana	Average	Waves were fat and closing out
1/09/2014 0:00	Mid Aramoana	Bad	I haven't named a particular session; this is more an observation over a number of years. I've been surfing Aramoana for close to 20 years now and only really go when conditions look optimal (2-3meter east swell, low tide, moderate SW wind). Aramoana was
13/09/2014 0:00	Mid Aramoana	Bad	In general the wave quality has declined. There are far more close out waves.
15/09/2014 0:00	Mid Aramoana	Average	Odd peak but gutless and not hollow :(
17/09/2014 15:00	Mid Aramoana	Average	Small swell, borderline conditions, 3 yellow-eyed penguins
17/09/2014 15:00	Mid Aramoana	Good	Bit grovelly, definitely lacking a bit of speed and power.
19/09/2014 0:16	Mid Aramoana	Good	Still not very hollow and not peaking in spots
20/09/2014 8:14	Mid Aramoana	Good	This is a great break , as often bigger to the north/mid end while can always get out down the south(mole) end so overs something for everyone plus the length of the break means you don't all have to be jammed into a small spot like other breaks
20/09/2014 13:00	North Aramoana	Average	This survey is flawed as surfers only surf in Average to Epic waves. If the waves are bad or terrible surfers don't make the trip out to Aramoana. Also there is no provision made for a comparison between the waves created by the current seabed /sand bank
2/10/2014 8:00	Murderers	Bad	Big swell, poor banks not very surfable at all
3/10/2014 7:09	Murderers	Average	Powerful swell no waves breaking right through though
3/10/2014 7:09		Average	Powerful swell but wasn't breaking through
3/10/2014 10:15	Murderers	Good	Large hole mid to outside rock???
3/10/2014 14:00	Mid Aramoana	Good	Less current chopping the waves than recent previous sessions
4/10/2014 15:45	Mid Aramoana	Epic	Aramoana pumps, please be careful when tampering with the sand banks. this beach means so much to so many

Date & time	Where	Surf Rating	Comments
18/10/2014 6:00	Murderers	Good	Sand banks at Murderers and Potato Patch have been sucked away, the waves are not breaking well at the moment, we need a big north swell to bring the sand back onto the rocks. Not too many people surfing Murderers at the moment which is good. We need to
29/10/2014 13:30	Mid Aramoana	Bad	Aramoana isn't what it used to be
27/11/2014 16:00	Mid Aramoana	Good	Good swell, lots of people. Some nice rides but not barrelling conditions like you would expect at Aramoana
18/12/2014 19:30	Mid Aramoana	Average	The sand dunes are getting badly eroded by people walking from the car park to the high point on the near dune which is a good surf check spot.
18/12/2014 20:00	Mid Aramoana	Good	Not that hollow compared to similar conditions over the past couple of years
20/12/2014 16:30	Mid Aramoana	Bad	Inside bank at start then breaking outer bank ,very av weak waves until the shore dump ,waves all over place
31/12/2014 20:00	Mid Aramoana	Good	Not really that hollow compared to similar swell height, period and direction over the few previous years
1/01/2015 5:38	Murderers	Good	One of best shape seen in a long time. Swell was angled right and sand banks consistent right through the point
1/01/2015 8:00	Mid Aramoana	Average	Night before was bigger/better. Most notable when swell is bigger is the outside sand bank breaks on smaller swell and white wash rolls thru. Previously would only break on biggest swell, then white water would vanish before reforming into very hollow wav
16/01/2015 16:00	Murderers	Epic	Second half of session the wind backed off and it was firing, Good shape with the sand banks.
16/01/2015 17:00	Mid Aramoana	Good	Nice lefts straight out by first rock
18/01/2015 20:00	Mid Aramoana	Good	Very warm water
19/01/2015 0:00	South Aramoana	Average	Surfed a bank in the corner by the mole, strong rip
19/01/2015 20:00	North Aramoana	Good	Lots of weed floating amongst the break
21/01/2015 20:00	North Aramoana	Average	Nice waves, but a bit too small.
27/01/2015 18:00	Mid Aramoana	Good	Not as many barrels as you would expect at Aramoana. Some good quality waves but quite fat overall
29/01/2015 18:00	Murderers	Good	Good waves coming through. Banks seem ok but waves not always breaking right through. Not as good as expected on a swell of that size and period.
5/02/2015 7:00	Murderers	Bad	A lot of sand in the bay making the waves break wide of the rocks
21092014	North Aramoana	Average	Was better the day before
15-10-2014 1130	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.
16-01-2015 1700	North Aramoana	Average	With conditions as on this night, having surfed here for 15 plus years I would have expected more hollow waves
Undefined	Mid Aramoana	Bad	Wave not barrelling like it use to. have noticed this over serious of surf sessions
Undefined	Murderers	Bad	Swell too big? Not breaking like it should.
Undefined	Mid Aramoana	Average	This is a poorly questioned Survey. On the bigger swell days is when and real observations can be made such as I have noticed that waves are now breaking further offshore than they used to be and weakening the shore breaking waves, clearly due to sand movement
Undefined	Murderers	Epic	It was all-time Murderers! Best surf I've ever had there. Aramoana lately has been getting a worse however ... breaking out too far and as a result not barrelling.

Table 8: A summary of the comments left in submissions for the surf survey. Nonsensical comments of letters and numbers have been omitted.

## Comments on the surf survey meetings

Surf meetings were held to enhance consultation with the public about the surf, dredging and disposal grounds. The attendees at the meetings had valuable thoughts on ways to improve the survey and make it more accessible.

It was suggested that a question of experience surfing the area should be introduced to the survey. Members of the surf community who have been surfing Aramoana and Murderers Beach for a long period of time will understand the behaviour of the surf better than those who are new to the area.

The survey could also be made more accessible to a wider reach by having paper copies available on a noticeboard at the beach or in cafes in Port Chalmers. The paper copies could be collected and entered into the database. Completing the survey by phone call was another suggested approach.

A meeting with the Technical Group for the Next Generation project resulted in the suggestion to make a phone application for the survey to be completed on.

The survey was also noted as bias because people only surf in conditions they expect to be favourable to surf in. However, it was debated that the surveys are for assessing the amenity value of the surf, not the overall surf action as we have cameras and a beacon to continuously record that.

The surf meeting on the 19<sup>th</sup> of March 2015 also concluded the surf photos should be made available to the public although not as a live stream.

## Conclusion

In conclusion, the updated survey report has found new participants in the surf survey who have submitted more than once since the initial surf survey report. It is encouraging to find there are still new people submitting, however, the rate of submissions has decreased as shown in Figure 1.

The surf meetings and thank you message has not instigated people to submit surf surveys. Figure 1 shows a time line of when submissions were made, with the surf meetings and the thank you message indicated. There was no obvious increase in submissions following any of the events. It is still worth holding such meetings to keep in contact with the community and continue consultation as the decrease in submissions may be alleviated. The consultation is not only a consent condition but also promotes the positive approachable face of Port Otago Ltd.

Mid Aramoana and Murderers Beach have the highest surf ratings, as shown in Figure 2 and Figure 3. Murderers Beach also had the largest proportion of 'terrible' surf, equal with North Aramoana. The sample sizes for each surf location are uneven so percentages were used to make the comparison more valid. However, South Aramoana has a very small sample size so it may amplify extremes and not be as representative as locations with a larger sample size such as Mid Aramoana.

There have been no obvious changes in surf ratings at either Murderers Beach or Aramoana Beach since the initial surf survey report (Fig. 4 and Fig. 5). A seasonal trend may become apparent after a full year has passed, however the irregularity in submissions may make any trend difficult to decipher.

As found in the initial report, surf is rated more highly if there are barrelling waves. 'Sometimes barrelling' and 'no barrelling' are the most commonly used categories for describing the surf at both surf locations despite the different sample sizes.



This report has found a higher percentage of submissions made contain comments when compared to the percentage of comments left for the initial report. The comments left are also more focussed on detailing the surf, rather than improvements for the survey or emotive comments. The change in comments could mean that those who see value on the survey are submitting while those who do not have stopped contributing to it, leading to a stronger focus on the surf in the submissions.

Suggestions for moving forward with the survey have been to add a question of experience surfing in the area, and to make the survey more accessible by making paper copies available and a phone application. Making the survey able to be completed by phone call was also suggested at a surf meeting. It was also recommended to complete a multivariate analysis to find what we were expecting the surf to do, what the surf did and include the public surf ratings to get a more holistic view of what is happening in the surf by tying all of the monitoring together.