

# Swimming in Christchurch: How the industry was affected by the earthquakes



Janine Gainsford  
Roslyn Kerr

LEaP Research Paper No. 21  
February 2013

Land Environment & People



Centre for Land  
Environment  
& People

A Lincoln University Research Centre.  
New Zealand's specialist land-based university.



Lincoln  
University  
Te Whare Wānaka o Aoraki  
CHRISTCHURCH-NEW ZEALAND

New Zealand's specialist land-based university

Swimming in Christchurch: How the industry was affected by the earthquakes

# Swimming in Christchurch: How the industry was affected by the earthquakes

Janine Gainsford  
Roslyn Kerr

Land Environment and People Research Paper No. 21  
February 2013

ISSN 2230-4207 (PDF)  
ISBN 978-0-86476-335-8 (PDF)

Lincoln University, Canterbury, New Zealand

## Acknowledgements

This report was made possible through Lincoln University's Summer Scholarship programme. The authors would also like to acknowledge those anonymous interviewees who provided some valuable insight into the swimming industry in Christchurch.

©LEaP, Lincoln University, New Zealand 2013  
Contacts - email: [leap@lincoln.ac.nz](mailto:leap@lincoln.ac.nz)  
web: <http://www.lincoln.ac.nz/leap>

This information may be copied or reproduced electronically and distributed to others without restriction, provided LEaP, Lincoln University is acknowledged as the source of information. Under no circumstances may a charge be made for this information without the express permission of LEaP, Lincoln University, New Zealand.

Series URL: <http://hdl.handle.net/10182/3410>

## **Abstract**

*Throughout 2010 and 2011, the city of Christchurch, New Zealand, suffered a series of devastating earthquakes that caused serious damage to the city. This study examines the effect these earthquakes have had on the sport of swimming in Christchurch. It specifically focuses on three different aspects of the swimming industry: indoor competitive swimming, open water swimming and learning to swim. It reports on the industry prior to the earthquakes before examining the developments subsequent to the shakes.*

*The effects on both facilities and participation numbers were examined. Results showed that many indoor swimming facilities were lost which had significant flow-on effects. In addition, many beaches were out of bounds and almost half of the schools in Canterbury lost the use of their own swimming pools.*

*In terms of participation numbers, results showed that while there was a decrease in the number of indoor competitive swimmers, Canterbury clubs were still highly competitive and their rankings at events either remained similar or bettered during and after the period of the earthquakes. On the other hand, an increase in the number of participants was seen in swimming lessons as temporary pools were constructed and subsidies were offered to cover transport and lesson costs. Open water swimming, however, seems to have been relatively unaffected by the earthquakes*



## Table of Contents

Acknowledgements.....	ii
Abstract.....	iii
Introduction .....	1
Types of swimming .....	1
Literature Review.....	2
Methodology.....	3
Indoor competition swimming.....	4
Open water swimming.....	4
Learning to swim .....	5
Pre earthquake .....	5
Indoor swimming .....	5
Outdoor swimming.....	6
Post-Earthquake.....	8
Facilities.....	8
Swimming clubs.....	10
Changes to competition swimming.....	11
Learn to Swim.....	14
Open water swimming .....	15
Open water competitions .....	16
Conclusion.....	18
References .....	19

## List of Images

Image 1: Locations of Council and private swimming pools in Canterbury.....	8
---	---

## List of Tables

Table 1: Swimming facilities available in the Christchurch area.....	7
Table 2: Swimming clubs and their respective training facilities.....	11

## List of Figures

Figure 1: Number of Canterbury swimmers participating at the New Zealand Short Course Competition 2010.....	13
Figure 2: Club rankings of Canterbury clubs at the Division II Competition 2012 .....	14
Figure 3: Number of competitors participating in the State New Zealand Ocean swim .....	16
Figure 4: Number of competitors at the two selected triathlons .....	17





## Introduction

In New Zealand, at 4.35am on the 4<sup>th</sup> September 2010, a magnitude 7.1 earthquake struck the town of Darfield just 40km West of Christchurch. It caused major damage to older brick and masonry structures around the Canterbury region and produced large amounts of liquefaction<sup>1</sup>. Yet, with the time and location of the shake the region was said to be quite fortunate as no deaths were reported (CERA, 2011, p. 9; GeoNet, 2011). A year after the initial incident more than 8100 aftershocks had been measured around Canterbury with approximately 320 occurring on one day (GeoNet, 2011). Included in these continual aftershocks was a devastating 6.3 magnitude shake that occurred during the early afternoon of the 22<sup>nd</sup> February 2011. This was a life changing event for some that caused over 180 deaths as well as extensive damage to the Christchurch area (CERA, 2011, p. 9; GeoNet, 2011).

In the aftermath of these earthquakes, the loss of infrastructure meant that undertaking routine tasks such as shopping, accessing schools, commuting and recreation became more difficult (Dalziel & C. Saunders, 2012). Many industries in Canterbury were affected and sport was no exception; it was hard hit. There was major disruption to sporting and recreation facilities resulting in both immediate and long term hardships for many disciplines (Swimming New Zealand, 2011, October). Many museums, swimming pools, churches and sports clubs had to be closed, with several facing demolition or extensive restoration work (CERA, 2011, p. 9).

Swimming is an activity that has been significantly impacted due to the loss of facilities and infrastructure caused by the earthquakes (Swimming New Zealand, 2011, October). Many people have had to find new swimming facilities and alter schedules to accommodate these often permanent changes. Thus, the aim of this research was to determine how swimming in Christchurch has been affected by the September 2010 earthquake and the continual aftershocks that followed. Swimming in Christchurch prior to the earthquakes was examined followed by the losses, changes and adaptations that have taken place in the aftermath of the disaster. This report will investigate what is becoming the 'new normal' in swimming and how trends have shifted to accommodate the change in facilities and their availability (Campbell, 2011). The impact on indoor competitions, open water competitions and swimming lessons will also be examined.

## Types of swimming

Swimming can take place in swimming pools both indoor and outdoor and usually entails two types of competition, namely short course, with the pool being 25m in length, or long course, where the swimming pool is 50m in length. Additionally, there is open water swimming. Open water swimming is defined as any swimming that takes place in rivers, lakes, oceans or water channels. Open water swimming competitions normally occur in bodies of water such as an ocean, a lake or river, although human-made quarries, pools, rowing courses, reservoirs and the like can also be used (Swimming New Zealand, 2010).

---

<sup>1</sup> Liquefaction is the loss of stiffness, strength and stability of soil due to the shaking that is experienced during an earthquake. Soils behave more like a liquid than a solid, resulting in considerable damage to both land and structures (Lambert, 2012, p. 2).

## Literature Review

A search for natural disasters similar to the Canterbury earthquakes was conducted to determine whether those events had a similar effect on sport and recreation or on swimming in particular. However, very little literature was found in regard to natural disasters and sport in general.

Nevertheless, some studies were found which discussed the overall outcomes and effects of natural disasters as well as the consequences inflicted on industries due to such hazards. Most literature described asset destruction, economic loss and death as the main outcomes of natural disasters (Fussell, Sastry, & VanLandingham, 2010; Huang & Jiang, 2010; Shennan & Hamilton, 2006; Skidmore & Toya, 2002). For example, on average, 140 000 people are believed to be killed by natural disasters each year (Skidmore & Toya, 2002). In more specific cases, between 35,000 and 45,000 deaths occurred in Portugal, Spain, and Morocco after the Lisbon earthquake in 1755 which left two-thirds of the city uninhabitable; after Hurricane Katrina in August 2005, floodwaters submerged 80% of New Orleans causing major damage to the area; in China, the 2008 Wenchuan earthquake destroyed many buildings, roads and other infrastructure mainly due to liquefaction and soil damage (Fussell, et al., 2010; Huang & Jiang, 2010; Pereira, 2009); and in 1992, Hurricane Andrew caused damage exceeding US \$20 billion in the South Florida and Louisiana areas alone (Skidmore & Toya, 2002).

What is more, a common occurrence brought on by earthquakes, which is said to cause the most substantial damage, is known as permanent deformation or residual deformation. This is an earthquake-induced phenomenon that results in the sinking of the ground and relevant structures in the vicinity (Huang & Jiang, 2010). For example, during the 1964 Alaskan earthquake, tidal marshes and wetlands experienced sinking of up to 2 meters (Shennan & Hamilton, 2006). After the 2011 earthquakes in Christchurch, this phenomenon was observed in areas such as North New Brighton where the QEII Recreation and Sport Centre was located (North East of Christchurch). This facility had 20cm horizontal and 10cm vertical land movement throughout the swimming pool area and a 16cm drop within the track and field stadium (Beca Infrastructure Ltd, 2011, pp. 3 - 4).

Natural disasters are also influential on the people that are exposed to the chaos of these events. Studies show that the capacity to cope and adapt in response to natural disasters can be influential on a city's population (Fussell, et al., 2010; Naude, 2009; Saldana-Zorrilla & Sandberg, 2009, p. 99). Coping and adapting is described as the ability to respond to an occurrence of harm and the ability to gradually transform in a way which can better the chances of survival when one's existence is threatened (Kelly & Adger as cited in Saldana-Zorrilla & Sandberg, 2009). As such, it has been suggested that if the ability to cope and adapt to a situation is negligible, people are more likely to consider migration in the increased occurrence of natural disasters (Naude, 2009, p. 167; Saldana-Zorrilla & Sandberg, 2009, p. 99). For example, after the devastation of Hurricane Katrina, an estimated 37% of the pre-hurricane residents of New Orleans had not returned to the city by mid-2007 (Fussell, et al., 2010). In Christchurch, this trend has also been noted after the earthquakes as over 8900 people (2.4%) had moved out of the city by June 2011 and by the end of June 2012 4,600 (1.2%) more people had moved away. Consequently, since the September earthquake in 2010 the city's population has declined by 13,500 over a 2 year period (Statistics New Zealand, 2011, 2012).

In addition to the physical destruction, natural disasters can significantly impact surrounding businesses. This is because industries become more vulnerable in an environment where previously successful competencies and routines may no longer be applicable (Ruef, 1997). One study was found that analysed the effects of the Christchurch earthquakes on certain businesses in the area. In the study, it was suggested that while some organisations may encounter serious and dramatic repercussions due to significant environmental change, not all organisations affected are always worse off; some businesses can thrive as a result of the changes that occur (Bowden, 2011). At least

two ways were described in the literature in which an unexpected event may differently affect alternative organizations. The first model suggests that the specific nature of the event may affect organisations differently due to the variation in their characteristics; for instance their nature of work, location, industry and size (Bowden, 2011, p. 858). This concept incorporates environmentally deterministic models whereby differences in environment determine different fates or outcomes (Diamond, 1997, pp. 25 - 26). Punctuated equilibrium is one such model incorporated which is described as an interchange between long periods when stable infrastructures permit only incremental variations and brief periods of revolutionary upheaval (Gersick, 1991, pp. 10 - 11). These environmentally deterministic models suggest that knowing the initial conditions would be enough to predict which firms would do well and which poorly in the face of an environmental change such as a natural disaster.

Bowden's second model incorporates the idea of strategic choice. The way firms respond to an environmental jolt as well as the resources and capabilities which they possess prior to the jolt may have an influence on their chances of success in the aftermath (Bowden, 2011). What is more, the process by which an organisation dealt with the turmoil and how they chose to deal with immediate problems and the associated short-term implications can influence success; an example of this is how organisations deal with business relocation (Bowden, 2011).

In terms of swimming, each complex or facility is part of the same industry, however, each is found in varying locations around Canterbury and all have different characteristics. Therefore, incorporating these two models would suggest that each swimming facility has the potential to be affected differently by the earthquakes because of their differences in resources, location, size of their pools, and relevant services. For instance, their location relative to the epicentre of the shakes, the strength of the surrounding buildings and how well the land itself fared would all be influential factors in terms of the success or survival of the pools post-earthquakes. Certain facilities, such as Jellie Park Recreation and Sport centre, will be discussed below to determine whether their outcomes did in fact differ greatly due to their characteristics and prior resources.

## Methodology

The following research was completed using a mixed methods strategy which focused on collecting, analysing, and mixing both quantitative and qualitative data (Creswell, 2003, p. 4). Initially, data was retrieved to determine which swimming facilities and clubs were up and running prior to the earthquakes and what was available post-earthquake. This was acquired through online research. Online newspaper articles were found through Google as were websites such as swimming club websites, private facility websites, Canterbury Swimming's website, the local council's website as well as Swimming New Zealand's website. Once this information was collected, the pre- and post-earthquake data was compared to evaluate how swimming facilities had been affected by the natural disaster. Following this, the research was split into three different areas of study, namely indoor competition swimming, open water swimming and learning to swim.

Emails and interviews were used to communicate with professionals from the swimming industry to gain an insider's view on the effects of the earthquakes. Three interviewees were selected as representatives of each of the three determined categories. A committee chairperson of one of the swimming clubs in Christchurch (who has been given the pseudonym of Sam) was interviewed in December 2012 to acquire information about the Canterbury swimming clubs and various indoor competitions. Following this, in January 2013, a member of the Christchurch City Council (Ashley) was questioned about the learning to swim programmes that the Christchurch City Council offers. The final interviewee was a person who has been involved in the two selected ocean swim series (Jo); this interview took place in February 2013. Each interview consisted of a single session ranging

between 30 minutes to an hour and comprised of various open-ended questions relating to swimming and the earthquakes. Sam's questions related to swimming clubs and related to how clubs were affected by the earthquakes in terms of facilities, participation and competitions. The questions put forward to Ashley included a stronger emphasis on how school and council run swimming lessons were affected, while Jo was asked about the impact on open water swimming in terms of participation and competitions.

Finally, for each category the numbers of swimmers participating at different occasions were then analysed to determine whether the Canterbury earthquakes had some form of influence on swimming participation. Each method of the collection process of participation data will be discussed in-depth below.

#### *Indoor competition swimming*

A variety of competitions were examined to determine how Canterbury's indoor competition swimmers had fared over the period during and subsequent to the earthquakes. The results of four national indoor swimming competitions from 2008 to 2012 were studied. The first two selected were short course events, namely the Division II Competition (Div II) and the New Zealand Short Course Competition, with the preceding two being long course events, namely the National Age Group Championships (NAGs) and New Zealand Junior Championships (Junior Champs). The Junior Champs caters for 10 to 12 year old swimmers, NZ Short Course caters for any swimmer aged 13 and older and Div II and NAGs cater for competitors aged 13 to 18 years. These four events were selected to gain a broad spectrum of swimming competitions that Canterbury swimmers take part in. Participation numbers were retrieved from the competition result sheets as were the rankings of all the Canterbury swimming clubs. This data was obtained through Swimming New Zealand's website, from their results page which is publicly accessible. The total number of participants for each club over the selected time period was then averaged to determine whether the club had either lost or gained competitors in a specific year. The same technique was used for the clubs' rankings. Their years ranking was compared to their average ranking to assess whether their performance had improved or worsened during the time of the earthquakes.

#### *Open water swimming*

Christchurch has a limited number of open water swimming competitions that take place annually. Nevertheless, to study the effects the earthquakes had on open water swimming, four various competitions were selected for examination, namely the State Ocean Swim, the Surf n Turf series, the Contact Tri series and the House of Travel triathlon. These were selected to determine whether there had been any change in participation numbers over a four year period starting from 2009 to 2012. However, the selected time frame was altered to 2010 to 2012 as the data relevant for 2009 or earlier proved difficult to obtain.

Two triathlons were selected for this research as they include an open water swim as were two open water swim series. The data for three of the selected events was obtained through each event's website. However, results for the final selected event were unobtainable online; this was the Surf n Turf series results for the 2009 to 2012 races. An attempt to obtain these result from an individual involved in the events was made, however, due to time constraints this was not achieved. Another difficulty encountered was that the 2010 Contact tri series results were unavailable from their website as the event only began in 2011. As such, the results for 2013 were used to ensure a three year time period was still examined. As with indoor competitions, the number of people who partook in the chosen events was examined to determine any change in the participation.

### *Learning to swim*

Swimming lessons was the final category set to be examined. As with open water swimming the number of people who took part in swimming lessons at the Christchurch City Council's swimming pools and at school facilities were to be studied and compared to determine if there had been any changes. However, this data proved too difficult to obtain and consequently learn to swim trends could not be examined.

## **Pre earthquake**

In New Zealand, during 2009, a survey conducted by Sport and Recreation New Zealand found that during any one month 16.4% of all New Zealand adults (537,124 people) participated in swimming at least once. Among these adults, the most common place to swim was swimming indoors at a sport facility. This was followed by outdoor swimming, whether being in or by a beach, river, lake or the sea, while swimming at home or at someone else's house was least popular (Sport and Recreation New Zealand, 2009b).

In addition to this, in 2009, swimming was the third most popular sport and recreation activity in Canterbury, with 34.4% of people in the Canterbury region having participated in some form of swimming. Further, as is the case with the New Zealand population, a 2005 survey revealed that Christchurch City Council indoor pools were the most popular venues for swimming (Christchurch City Council, 2003; Saunders, Dalziel, & Greer, 2005; Sport and Recreation New Zealand, 2009a).

### *Indoor swimming*

With these statistics in mind it is clear that a large portion of swimmers in Christchurch largely rely on the use of facilities belonging to the Christchurch City Council (referred to as the Council). Thus, by March 2003, thirteen swimming pools were made available to the public by the Council; six of these were found at leisure centres that included both pools and stadiums, for instance QEII Leisure Centre (North-East Christchurch), Pioneer Leisure Centre (South Christchurch), Jellie Park (North-West Christchurch), Centennial Recreation and Sport Centre (Central Christchurch) and Wharenui Recreation Centre (West Christchurch) (Christchurch City Council, 2003). By 2009, five multi-purpose recreation and sport centres were open to the public as well as nine public outdoor pools, two of which were community pools (See Table 1). There were also nine paddling pools available around the Christchurch area (Christchurch City Council, 2009). Other non-Christchurch-City-Council swimming facilities also available to the public included privately run centres such as the Aquagym Swim Centre (Central Christchurch) and other District Council facilities such as Dudley Park in Rangiora or the Kaiapoi Aquatic Centre (North of Christchurch). There were also 45 school pools located around the Canterbury region which were available for school use and, in some cases, also for community use (CERA, 2011, p. 9).

These swimming facilities are available for a range of different forms of swimming including swimming lessons (learn to swim), aquajogging, swim training and recreational swimming (Christchurch City Council, 2012b). By 2009, fifty schools were using the above public pools for swimming lessons alone (3 News, 2009, February 10). This is supported by a survey that was completed in 2005. It showed that of 504 people surveyed, 70.8% of them who attended swimming lessons did so at a Council owned or leased swimming pool (Saunders, et al., 2005, pp. 20 - 21).

### *Outdoor swimming*

Canterbury has an extensive coastline with sections of rocky shores, sandy beaches and two estuaries. It includes many swimming areas such as the beach at Spencer Park as well as Waimairi Beach, North and South New Brighton, Sumner Beach, Taylors Mistake and Banks Peninsula beaches (Christchurch City Council, 2010). Popular areas for swimming competitions also include Corsair Bay in Banks Peninsula, Sumner and New Brighton beaches. In addition to these areas where opening water swimming can take place, in 2009 a lake was completed in Pegasus Town which has also become a popular recreational swimming and competition location ("Lake Pegasus now fill," 2009). The 14-hectare lake took around 18 months to excavate, shape, line and landscape but now holds over 560 million litres of fresh water fed naturally through a system of inlets and filters ("Lake Pegasus now fill," 2009).

**Table 1: Swimming facilities available in the Christchurch area**

Facility	Location	Facility owner	pre-earthquake facilities (2009)	open / closed	post-earthquake facilities (2012)
Centennial	Christchurch Central	Christchurch City Council (CCC)	25m pool, leisure pool	Closed February 2011 due to earthquake damage	-
Graham Condon Centre	Papanui	CCC	-	Opened October 2011	25m pool (8 lanes), toddlers pool
Halswell Domain Pool	Halswell	CCC	33.3m outdoor pool, toddler pool	Open (summer season only)	33.3m outdoor pool, toddler pool
Jellie Park	Burnside	CCC	2 x 25m sport pool, 15m teaching pool, toddler pool, 50m outdoor pool, outdoor dive well	Open	Upgraded 25m pool, 25m pool, 15m teaching pool, toddler pool, 50m outdoor pool and dive well
Norman Kirk Memorial	Lyttelton	CCC	25m outdoor pool	Closed February 2011 due to earthquake damage	-
Pioneer Recreation and Sport Centre	Somerfield	CCC	25m pool, 20m leisure/wave pool	Open	25m pool, 16m (4 lanes) teaching pool, 20m leisure/wave pool
QEII Complex	North New Brighton	CCC	40m wave pool and lazy river, teaching pool, 50m training and competitive pool, 25m training pool, learners pool and 30m dive well	Closed February 2011 due to earthquake damage	-
Templeton	Templeton	CCC	25m outdoor pool	Open (summer season only)	25m outdoor pool
Waltham Lido Pool	Waltham	CCC	33.3m outdoor pool, toddler pool	Closed February 2011 due to earthquake damage	-
Wharenui	Riccarton	CCC owned – rented by swim club	25m pool, teaching pool and toddlers pool	Open	25m pool, teaching pool and toddlers pool
Governors Bay	Governors Bay	CCC / Community - provided with a grant by CCC to assist operation by a local management committee	(unsure of the type of pool)	Open to key holders (summer season only)	Open
Port Levy community pool	Port Levy	CCC / Community - provided with a grant by CCC to assist operation by a local management committee	(unsure of the type of pool)	Open (summer season only)	Open
Dudley Park	Rangiora	Waimakariri Council	25m pool, 20m learners pool, leisure pool including toddler area	Closed October 2011 due to snow damage Reopened December 2011	25m pool, 20m learners pool, leisure pool including toddler area
Kaiapoi	Kaiapoi	Waimakariri Council	25m pool, 12m learners pool, toddlers pool	Closed February 2011 due to earthquake damage	Expected to be open June, 2013.
Aquagym	Linwood	Private	25m pool	Closed Feb 2011 due to earthquake Reopen Sept 2011	proposed new 30m x 20m learner pool – construction to begin in Dec 2013
Kings Swim School	Sockburn	Private	20m pool	Open	20m pool
MacMillian's Aquatic Centre	Bromley	Private	20m pool	Open	20m pool

## Post-Earthquake

### Facilities

The Christchurch City Council estimated that 60% of the swimming pool capacity in Christchurch was lost due to the serious damage inflicted on the city's facilities by the earthquakes (See image 1 below) (Swimming New Zealand, 2011, October). Also, a significant imbalance in the geographical distribution of swimming pools within Christchurch City became apparent and was largely due to the closures of all public indoor facilities located in the Eastern suburbs of Christchurch (Sport and Recreation Earthquake Leadership Group, 2012). Thus, the Sport and Recreation Earthquake Leadership Group (2012) put forward different ways to rebalance the network of available pools in Christchurch. This included development of a major indoor aquatic centre which would service the intended 30,000 households and working population within the Central City Plan area and would replace the lost capacity of the Centennial Pool; development of a new local aquatic centre to serve the north/north-east of the city; expansion the Kaiapoi Pool with additional learn to swim facilities which would also serve the northern fringe of Christchurch City; development of a new aquatic centre in the West to meet the anticipated growth in this area of the City which would complement the development of the Selwyn Aquatic Centre; and upgrades of strategically located school pools to provide improved local learn to swim and recreational swimming opportunities (Sport and Recreation Earthquake Leadership Group, 2012). Some of these ideas have been put into action which will be discussed below; however, Sam (an interviewee) explained that even with all these plans the current major concern for the swimming industry is the lack of lane space now available due to closures of many pools.

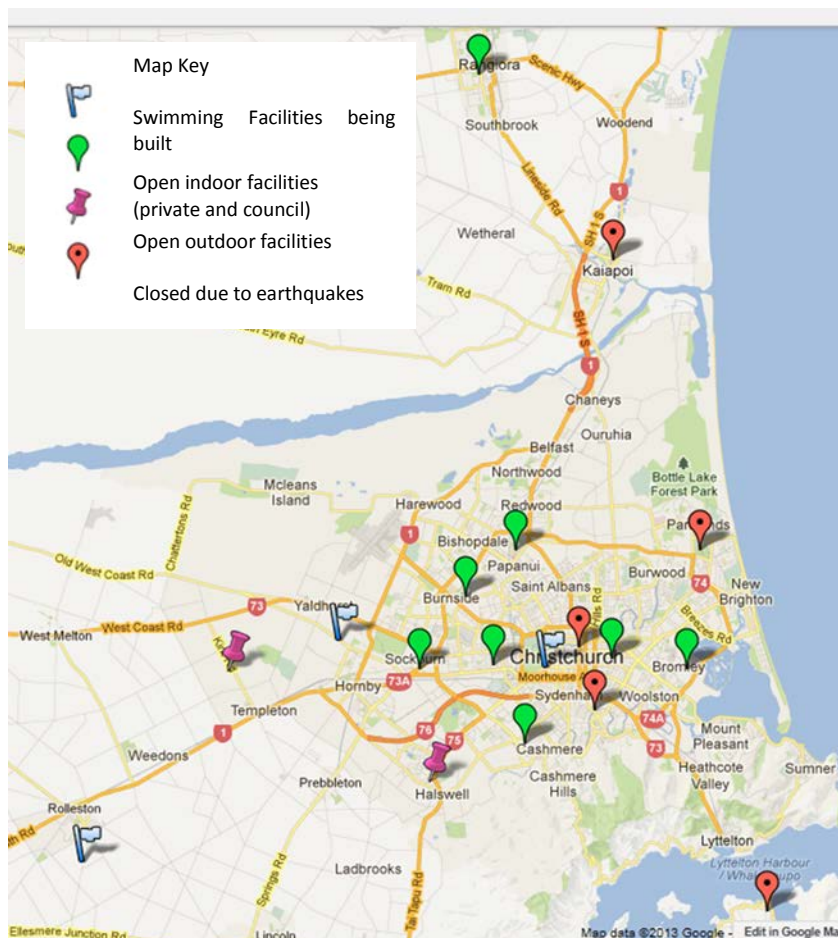


Image 1: Locations of Council and private swimming pools in Canterbury



For example, over the winter of 2011 there were only three out of the previous five Council swimming centres in operation: Jellie Park, Pioneer and Wharenui (Robinson, 2011). This was because any outdoor pools still in working order do not operate over the winter period and alternative pools had been closed due to excessive damage. Facilities such as Centennial and QEII were deemed unsafe and out of use as were four other Council pools (See table 1) (Christchurch City Council, 2012b). This meant that the only 50m pool in Christchurch (QEII) was no longer available for use. Additionally, of the eight Council paddling pools which were expected to open during the summer season of 2011/2012, only two were in a suitable condition to do so (Christchurch City Council, 2009). 24 of the 45 school pools available were also damaged, many irreparable, as were some of the outer Districts' pools such as the Kaiapoi Aquatic Centre which has been closed since February 2011 (CERA, 2011, p. 9; Waimakariri District Council, n.d.).

Yet, it was not only losses that occurred subsequent to the earthquakes. For example, the Council had been planning for a new pool complex (North-West of Christchurch) in partnership with Papanui High School, and were contributing an estimated \$8.5 million toward the build. Construction was due to start on the complex, named the Graham Condon Centre, in 2007 (Christchurch City Council, 2006). However, while the expected completion date was in early 2009, there were various delays, including earthquake related complications, which lead to the facility only opening in October 2011 (Christchurch City Council, 2006). Nevertheless, after all the delays the new centre was welcomed by many swimmers who were in need of a replacement pool. There have been 141,000 visits to the Graham Condon Centre pools and around 1783 children received swimming lessons every week between its opening in 2011 and February 2012 (Marryatt, 2012).

In addition, up to \$190,000 was put forward by the Earthquake Appeal Trust to go toward swimming in Canterbury (Christchurch Earthquake Appeal, 2011a). Also, \$150,000 was awarded to Jellie Park for upgrading their 25m pool and associated facilities. This meant new electronic timing could be installed, the starting blocks could be adjusted and the seating area for competitive swimming and school swimming sports could be increased (Christchurch Earthquake Appeal, 2011a).

Kaipoi Swimming Pool also received a financial boost. After its closure in February 2011, 120,000 local residents who had used these facilities annually were forced to find an alternative pool (Christchurch Earthquake Appeal, 2011a). However in June 2011, the Waimakariri District Council received a \$1.1 million grant, on behalf of the Christchurch Earthquake Appeal Trust, which was used to alleviate the estimated \$5 million cost of repairing the Kaiapoi Aquatic centre. The rebuild of this facility began on the 3rd September 2011 and is scheduled to be completed by the end of June 2013 (Christchurch Earthquake Appeal, 2011a).

Other facilities have also benefited as swimmers needed an alternative to the closed pools which they had previously used. In 2012 the Council experienced an increase in revenue of \$0.3 million for pool programmes and general admittance (Christchurch City Council, 2012a, p. 84). Also, Sam and Ashley explained that swimming lessons are the main source of income for swimming pools. Therefore, due to the increased need for lessons and swimming space, pools have also been adding to their existing facilities to try and accommodate the increased number of swimmers and to take advantage of the opportunity to increase their revenue. For example, Pioneer Recreation Centre built a new teaching facility in 2012 to accommodate for the increase in number of students; costing the council \$1.3 million. While this learners' pool was recommended by the Council's 2006 Aquatic Facilities Plan, it gained more publicity after the earthquakes and the opening of the pool was shifted to an earlier date (Christchurch City Council, 2012, March 6; Marryatt, 2012, February). The Aquagym centre also plans to build a new 20 m by 30 m learners' pool (Cairns, 2012, September 23),

however, Sam speculated that the pool is being proposed to try and counteract the loss of swimmers they may experience when the new Council pool is built in town.

In addition, three new competition and lap pools are being built in varying locations around Christchurch to increase availability of pool space; as per the suggestions of the Sport and Recreation Earthquake Leadership Group. The first facility proposed is a new private swimming complex which is being built in Yaldhurst located West of Christchurch (Cairns, 2012, September 23; Canterbury Swim School, 2012). The new complex is being built for Canterbury Swim Club and is set to include an indoor lap pool as well as a learn-to-swim pool (Canterbury Swim School, 2012). This information was supported by Sam who explained that Canterbury Swim club has been brought together after the split of Templeton Swimming Club and was in need of a pool to train; again swimming lessons being the way they plan to finance the operation.

Secondly, as mentioned previously, the Council is developing a new swimming complex which is set to use the space that was previously held by the well-known Canterbury Brewery in Central Christchurch. The brewery's buildings were severely damaged in the earthquakes and have now been brought down to make way for the new Metropolitan Sport Facility (Cole, 2012). The centre is anticipated to play a significant role in revitalising the central city and will form a world class sporting hub when joined with existing sports hub at Hagley Park and the Avon river recreational corridor (Sport and Recreation Earthquake Leadership Group, 2012). The sports centre is expected to include an aquatic centre comprising of a 50m, 10 lane competition pool as well as a dive well and leisure pool. There will also be a high performance centre with facilities for coaching and training (Christchurch Central Development Unit, n.d). This centre is said to be one of the four top-priority anchor projects identified by the Christchurch Central Development Unit in the Christchurch rebuild (Cairns, 2012). During the investigation of this new centre it was revealed that the Council had been planning the development of the Metro Sport Centre since 2009 and had set to commence with construction in 2016-17 (Christchurch City Council, 2009, p. 115). However, with the devastation of the earthquakes the plan for the Metro Sport Centre has gained more attention from the public and with the increased need of a 50m competition pool the starting date was pushed forward from 2016 to the end of 2013 (Cairns, 2012). With this said, Sam suggested that money being spent on facilities such as Jellie Park for competition upgrades is unnecessary expenditure because once the Metro Sport Facility is open in town, those pools will rarely be used for competitions.

The final pool being built is located in Rolleston, in the Selwyn District (South of Christchurch). The plans and provisions for this centre had been completed prior to the earthquakes and therefore, it is expected to be completed at the end of 2013. The Selwyn Aquatic Centre will include a new 25m pool, learn to swim pool, toddlers pool and therapeutic pool with spa (Sport and Recreation Earthquake Leadership Group, 2011, 2012).

### *Swimming clubs*

During the period of the earthquakes the swimming community tried to retain their usual competition schedule. This meant the Canterbury Clubs (Aquagym, Jasi, Templeton, Kaiapoi, Wharenui and QEII) needed to sustain their training programs, to the best of their ability, to ensure they maintained their competitiveness (For the clubs' premises see table 2 below). As such, it appears that facilities that were still up and running post-earthquake tried to be as accommodating as possible to the other swimming organisations and clubs who needed assistance and pool time. Sam described the Canterbury clubs as a group that hold a good rapport with each other and look out for one another. For instance, the QEII swimming club was left without a training facility when their pool was closed in 2011. Yet, the club easily found pools to swim in, training at many facilities around Christchurch including Dudley Park, until finally settling with Jellie Park as their new permanent premises (QEII Swim Club, 2013). However, this move has disadvantaged the public

swimmers as there is now only one or two lanes open for public lap swimming as two squads need space to train (Swimming New Zealand, 2011, October). Aquagym was also without a pool for 7 months as theirs needed some major repairs.

In January 2011, Kaiapoi Swim club merged with the Dudley Park Amateur Swim Club to form North Canterbury Swimming Club which is now located and swim at Dudley Park (North Canterbury Swimming Club, 2013). This was just in time to avoid being forced into finding a new permanent location due to the closure of their Kaiapoi facilities.

Additionally, the other five swimming clubs in Christchurch, Jasi, Wharenui, Templeton, Aquagym and Kaiapoi, all had a period of time where they had to swim at different facilities while their pools were checked by engineers to ensure the buildings were safe before continuing as usual.

**Table 2: Swimming clubs and their respective training facilities**

<b>Facility</b>	<b>Competitive Swimming club</b>
<b>Graham Condon Centre</b>	Aquagym (trains at centre part-time)
<b>Jellie Park</b>	Jasi swim club and QEII
<b>QEII Complex</b>	QEII swim club (moved to Jellie Park after earthquake)
<b>Templeton</b>	Templeton Swim Club (based at Wharenui due to pool being outdoors) - splitting into 2 clubs in 2013, one being Canterbury Swim Club
<b>Wharenui</b>	Wharenui swim club and Templeton Swim Club
<b>Dudley Park</b>	North Canterbury swim club – formed January 2011
<b>Kaiapoi</b>	Kaiapoi swim club combined with Dudley park squad to form North Canterbury swim club
<b>Aquagym</b>	Aquagym swim club – were pool-less for 7 months. Now independent of the centre therefore they swim at both Aquagym and the Graham Condon Centre

### *Changes to competition swimming*

As previously explained, swimming organisations attempted to ensure competitions continued as usual during and after the earthquakes and this resulted in various changes. The changes were brought about primarily because of the loss of the only 50m competition pool in Christchurch (QEII). As such, long course competitions that were previously held in the region were moved to different locations outside of Canterbury while short course competitions were moved to different locations within Christchurch. Jellie Park was one of the venues which took on some of the competitions. However, this was an on-going struggle as they are a Council pool and need to accommodate for all types of pools users. For instance, closing the pool for a 3-day period for competitions was challenging when other public swimmers wanted the use of the pools (explanation from Sam, 2012). As such, because the alternative pools around Christchurch do not have the right facilities or space, the majority of swimming competitions are now being held at Wharenui as opposed to QEII. This is because, while it is a council pool, the club rents the facilities and therefore are able to privately run the pools; this means they are not required to be open for recreational or other public swimmers.

Sam also explained that swimming competitions that were formerly held in Canterbury such as the New Zealand National Age Group Championships and Canterbury A's have now been moved to places such as Wellington and Dunedin. After the September 2010 earthquakes, for example, Swimming New Zealand (SNZ) saw it as necessary to move the 2010 New Zealand National Age Group Short Course Championships to Wellington and in March 2011 the Division 2 Competition that were scheduled for Christchurch had to be transferred to Rotorua (Swimming New Zealand, 2011, October).

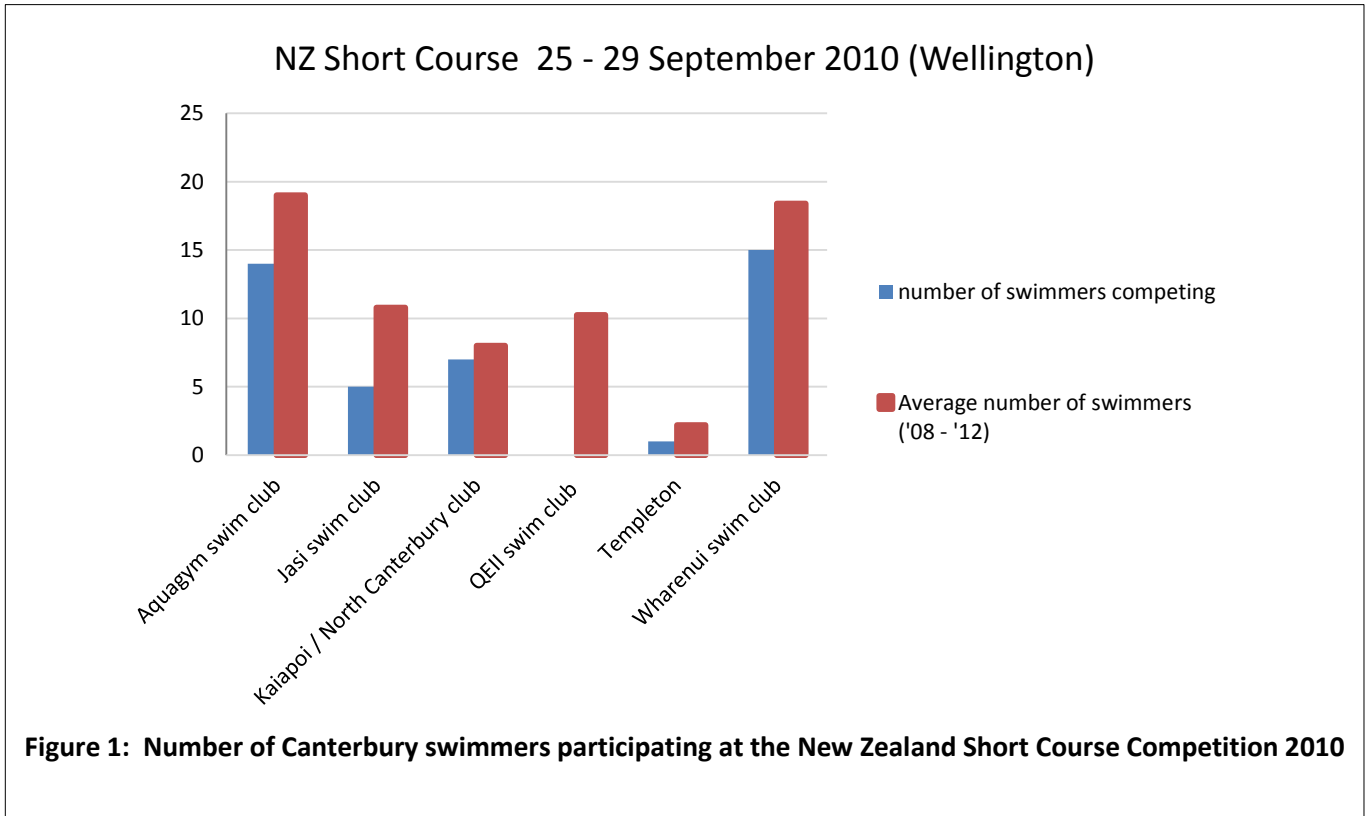
The movement of competitions away from Christchurch did not only affect the competition swimmers but had financial implications too. For example, having the 2010 NZ National Age Group Short Course Championships moved, resulted in a loss of revenue as well as the loss of 1000 swimmers, coaches, officials and supporters, who were scheduled to attend the competition at QEII Leisure Centre (Earthquake forces major NZ swim meet shift, 2010, September 1). Each club in Christchurch was adversely affected financially either through their inability to host regional swim meets or, when competition were run, decreases in entries often occurred. The lower amounts of competitors also affected many clubs' ability to run effective fundraising initiatives which are a necessary income for many (Swimming New Zealand, 2011, October).

Furthermore, participation in swimming competitions has also changed. The loss of club swimmers or just swimmers in general is an on-going concern that has been brought about by the earthquakes. By September 2011, Swimming Canterbury West Coast had 380 registered members in comparison to 519 members they had at the same time in 2010; a 26% decline in competitive swimmers over the year (Swimming New Zealand, 2011, October). Sam suggests that the main reason for the decrease in swimmers is due to people's loss of income. Jobs have been lost for various reasons, mostly due to the earthquakes, which have resulted in the inability for some to continue with swimming lessons, club swimming and recreational swimming as it is too expensive. Alternative reasons put forward by Sam were that many people are moving away from Christchurch and competitions are getting more costly now that they are held outside of Christchurch. The former is supported by previously discussed research where people are inclined to migrate in the face of on-going natural disasters (Fussell, et al., 2010; Naude, 2009; Saldana-Zorrilla & Sandberg, 2009). The latter, the on-going increase in costs to compete, is becoming more and more prominent.

Funding in the form of earthquake support was readily available the year subsequent to the earthquakes, however, this money and sympathy is fast running out and funding is starting to become more difficult to come by. Yet, financial assistance is continually needed as costs to compete have increased. This is because swimmers that took part in national competitions previously held in Christchurch now have to travel around New Zealand in order to compete in the same competitions. This is resulting in an increase in travel and accommodation cost. As such, funding was applied for and was given from the Mainland Foundation for accommodation, transport and other competition related costs since the earthquakes in 2010. An approximate amount of \$55,100 has been donated to Swimming Canterbury West Coast from August 2010 until July 2012 (Mainland Foundation, 2012), but, it is uncertain whether this funding can be continually obtained and relied upon. However, this specific hardship is expected to lessen once the new Metro Sport Centre in central Christchurch has been completed and competitions are once more held in Canterbury. This would mean traveling and accommodation costs would lessens as swimmers can stay at home.

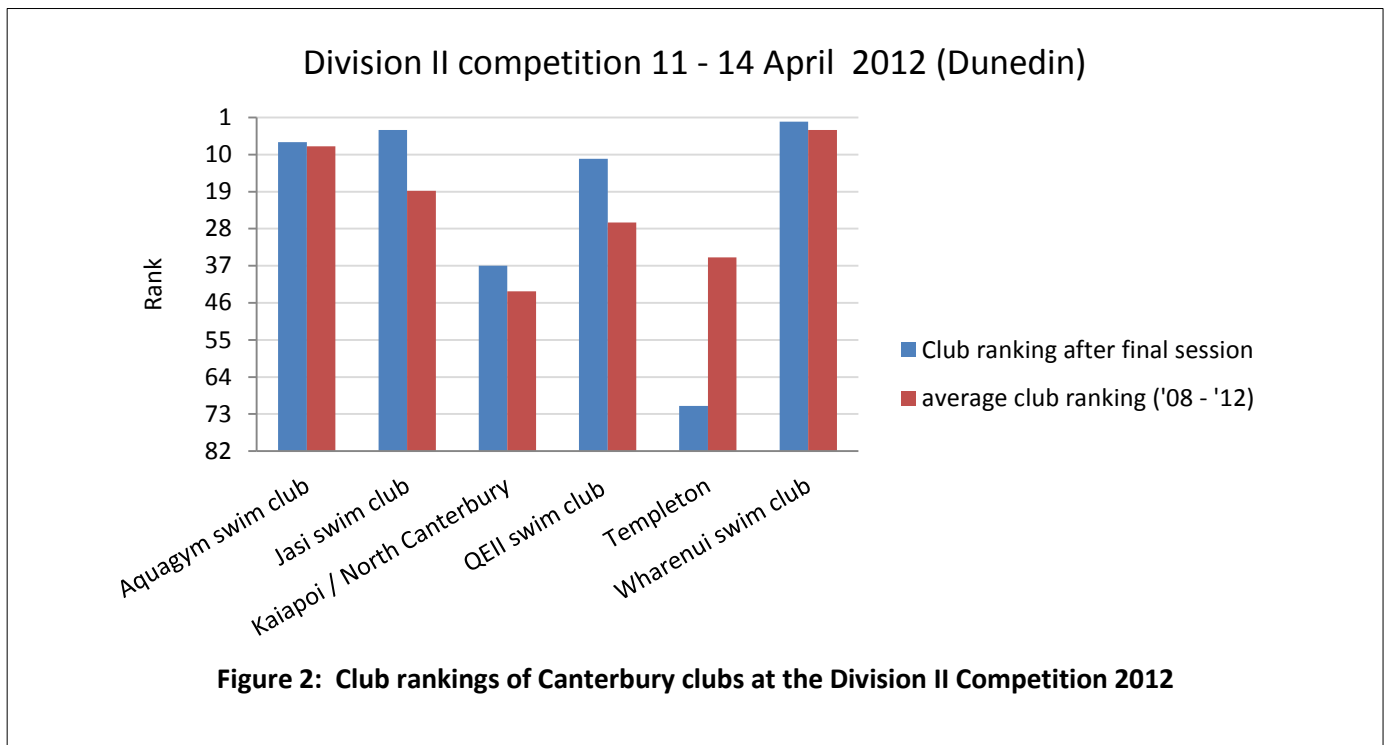
To determine whether participation numbers in competitions were decreasing because of the earthquakes, four national swimming competitions were examined. The results of this investigation illustrated that a total of 497 Canterbury swimmers partook in the four competitions during 2009 and 2010 while, from 2011 to 2012, only 410 swimmers competed for the Canterbury clubs. There was also a significant difference in the number of participants who competed directly after the first earthquake in September 2010. For example, in 2009, 108 Canterbury swimmers competed at the NZ Short Course Competition yet following the 4th September 2010 only 42 swimmers took part (Figure 1.). This decrease, however, may have also been associated with the last minute move of the swimming competition from Christchurch to Wellington. A similar decrease is seen in the number of competitors for NAGs. These competitions were scheduled to be held in Christchurch and Wellington in alternating years, however, after the meet at QEII in 2010 where 97 Canterbury swimmers took part, only 69 took part in 2012 (the competition that was due to be held in Christchurch).

What is more, on average there was a 17% drop in the number of Canterbury swimmers competing during 2011 to 2012 in comparison to the number of swimmers competing during 2009 and 2010. However, it should be noted that while a definite drop in numbers has been discovered in most cases, it is possible that it is not directly caused by the earthquake though there is probable



correlation.

While the number of swimmers competing decreased from 2011, the ranking of each competing Canterbury club was found to either remain equal to their average rank or bettered following the earthquake in February 2011. By 2012, five out of the six Canterbury clubs partaking were above their average ranking. The sixth club, Templeton, had only one swimmer taking-part resulting in their below average ranking (Figure 2.). Nonetheless, this trend in higher-than-average podium rankings is also seen in NAGs, NZ Short Course Competition and the NZ Junior Champs. QEII swim club has even exceeded expectations by remaining the number one ranking club at the New Zealand Junior Swimming Championships in 2013; their second year running even though they are still without their own pool (Swimming NZ, 2013).



### *Learn to Swim*

As a result of the earthquakes, 24 (53%) school pools in the Canterbury area were damaged; most being east of Christchurch (CERA, 2011; Sport and Recreation Earthquake Leadership Group, 2012). This meant that many students were left without the opportunity to continue with their swimming lessons. As such, the Education Ministry decided to fast-track the repairs of 23 of these school pools to ensure children could get back in the water and continue to learn to swim. This initiative is said to be costing approximately \$800 000 to complete (Law, 2012b). The pools that have been nominated for repairs have been strategically selected in terms of their location. This is because schools and early childhood centres across greater Christchurch have now been grouped into learning community clusters of predominantly geographical interest so, where possible, facilities such as swimming pools will be shared (Ministry of Education, 2012; Sport and Recreation Earthquake Leadership Group, 2012).

However, while there has been a decrease in the availability of school pools in Christchurch, participation in swimming education programmes increased significantly after an initial decrease subsequent to the earthquakes. This increase has been contributed to quality swim schools, a national awareness campaign and availability of temporary pools (Christchurch City Council, 2012a, p. 81). Ashley explained that in 2012 Jellie Park and Pioneer Recreation Centre had major increases in the number of children undertaking swimming lessons, but, suggested that the change in numbers is mainly due to the loss of learning pools such as QEII and many school pools. Facilities such as Wharenui have also had an increase in the number of schools using their pools for lessons, and Sam explained that facilities are using this opportunity as a way of attracting more swimmers to their respective squads. This is because, when learn-to-swim numbers reduce, it has a direct flow-on effect to competitive swimming resulting in fewer swimmers joining in competitive swimming (Swimming New Zealand, 2011, October). Ashley also explained that the swimming lesson offered to school groups are largely subsidised. For example the Kiwi swim programme subsidised 80,000 swimming lessons in December 2011 alone (Christchurch City Council, 2012a, p. 81). As such, many schools are ensuring their students are continuing with their lessons even with the loss of their own facilities.

Furthermore, since the earthquakes, schools wanting to begin or continue with swimming lessons while their own pools are out of order have been given the opportunity to apply for Kiwisport funding; this covers students' transport costs to and from the closest Council facility, including the temporary pools (Christchurch City Council, 2012c). For example, funds were given to 1700 school children from Kaiapoi to cover their transport costs as they wanted to complete their swimming programme at Dudley Park Aquatic Centre while the Kaiapoi pool is still inoperative (Christchurch Earthquake Appeal, 2011b). However, it was felt that this option was not always ideal for schools as traveling to and from facilities can be time consuming. For instance, Diamond Harbour School pupils had to travel 80 minutes in a bus each day for two weeks to get to and from swimming lessons in Halswell. These trips were found to be very disruptive to the pupils' school day and were only sought after as a short-term solution (Law, 2012b). Thus, the repair work being done by the Ministry of Education is being welcomed by many.

The temporary pools, which were previously mentioned, have been erected to compensate for the loss of school pools and teaching facilities around Christchurch. The Christchurch Earthquake Appeal Trust, Rotary International, Mainland Foundation and Water Safety New Zealand have come together to invest in these new temporary pools which are 1.3 meter deep and are said to cost approximately \$55 000 each (Christchurch Earthquake Appeal, 2011a; Law, 2012a). Still, three new pools were brought and are now part of Sport Canterbury's Pools in Schools initiative which has set out to address the serious shortage of learn to swim space in Canterbury and aims to ensure that primary school students continue to learn essential swimming and water survival skills (Christchurch Earthquake Appeal, 2011a). The portable pools have been placed at Linwood Avenue School (East of Christchurch), Kaiapoi (North of Christchurch) and Queenspark School (North East of Christchurch) and are operated by the respective City Councils (specifically Christchurch and Waimakariri).

It is estimated that each week, 500 children used the Kaiapoi and Queenspark facilities respectively and since the opening on 13 February 2012, seven schools from the East of Christchurch have continually been using the pool located at Linwood Avenue School (Christchurch Earthquake Appeal, 2011a; Law, 2012a; Marryatt, 2012, February). By the end of the summer season in April 2012, almost 11,000 people had used the 3 pools before they were for the winter (Law, 2012b). Unfortunately, since then, Ashley explained that the pool located at Linwood Avenue School has not reopened for the 2012/2013 summer season due to the continual vandalism of that facility.

#### *Open water swimming*

With a 60% loss of swimming facilities in Christchurch, the Council anticipated that more people would be using the beaches in around the city, however, before the beaches were open to swimmers a large scale clean-up was needed (Christchurch Earthquake Appeal, 2011a). The earthquake of 2011 caused major damage to sewer pipes and pump stations in and around Christchurch resulting in all the beaches being off limits for some months due to contamination (Environment Canterbury, 2012; Newth, 2012, December 20). This disrupted many water-based recreation activities such as swimming as untreated human sewage was discharged into the Avon River, the Heathcote River, the Avon-Heathcote Estuary and the sea (Environment Canterbury, 2012). Additionally, people were apprehensive about using certain beaches around Christchurch, such as Sumner and Taylors Mistake, as these areas were unsafe and prone to rock fall following the earthquakes (Newth, 2012, December 20). As such, beaches like Sumner which used to be one of the city's most popular swimming beaches had a quiet summer in 2011 and early 2012 (Newth, 2012, December 20).

Lifesaving in Christchurch also faced challenges following the earthquakes. In addition to the closure of beaches, there was a loss of members from some clubs and the QEII complex which was used for training was no longer available. This meant people were forced to travel to places such as Jellie Park

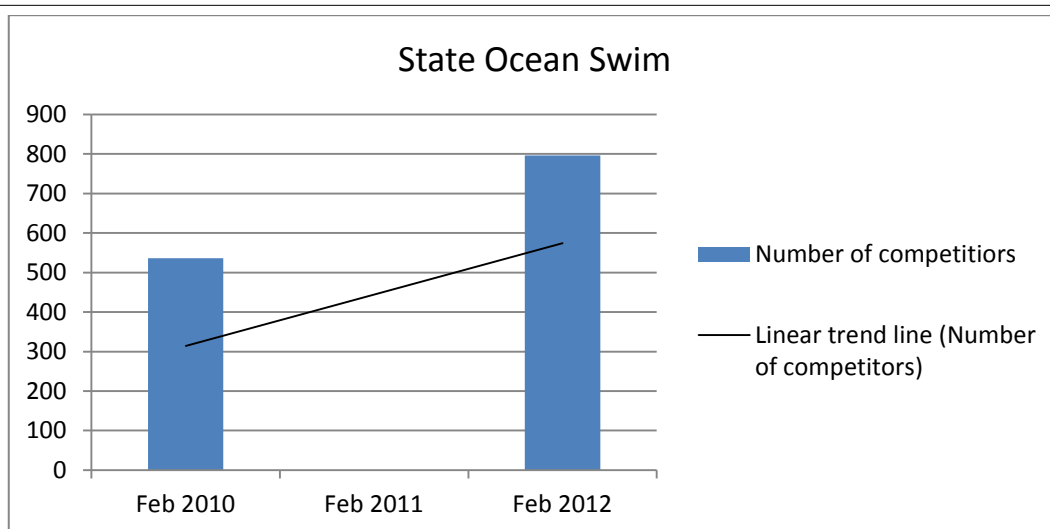
and the Graham Condon Recreation & Sport Centre for training. (Newth, 2012, December 20). Additionally, the annual State National Surf Life Saving Championships which were set to be held at New Brighton beach in 2011 were called off and moved to Mount Maunganui as it was deemed unsuitable to run it in Christchurch (Surf Life Saving New Zealand, 2011, March 8)

Nevertheless, there was some relief for swimmers and recreational beach goers alike after the release of the 2012 Ministry for the Environment recreational water quality report. It stated that beaches such as New Brighton, Sumner and Waimari were rated good or satisfactory for swimming most of the time and Taylors Mistake and other popular spots such as Spencerville, Woodend and Waikuku beaches were all rated very good (Ministry for the Environment, 2012; Newth, 2012, December 20).

Open water swimming competitions were also affected by the earthquakes. For example, the Contact National Schools Triathlon Championships, which involves 120 schools nationwide and consists of two races, a triathlon and an open water swim, was set to be held in Canterbury in 2011 at the new Pegasus Township (Triathlon New Zealand, 2010, April 7, 2012, July 16). In 2010, over 800 participants took part in the event which was held at Lake Karapiro (North Island) following which, the decision was made to move the event to the South Island schools (Triathlon New Zealand, 2010, April 7). However, after the February earthquakes in 2011, the event was relocated to Jack’s Point, Queenstown. While this meant schools taking part had to travel to take part once again, the event had only been shifted temporarily. After the event was run at Lake Karapiro in 2012, Pegasus is set to host the Contact National Schools Triathlon Champs on March 21st (triathlon) and 22nd (open water swim) in 2013.

*Open water competitions*

When comparing the selected open water swimming events the results revealed that participation numbers had either remained relatively similar to those prior to the earthquakes or had actually increased. Jo explained that the number of people taking part in the Surf and Turf series had been steadily increasing each year since its start in 2008; this included a move from Sumner beach to Corsair Bay. Following the February earthquake, however, competitor numbers did not increase but rather remained the same as the previous year. Nevertheless, following this, a small amount of growth has been seen again at the Surf and Turf events.



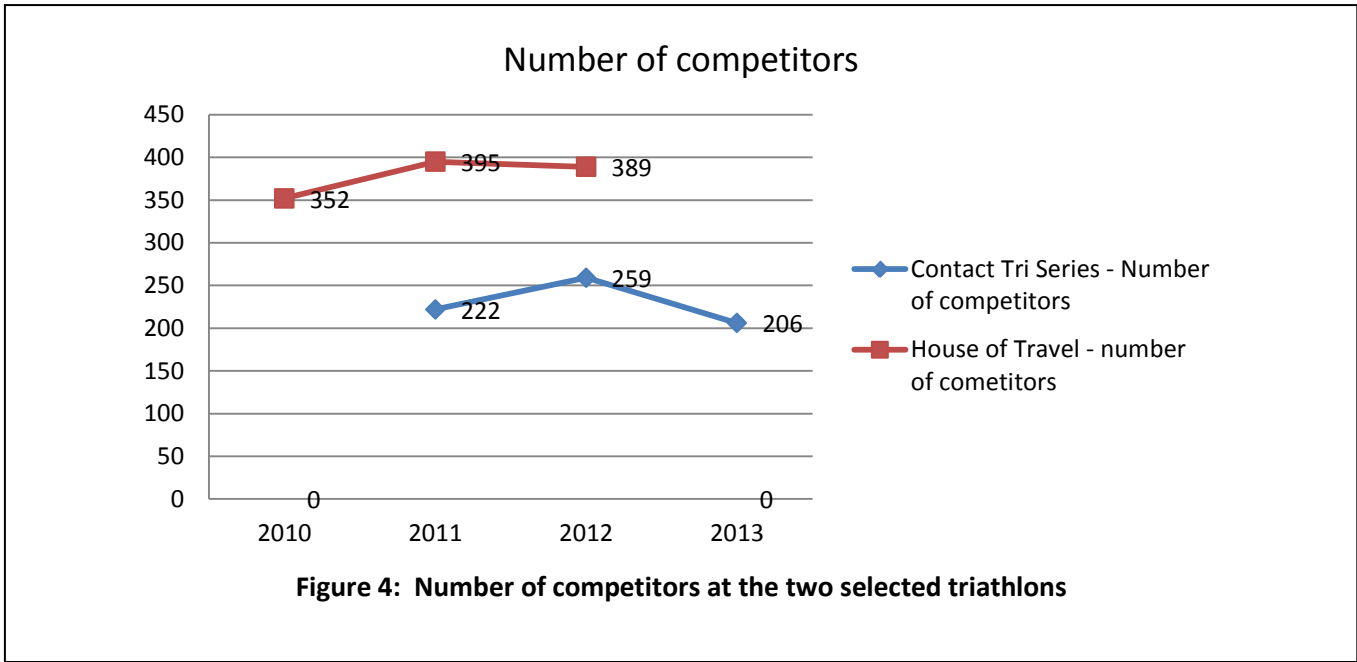
**Figure 3: Number of competitors participating in the State New Zealand Ocean swim**



Similarly, the State New Zealand Ocean Swim, which used to be known as the Corsair Classic, has now been renamed the La Grande Swim and has moved to Akaroa. This event has grown tremendously over the years and has had two new races added; namely the 300m and 1000m swim (State, 2011, March 2). Even with the cancelation of the race in 2011 due to the earthquakes, it reached its goal of attracting 800 competitors in 2012 (See figure 3) (Marryatt, 2012, February). By 2013, the number of competitors remained relatively stable with 799 people taking part in the swim (Ocean Swim, 2013).

With the two triathlons, no significant change in the number of competitors was noted when comparing the available data. The House of Travel triathlon events had between 350 and 395 athletes competing each year from 2010 to 2012 and the Contact Tri Series had between 220 and 260 athletes, illustrating no substantial effect of the earthquakes on the racers or the overall events (Figure 4).

It should be noted, however, that the increase in the number of competitors taking part in the open water swimming series could be as a result of many different factors. While the earthquakes may have shifted people to toward more opening water swimming due to pool closures, other factors could also be influencing this trend.



## Conclusion

Christchurch has had to cope with many long- and short-term effects brought on by the September 2010 earthquake, the February 2011 aftershock and the thousands more shakes the region has experienced since 2010. People have lost loved ones and homes and many have chosen to move to different regions around the country to find a safer place to settle. Industries have been significantly affected as buildings have been demolished and the work force and customer base has decreased.

Sport has had similar problems to deal with as many playing fields and competition facilities have been lost or are in desperate need of repairs and the number of athletes training and competing has decreased. The swimming industry is no exception; the only 50 m competition pool in the region was lost, beaches were out of bounds and almost half of the schools in Canterbury lost the use of their own swimming pools. However, while reduced pool space is a significant on-going issue in Canterbury due to many pools being closed, some facilities have benefitted from the earthquakes and have received funding for upgrades or have acquired more swimmers and students to take part in swimming lessons. As such, new learning pools have been built to accommodate the increased demand for pool space and three new aquatic centres are in the process of being constructed.

Finally, the impacts that the earthquakes have had on indoor competitions, open water competitions and swimming lessons were examined in this report and in most cases the research revealed that people in Christchurch seem to be adapting to the 'new normal'. Indoor competitions have continued to take place as usual, even with many being moved to different locations around the country. And while there has been a decrease in the number of competitors taking part, the data revealed that the Canterbury clubs are still highly competitive and their rankings at events have either remained similar or bettered during and after the period of the earthquakes. The number of people taking part in swimming lessons has also increased as temporary pools have been put in place and subsidies have been offered to cover transport and lesson costs. Open water swimming, however, seemed to be relatively unaffected by the earthquakes even when events were moved or postponed. Overall, this report has shown that swimming in Christchurch was significantly affected by the earthquakes.

## References

- 3 News. (2009, February 10). *Closure of school pools worries swimming professionals*. Retrieved from <http://www.ccc.govt.nz/CCC.Web.RecreationSport/cityleisure/recreationsport/facilities/index.aspx>
- Beca Infrastructure Ltd. (2011). QEII post February earthquake - survey report. In *Geospatial Survey Report*. Christchurch: Beca.
- Bowden, S. (2011). Aftershock: Business relocation decisions in the wake of the February 2011 Christchurch earthquake. *Journal of Management and Organization* 17, 857 - 863.
- Cairns, L. (2012). *Work on new pool to start 2013*. Retrieved 15 January, 2013, from <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/city-blueprint/7734509/Work-on-new-pool-to-start-2013>
- Cairns, L. (2012, September 23). *Pool proposed for city centre*. Retrieved 4 December, 2012, from <http://www.stuff.co.nz/the-press/news/7990396/Pool-proposed-for-city-centre>
- Campbell, J. (Writer/Producer/Director). (2011). *The 'new normal' in Christchurch*. New Zealand. Retrieved from <http://www.3news.co.nz/The-new-normal-in-Christchurch/tabid/817/articleID/210534/Default.aspx>
- Canterbury Swim School. (2012). *Canterbury Swim School*. Retrieved 20 December, 2012, from <http://www.canterburyswimschool.co.nz>
- CERA. (2011). *Draft recovery strategy for greater Christchurch*. Christchurch: Christchurch Earthquake Recovery Authority
- Christchurch Central Development Unit. (n.d). *Metro Sports Facility*. Retrieved 15 January, 2013, from <http://ccdu.govt.nz/what-we-are-doing/metro-sports-facility>
- Christchurch City Council. (2003). Leisure and Recreation. *Christchurch City social trends report 2003 - Draft*, 105 - 114.
- Christchurch City Council. (2006). *Christchurch to build four new aquatic facilities* Retrieved 17 January, 2013, from <http://www.scoop.co.nz/stories/AK0609/S00113/christchurch-to-build-four-new-aquatic-facilities.htm>
- Christchurch City Council. (2009). Council activities and services: Recreation and Leisure. *Christchurch Long Term Council Community Plan 2009 - 2019*, 108 - 118.
- Christchurch City Council. (2010). *Swimming*. Retrieved 3 January, 2013, from <http://www.ccc.govt.nz/cityleisure/recreationsport/sportsrecreationguide/swimming.aspx>
- Christchurch City Council. (2012a). *Annual Report 2012 Christchurch*
- Christchurch City Council. (2012b). *Facilities*. Retrieved 3 December, 2012, from <http://www.ccc.govt.nz/CCC.Web.RecreationSport/cityleisure/recreationsport/facilities/index.aspx>
- Christchurch City Council. (2012c). *Swim Education*. Retrieved 5 January, 2013, from <http://www.ccc.govt.nz/cityleisure/recreationsport/classes/swimeducation.aspx>
- Christchurch City Council. (2012, March 6). *Innovative new Learn to Swim pool* Retrieved 20 December, 201, from <http://www.ccc.govt.nz/thecouncil/newsmedia/mediareleases/2012/201203062.aspx>
- Christchurch Earthquake Appeal. (2011a). *Sport and Recreation*. Retrieved 6 December, 2012, from <http://christchurchappealtrust.org.nz/Sport-and-Recreation#swimming>

- Christchurch Earthquake Appeal. (2011b). *Vodafone foundation Canterbury Fund*. Retrieved 6 December, 2012, from <http://christchurchappealtrust.org.nz/Vodafone-Foundation-Canterbury-Fund>
- Cole, C. (2012). *Our beer, no longer here*. Retrieved 15 January, 2013, from <http://www.stuff.co.nz/the-press/christchurch-life/8127694/Our-beer-no-longer-here>
- Creswell, J. W. (2003). *Research design: qualitative, quantitative and mixed methods*. California: Sage Publications.
- Dalziel, P., & C. Saunders. (2012). Regional development before and after an earthquake: the Canterbury New Zealand experience. *Australian Journal of Regional Studies* 18(1), 100 - 127.
- Diamond, J. (1997). *Guns, Germs and Steel*. New York: W.W. Norton & Company.
- Earthquake forces major NZ swim meet shift*. (2010, September 11). Retrieved 4 December, 2012, from <http://www.stuff.co.nz/dominion-post/sport/4119963/Earthquake-forces-major-NZ-swim-meet-shift>
- Environment Canterbury. (2012). *Water contamination in the Christchurch area after the 22 February and 13 June 2011 earthquakes*. Retrieved 10 December 2012, from <http://www.ecan.govt.nz/services/online-services/monitoring/Pages/water-contamination-christchurch-post-22-feb-2011-earthquake.aspx>
- Fussell, E., Sastry, N., & VanLandingham, M. (2010). Race, socioeconomic status, and return migration to New Orleans after Hurricane Katrina. *Population and Environment*, 31, 30 - 42.
- GeoNet. (2011). One year anniversary of the magnitude 7.1 Darfield (Canterbury) earthquake. *GeoNet News*, Oct (15), 4 - 5.
- Gersick, C. J. G. (1991). Revolutionary change theories: a multilevel exploration of the punctuated equilibrium paradigm. *The Academy of Management Review*, 16(1), 10 - 36.
- Huang, Y., & Jiang, X. (2010). Field-observed phenomena of seismic liquefaction and subsidence during the 2008 Wenchuan earthquake in China. *Natural Hazards*, 54, 839 - 850.
- Lake Pegasus now fill. (2009, December ). *Pegasus Life*, p. 2.
- Lambert, S. (2012). *Impacts on Maori of the Ōtautahi/Christchurch earthquakes*. Faculty of Environment, Society and Design. Lincoln University.
- Law, T. (2012a). *East side kids still in the swim despite quakes*. Retrieved 11 December, 2012, from <http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/6516506/East-side-kids-still-in-the-swim-despite-quakes>
- Law, T. (2012b). *Swimming time returns to schools*. Retrieved 11 December 2012, from <http://www.stuff.co.nz/the-press/news/schools/7896957/Swimming-time-returns-to-school>
- Mainland Foundation. (2012). *Applications recieved*. Retrieved 20 December, 2012, from <http://www.mainlandfoundation.co.nz/applications-received/#received>
- Marryatt, T. (2012, February). *Update of current projects for elected members*. Retrieved 6 December, 2012, from [http://resources.ccc.govt.nz/files/thecouncil/meetingsminutes/agendas/2012/April/Fendalt onWaimairi2nd/Clause11.2Attachment-CouncilUpdate.pdf](http://resources.ccc.govt.nz/files/thecouncil/meetingsminutes/agendas/2012/April/Fendalt%20onWaimairi2nd/Clause11.2Attachment-CouncilUpdate.pdf)
- Ministry for the Environment. (2012). *Recreational water quality in New Zealand - indicator update*. Retrieved 23 January, 2013, from <http://www.mfe.govt.nz/environmental-reporting/report-cards/water-quality/2012/index.html>

- Ministry of Education. ( 2012). *Education renewal for greater Christchurch*. Retrieved 12 February, 2013, from <http://www.edgazette.govt.nz/Articles/Article.aspx?ArticleId=8668>
- Naude, W. (2009). Natural disasters and international migration from Sub-Saharan Africa. *Migration Letters*, 6(2), 165 - 176.
- Newth, K. (2012, December 20). *Christchurch beaches ready for summer - best place to take a dip this summer*. Retrieved 15 January, 2013, from <http://www.stuff.co.nz/the-press/christchurch-life/8101957/Chch-beaches-ready-for-summer>
- North Canterbury Swimming Club. (2013). *North Canterbury Swimming Club*. Retrieved 20 January, 2013, from <http://www.northcanterburyswimclub.co.nz/>
- Ocean Swim. (2013). Results. Retrieved 23 February, 2013, from <http://www.oceanswim.co.nz/20122013-results/>
- Pereira, A. S. (2009). The opportunity of a disaster: The economic impact of the 1755 Lisbon earthquake. *The Journal of Economic History*, 69(2), 466 - 499.
- QEII Swim Club. (2013). *About Us*. Retrieved 20 January, 2013, from <http://www.sportsground.co.nz/qe2swim/70561/>
- Robinson, G. (2011). *Pools to reopen for summer*. Retrieved 7 December, 2012, from <http://www.stuff.co.nz/the-press/news/5830990/Pools-to-reopen-for-summer>
- Ruef, M. (1997). Assessing organizational fitness on a dynamic landscape: an emperical test of the relative inertia thesis. *Strategic Management Journal*, 18, 837 - 853.
- Saldana-Zorrilla, S. O., & Sandberg, K. (2009). Impact of climate-related disasters on human migration in Mexico: a spatial report. *Climate Change*, 96(97 - 118).
- Saunders, C., Dalziel, P., & Greer, G. (2005). *Pricing recreation in Christchurch: Agribusiness and Economics Research Unit*, Lincoln University.
- Shennan, I., & Hamilton, S. (2006). Coseismic and pre-seismic subsidence associated with great earthquakes in Alaska. *Quaternary Science Reviews* 25(1-2), 1-8.
- Skidmore, M., & Toya, H. (2002). Do natural disasters promote long-run growth. *Economic Inquiry*, 40(4), 664 - 687.
- Sport and Recreation Earthquake Leadership Group. (2011). *Greater Christchurch sport & recreation plan: Final issues and options paper*. Christchurch.
- Sport and Recreation Earthquake Leadership Group. (2012). *Spaces and places plan for sport and recreation in greater christchurch*. Christchurch.
- Sport and Recreation New Zealand. (2009a). *Sport, recreation and physical activity profile: Canterbury West Coast Region 2007/08*. Wellington: SPARC.
- Sport and Recreation New Zealand. (2009b). *Sports and recreation profile: Swimming - Findings from the 2007/08 Active NZ Survey*. Wellington: SPARC.
- State. (2011, March 2). *State and Ocean Swim join forces to help Christchurch*. Retrieved 6 December, 2012, from <http://www.state.co.nz/about-state-insurance/News/Pages/state-and-ocean-swim-join-forces-to-help-christchurch.aspx>
- Statistics New Zealand. (2011). *Christchurch's population decreases after the earthquake*. Retrieved 16 January, 2013, from [http://www.stats.govt.nz/browse\\_for\\_stats/population/estimates\\_and\\_projections/SubnationalPopulationEstimates\\_MRJun11.aspx](http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/SubnationalPopulationEstimates_MRJun11.aspx)

- Statistics New Zealand. (2012). *Subnational Population Estimates: At 30 June 2012*. Wellington: Statistics New Zealand.
- Surf Life Saving New Zealand. (2011, March 8). *Switch to Mount real event lifesaver*. Retrieved 6 February, 2013, from <http://www.surflifesaving.org.nz/Article.aspx?ID=16038>
- Swimming New Zealand. (2010). *Open water swimming manual*. Retrieved from [http://www.swimmingnz.org.nz/uploads/files/SNZ\\_Open\\_Water\\_Swimming\\_Manual.pdf](http://www.swimmingnz.org.nz/uploads/files/SNZ_Open_Water_Swimming_Manual.pdf)
- Swimming New Zealand. (2011, October). Impact of the earthquakes for swimming in Canterbury. *Fastlane - The Swimming New Zealand Newsletter*.
- Swimming New Zealand. (2013). Christchurch club tops junior swim honours again. Retrieved 23 January, from <http://www.swimmingnz.org.nz/high-performance/news/christchurch-club-tops-junior-swim-honours-again>
- Triathlon New Zealand. (2010, April 7). *National schools triathlon to make contact with South Island*. Retrieved 23 January, 2013, from <http://www.pegasustown.com/more-info/media-releases>
- Triathlon New Zealand. (2012, July 16). *Contact school champs return to Pegasus in 2013*. Retrieved 23 January 2013, 2013, from <http://www.pegasustown.com/more-info/media-releases>
- Waimakariri District Council. (n.d.). *Kaiapoi Aquatic Centre* Retrieved 7 December, 2012, from [http://www.waimakariri.govt.nz/leisure\\_recreation/pools/kaiapoi-aquatic-centre.aspx](http://www.waimakariri.govt.nz/leisure_recreation/pools/kaiapoi-aquatic-centre.aspx)