



WETLAND WARRIORS

Wetlands in Canterbury Presentation
Research Methods

How can the story* of distinctive Canterbury Wetlands be effectively visualized for attendees at the International Wetland Conference?" (*including cultural and physical narratives)

Kaley Boyd
Jess Holland
Annaliese Boot
James Hoare

Geography 309- Research
Methods

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Executive Summary

In October next year, Christchurch is hosting the 11th International Wetland Conference (IWC). Di Lucas, a member of the 2020 IWC organising committee, wants to provide attendees an opportunity to learn about Canterbury wetlands. Di's goal is to have presentation options available at the conference to show attendees the changes of Canterbury wetlands through time. As conference attendees will come from all around the globe, this will be an opportunity to showcase wetland values that are significant to New Zealanders.

How can the story* of distinctive Canterbury Wetlands be effectively visualised for attendees at the IWC? (*including cultural and physical narrative). Cultural narrative refers to the Māori and European settlers. The physical narrative refers to the geomorphology, geology and ecology of the wetlands. The aim is to present the story of Canterbury Wetlands at the IWC.

To be considered a significant Canterbury wetland they had to have: a relationship with other wetlands, be geomorphologically different, have ecological information available and be of cultural significance. Presentation methods had to be inclusive, no narrator requirement, engaging and factual. A review of academic literature was completed to determine effective presentation methods and to find wetlands that meet the selected criteria.

Distinctive selected wetlands were the Waimakariri Lakes Complex, Waimakariri River, the Avon River within the CBD precinct and the Avon- Heathcote Estuary (Ihutai). The presentation methods selected include a Prezi display for at the conference and a walking tour to be completed in attendees own time. A website was created to link the presentation methods together and provide additional information for those who are interested.

The largest limitation in this project was finding in depth information on all Canterbury wetlands. Those without data were excluded from the selection pool so the research and production of presentation methods could be completed within the project time frame. The accuracy of the cultural data still requires being checked by Ngai Tahu or an affiliated iwi. It is strongly recommended that the IWC committee approaches Ngai Tahu or Ngai Tuahiriri to ensure the results are correct.

To extend the educational benefits of the project beyond the conference, boards with the QR code link could be placed at the walking tour sites. The website could be expanded on to cover wetland environments that were not researched during the project. Suggestions for future studies involve getting academic staff members to complete a poll on previous conferences they found engaging.

1.0 Introduction

Wetlands are identified by Ramsar as being “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” (Ramsar, 2016). When choosing the wetlands, the Ramsar definition was narrowed down to permanent water bodies.

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How can the story* of distinctive Canterbury Wetlands be effectively visualised for attendees at the IWC? (*including cultural and physical narrative). The cultural narrative refers to Māori and European settlers. The physical refers to the geomorphology, geology and ecology of the wetlands. The aim is to present the story of Canterbury Wetlands at the IWC.

2.0 Literature Review

Literature reviews are essential for learning background information and identifying any gaps within the literature (Maier, 2013). A literature review was completed on areas that used research throughout the project. Presentation methods were researched to provide a range of possibilities to impact a larger audience.

Research was completed at the start of the project to understand wetlands globally and locally. It helped gain an understanding of common ecology, rehabilitation techniques, cultural values, and their geomorphology. To learn how wetlands are valued and how they have changed overtime to get an understanding of the New Zealand wetland story. Background literature reviews were completed to determine what makes a distinctive wetland.

Ecological papers were studied based on the biodiversity of wetlands within Canterbury or global wetland rehabilitation techniques. Ecology papers provide an insight into the flora and fauna of the Canterbury wetlands and their changes since human colonisation.

3.0 Methods

Methods detail why specific wetlands were chosen and what their relationship with cultural and ecological aspects are. Each presentation method integrates information consistently used throughout all methods designed. Each presentation method had their effectiveness as a visual tool researched.

Di Lucas envisioned the story of a variety of Canterbury Wetlands from the mountains to the sea being shown at the 2020 IWC. Each study site hosts a different wetland type, formed from a range of geomorphological processes.

3.1 Secondary data collection

In order to understand ecological biodiversity and species populations in detail, more than 12 weeks is needed. Secondary resources allowed for efficient and effective research to be completed around the four chosen wetlands, freeing up time for researching presentation methods.

The project was made using existing wetland data to ensure the completion of the research and creation of presentation outputs within the timeframe. For major wetlands in New Zealand, the

Ministry for the Environment and Department of Conservation have already completed assessments on the ecological and cultural values of wetlands and their key geomorphic features.

The project was based around the ability to present data on Canterbury wetlands. As such, the advantages of secondary data in achieving the requirements set by the community partner.

3.2 Wetland selection criteria

Using land type figures provided by Di, the Canterbury region can be split into four land types. These are the high country, upper plains, lower plains and coastal region. To select the distinctive wetlands to present, a set of criteria was created. The criteria considered the geomorphology, ecological and cultural significance, wetland location and interconnectedness. Wetlands were compared to the following criteria to determine their significance as a Canterbury Wetland.

Wetland Selection Criteria

- The wetland environments would follow one to two river systems through the land types.
- The land types have different dominant geomorphic features. These influence the type of wetlands present within the area. Splitting the Canterbury transect into four zones allowed for distinctive geomorphology of the Canterbury region to be highlighted. For example, braided rivers, common in Canterbury, are rare internationally.
- New Zealand is home to unique flora and fauna. In order to showcase New Zealand's native species to an international audience, wetlands need to be ecologically significant.
- The theme for the 2020 IWC is traditional knowledge and innovative science in wetland research and management (Gerbeaux, Myres & Perenara-O'Connell, 2019). This theme is acknowledged by wetlands being of cultural significance to Māori.

3.3 Effective Presentation Methods

Visual aids are a valid form of portraying clear messages beyond the written word (Davis et al., 2012). Choosing effective presentation methods were essential for the project. A presentation needs to be engaging, exciting and understandable all while ensuring there is a clear message (Davis et al., 2012). Utilising multimedia presentation methods has the potential to provide a compelling portrayal of the Canterbury wetlands (Cairncross and Mannion, 2001).

Through consultation with Di, there is a possibility of displaying the story in the conference break room. A brainstorm of possible presentation ideas that would suit this situation, determined that posters, maps, PowerPoints or Prezi's required researching. The IWC committee is planning excursions for attendees so presentations to coincide with this would be ideal (Gerbeaux, Myres, Perenara-O'Connell, 2019). Following a review of presentation methods, the following methods were compared to determine their effectiveness; poster, PowerPoint, Prezi, fieldtrip and website.

Literature was reviewed to determine presentation methods which would be effective at the IWC. That is: if the method is engaging when a standalone item, if it is visual to meet the requirements of the community partner, if it could present details of the story, and if it would be interactive.

4.0 Results

4.1 Research Results

One site from each land type (Lucas Associates, 2019) was chosen to tell the story of Canterbury wetlands. The selected high-country wetland is the Waimakariri Lakes Complex, upper plains wetland is the Waimakariri River, lower plains wetlands is the Avon River, and the coastal wetland is the Avon-Heathcote Estuary. The Waimakariri River connects all the chosen wetlands

forming a transect of the Canterbury region (Appendix A, Table 2) (White (2007/2009) and Environment Canterbury [ECAN] 2017,2019).

Taylor (2001) explained the early movements of Māori in the South Island and how the wetlands supported their journey. Taylor (2001) also described the early interactions of Māori and European settlers in Canterbury portraying the difference in attitudes towards wetlands. Larger wetlands such as Ihutai, Avon and Waimakariri Rivers became heavily modified by settlers as a means of protecting their interests (Parks Unit, Christchurch City Council, 1992).

Maloney et al., (1997), Blakely (2014) and CCC (2015) provided an understanding of the ecological significance for each of the chosen wetlands. The aquatic and semi-aquatic species that occupied these habitats are an important cog in the ecosystem's sustainability. Birds are another biodiverse species which rely on wetlands for food, nesting and mating grounds.

4.2 Presentation Results

Comparing presentation styles and how they meet effective presentation criteria (Appendix A, Table 1). Of the selected presentation methods researched, posters and PowerPoints were found to be ineffective in the context of the conference (Hays, 2002; Grech, 2018). Posters are not suited to displaying text-based research results (Hays, 2002). PowerPoints are not suited as a standalone item with no speaker providing additional information (Grech, 2018).

Prezi's animated displays, allows for a more effective visualisation of information as their dynamic nature enables more focus on each aspect of presentation (Krum, 2014). Each slide focuses on a different wetland, and this helps emphasise the significance of each. For presenting in the IWC breakroom, Prezi is the best method to display information as it is more interactive and engaging than a PowerPoint.

Field trips often came up as a method of teaching students about the physical environment, and ecology. Field trips are common because they are fun, encourage learning and can motivate learners to seek additional experiences (Hamilton-Ekeke, 2007; Ja'afar-Furo, Sulaiman & Dana'ilu, 2017; Cooper, 1980). As the conference will mainly involve sitting down and listening, a field trip may engage attendees as a way to get up and walk around. Field trips are most effective when supported by a handout. Handouts should be relevant and useful to the reader. A walking tour brochure provides a source of directions and information without using technology. It is essential not to give too much information that could overwhelm the reader or prevent them from wanting to read the brochure (Chan, 1999). The walking tour was the best way to provide an out of conference engagement for the attendees.

Websites are an effective method of presenting large data quantities. Websites use images, a consistent layout and an attention-grabbing design for user engagement. Photographs were chosen to portray Canterbury wetlands because images convey scientific messages in an effective manner (Davis et al., 2012). One image per page enhances viewer's enrapturement whilst staying professional (Pavlik, 2016). Grabbing attention from the homepage increases the efficiency of getting the message across so large striking images were used to enhance engagement (Pavlik, 2016). The website was an effective way to make the information easily accessible to a broad audience.

Geospatial maps help promote engagement from the audience by presenting data in a visual format (Egiebor & Foster, 2019). GIS maps are used to display information on the wetland environments as well as those detailed in the walking tour. This map type is useful to summarise information making it more manageable for the reader. The choice of website, walking tour brochure, GIS imagery and Prezi allows a varied presentation approach maximising the efficiency of portraying the message to the viewer.

5.0 Discussion

5.1 Wetland Research

This section will discuss the selected wetlands and how they met the criteria. The research was completed using academic literature and further information on their selection can be found in Appendix A and Appendix B.

5.1.1 Waimakariri Lakes Complex

The Waimakariri Lakes Complex was selected to represent high-country wetlands in the Canterbury region. At the head of the Waimakariri River, located North of Christchurch, the Waimakariri Lakes Complex is a two-hour drive from Christchurch. This area was shaped by the Waimakariri Glacier shaping a range of post-glacial land features; moraines, kettle holes, outwash surfaces, outwash channels, kame terraces, lakes and roche moutonnées (Steven, 1996). Whilst turf lands, tarns, swamps and streams are present in this region, the six small lakes were selected as the research focus of the high-country area.

The Complex is one of New Zealand's key areas for the Great Crested Grebe. In addition to water fowl this region supports many fish species including Lake Trout, Native galaxiid bully species and long-finned eel. The ecological significance of the complex has been recognised through Lake Grasmere's Wildlife Refuge Status and the recommendation of placing Lakes Sarah, Pearson and Letitia in a protected area. The wildlife present in the complex allowed for it to be a place of mahinga kai. Historically Maori would hunt birds and collect other resources on the banks of Lake Hawson. Today the birdlife and aesthetic landscape means it is commonly used as a place of bird watching and photography. Other recreational uses of the area include camping, picnicking, boating and fishing (Steven, 1996).

5.1.2 Waimakariri River

The Waimakariri River was chosen as a significant wetland to research because it connects from the Waimakariri Lakes Complex and provides water to the Avon Precinct which drains into the Avon- Heathcote Estuary.

Settlement of Māori and later by Europeans, instigated a change in the native wildlife. The introduced exotic flora and fauna species changed the braided river dynamic and its ecosystem. Culturally, the river is significant for providing mahinga kai for Māori and later irrigation and drainage for European settlers. The river has been investigated for possible dam construction. Today it is mainly used for recreational activities.

Braided rivers are rare throughout the world so there is little research on effective sustainable practices. For example, one paper detailed research methods in revitalising wetlands within NZ (Myers et al., 2013) and tried to follow meandering river methods used globally but found they were ineffective and unsustainable for a dynamic river environment.

5.1.3 Avon River Precinct

The Avon became a study site due to the significance early Māori tribes had with the present Christchurch CBD location (Taylor, 2001). The central city section of the river became the focus because Di Lucas, suggested a walking tour that attendees of the IWC could do in-between talks.

The river is home to an array of native and exotic flora and fauna (Blakely, 2014). Throughout history, the river has been a significant resource for local communities. The river provided South Island Māori such as Waitaha, Ngati Mamoe and Ngai Tahu tribes with seasonal mahinga kai resources (Taylor, 2001). Materials for building, clothing and hunting were gathered along its shores. Europeans colonised in the mid-1800s, designing an industrialised city around the banks of the Avon River (Wigram, 1916). The Avon Precinct is a great example of the successful incorporation of an urban wetland within the development of a city (Christchurch City Council, 2016).

5.1.4 Avon- Heathcote Estuary/ Ihutai

Ihutai was chosen as a study site due to its cultural and physical importance to Christchurch. The estuarine wetland supports both native and exotic flora and fauna. It is commonly used for recreational activities and is easily accessible to attendees of the IWC.

Ihutai is an estuary, fed by the South-East flowing Avon River and the North-East flowing Heathcote River (Crossland, 2013). Ihutai supports multiple significant species, such as the bar-tailed godwit, which has a declining population (DOC, 2016). The estuary has been part of Māori history since the mid1500's (Christchurch City Council Libraries [CCCL], n.d.). It was essential for mahinga kai collections and helped maintain connections for South Island iwis (CCCL, n.d.).

Ihutai is an excellent example of a thriving urban wetland in a redeveloping city. This wetland helps to create awareness of successful wetland management within urban environments.

5.2 Collation of Presentation Methods

5.2.1 Prezi

The initial slide is a GIS image displaying the projection of historic wetlands and those that still exist today throughout all of New Zealand. The second slide is a zoomed-in image of the Canterbury wetland extent, historically and currently. This pattern is repeated before each new wetland, increasing the chance of viewers observing both wetland extent and individual wetland information. Refer to Appendix F for further information.

The time between each slide movement is 10 seconds giving ample time to read the displayed information and observe the images. Throughout the animation, the Prezi enables movement, variety and engagement (Krum, 2014).

5.2.2 Prezi Map

Visual communication of wetland extent was achieved using a thematic map. The background of the map was generated by overlying shapefiles of wetland extent in QGIS.

The shapefiles were sourced from the website Koordinates:

- Prediction of wetlands before humans arrived data from the Ministry of the Environment was downloaded under Creative Commons Attribution 3.0 (CC BY 3.0 NZ)
- Current wetland extent, 2013 from the Ministry of the Environment was downloaded under Creative Commons Attribution 3.0 (CC BY 3.0 NZ)

Research by White et al. (2007) explained that the extent of New Zealand wetlands has significantly declined between 1856 and 2003. This was seen in the shapefile layers from the Ministry for the Environment (2016, 2017). The historic layer was therefore placed underneath the 2013 wetland extent layer so that the area difference could be seen with both layers visible.

Colour blindness exists in 9% of the male population (Aebi, Gunzburg, Nazarian & Olmarker, 1997) so colours selected were checked using preview options available in QGIS. This ensured the layers were distinguishable for people with normal, protanope and deuteranope vision. Initially pink and blue were used, however in the colour-blind preview these were determined as too similar, so orange and blue became the output colours.

The location points of previously selected wetlands were created from site coordinates retrieved from Google Maps. These coordinates were converted from WGS84 format into New Zealand Transverse Mercator 2000 using the LINZ data coordinates conversion site. Coordinates, wetland name and type were input to create an Excel CSV file (see Appendix B - Table 3). This file was imported into QGIS and converted into a point shapefile to be used on map.

5.2.3 Walking Tour and QR Codes

The walking tour was planned to provide attendees of the IWC the opportunity to explore Christchurch wetlands and quickly became a guide for wetland exploration within Central Christchurch City. The walking tour has two different routes for variety in the environments explored to the North or South. The split into two routes makes it accessible to all fitness levels. The resulting walking tour could become accessible to both members of the conference and the general public.

The walking tour sites were selected based on cultural importance to both Māori and early Europeans, including relevant sites of today. There were eight sites selected that are significant to Christchurch CBD culturally and/or ecologically. The walking tour was supported by a brochure (Appendix E). It would have a map showing the location of Christchurch wetland areas with a short blurb on each of the selected environments.

The brochure map was created using a wetland location shapefile. OpenStreetMap was used as the background layer to ensure readers would be able to navigate with the map effortlessly. Upon scaling the map down to fit the brochure, the background layer quality was decreased so the street names could not be read. This was combated by tracing around the streets to create a simplified version of OpenStreetMap. This enabled select streets to be labelled for the optimisation of information present without overcrowding the map with text.

Technology interaction increases the reader's experience, resulting in higher topic engagement (Wankel and Blessinger, 2013). A QR code on the brochure provides a technological link to the website for further information.

5.2.4 Brochure

The brochure shows the location of Christchurch wetland areas, with a short blurb on each of the selected environments (Appendix F). The brochure map was created using a wetland location shapefile. OpenStreetMap was used as the background layer to ensure readers would be able to effortlessly navigate with the map. Upon scaling the map down to fit the brochure, the background layer quality was decreased so the street names could not be read. This was combated by tracing around the streets to create a simplified version of OpenStreetMap. This enabled select streets to be labelled for the optimisation of information present without overcrowding the map with text.

5.2.5 Website

Background research was undertaken to identify designs that were easy to read, simple to navigate and aesthetically pleasing. Basic text colours (black or white) on a singular gradient background are easier to read than those overlaid on images (Al- Qeisi et al., 2014). When choosing pictures to underlay titles and text, they had to have a fairly consistent colour gradient where the text lay. Websites with a navigation bar at the top of the page were easier to navigate, so this concept was used to design the website (Appendix D). The pages are titled after their respective Canterbury land type for an overall understanding of the general location. The layout of the website has been kept consistent on each page for a sense of continuity. Pictures have been inserted to break up the writing and show off the beauty of the wetlands and their respective ecology.

The website connects the other presentation methods. The website is an accessible visual component which maintains the information presented at the IWC to be accessed after the conference ends. The QR codes used on the walking tour will link to the website for further information. A brochure design relies on the website to back up the information summaries that it provides about the Canterbury wetlands. Presenting wise, the Prezi slideshow is a very basic summary of the website and runs images in situ with those found on the website.

5.3 Limitations

5.3.1 Research Limitations

The variability of secondary resources constrained the research. For example, the Rakaia Lakes was investigated as a possible high-country site with wetlands around the Rakaia River as the upper plain wetlands. While detailed information on high-country wetlands was found, there was very little research about wetlands along the associated plains of the Rakaia River. Therefore, the Rakaia River was discarded as a possible option.

Background research of the geological, ecological and cultural aspects of each of the wetlands were gathered using reports concerning the Christchurch City Council or ECAN. This limited the research as most of the reports were completed for industrial development and policy, not for general research of wetlands.

A similar problem occurred with the documentation of cultural importance during early human settlement. Māori history, before European arrival, was passed on through oral stories. Much of the data relating to early human settlement is a combination of archaeology and Māori genealogical history with records becoming more detailed throughout time. This information would have given more detail about Canterbury's Wetlands if it had been available.

5.3.2 Presentation Limitations

Limitations to the webpage include data and image collation. There was a wide range of secondary data on the wetlands; however, collating the information was challenging. The issue of copyright limited the possible images that could be used to those that were taken by group members or a select few images online which were available for commercial use.

The Prezi limitations are the ability to play automatically and consist of clear information. The Prezi software itself does not allow the presentation to be saved as a movie file. Therefore, the screen recording software Action! was used to record the presentation with a 10-second delay on each slide for the conference. Each slide focuses on a different wetland to emphasise the significance of those chosen. The layout was made to ensure that viewers could understand the information even if they do not watch from the beginning.

5.4 Suggestions for Improvements

The selection of presentation methods was completed through a literature review. If a similar project were to be completed, a survey on engaging presentation methods completed by university staff who have attended conferences could be beneficial. Alternatively following the IWC conference, a survey could be presented to attendees asking for feedback on presentation methods.

Ngai Tahu were emailed inquiring about their perspective on the cultural significance of the wetlands with no response. If this project was repeated it is recommended that researchers go and talk to Ngai Tahu or Ngai Tuahiriri directly.

This project was focused on telling the New Zealand wetland story. It could become an interactive tool to demonstrate the significance of wetlands to the public. Creating information boards at selected wetland sites to inform visitors about the area and have QR codes to link to the website is a possibility. This would continue engagement with the wetlands beyond the conference and may assist with extending the values of wetlands' awareness.

6.0 Conclusion

Presenting the story of certain Canterbury wetlands has had its limitations and benefits. Research and presenting methods were finalised by literature reviews. Wetland sites required valid research on geological, ecological and cultural history. Presentation methods interconnected with all the designed methods relating back to the website for effective user interaction. Limitations were based around lack of literature and time. Future suggestions include introducing it as an educational tool to raise public awareness on wetland significance.

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Appendices

Appendix A- Criteria for choosing significant wetlands and presentation techniques.

Table 1 Presentation method literature results collated to determine their effectiveness at presenting the Story of Canterbury wetlands (Hays, 2002; Grech, 2018; Krum, 2014; Hamilton-Ekeke, 2007; Ja'afar-Furo, Sulaiman & Dana'ilu, 2017; Cooper, 1980; Egiebor & Foster, 2019).

Method	Effective Presentation			
	Visual	Engaging	Textual Results	Interactive
Poster	X			
PowerPoint	X			
Prezi	X	X		
Field Trip	X	X	When supported by brochure	X
Website	X	X	X	X
GIS Map	X	X		

Appendix B

Table 2 How the selected wetlands fit the criteria for being a significant Canterbury wetland.

	Waimakariri Lakes Complex	Waimakariri River	Avon River	Avon-Heathcote Estuary
Connection	Head of Waimakariri River.	Fed by the Waimakariri Lakes Complex.	Fed underground by the Waimakariri River.	Fed by the Avon River.
Geomorphology	Glacial processes shaped the landforms present in the Complex.	Braided rivers are rare globally. Canterbury is home to 60% of New Zealand's braided rivers. It has a long history of transporting glacial- fluvial sediments along the Canterbury Plains and building up the terrane.	A key part of Christchurch's cityscape.	Largest shallow, semi-enclosed, tidal wetland in Canterbury.
Ecology	The most notable waterfowl in the Complex the endangered Great Crested Grebe as such the complex is one of 4 key regions in New Zealand for this bird. The ecological value of the lakes is recognised in the Wildlife Refuge Status for Lake Grasmere and recommendation of placing Lakes Sarah, Pearson and Letitia into protection.	Habitat to the Endangered Robust Grasshopper, which was thought extinct until the 1980s.	Habitat for a wide variety of water-tolerant plants such as raupo, tussock sedges, podocarp and harakeke. Rich with aquatic animals such as shortfin and longfin eels, kokopu, and bully fish. Currently home to species such as eels, pukeko, grey duck and brown teal.	Feeding location for the bar-tailed godwit during the Alaskan winter. New Zealand's most important wetland for migratory shorebirds. Recognised as one of 136 wetlands globally which make up the East Asian-Australasian Flyway (EAAF) network which supports migratory

				waders and shorebirds.
Cultural Significance - Maori	The wildlife present in the complex allowed for it to be a place of mahinga kai. Historically Maori would hunt birds and collect other resources on the banks of Lake Hawson.	Place of mahinga kai for Maori.	Seasonal source of mahinga kai for South Island Maori and for build materials and clothing.	Place of mahinga kai for over 600 years and place of habitation. Helped maintain intertribal connections throughout the South Island.
Cultural Significance - European	Recreational activities such as camping, boating, fishing and birdwatching.	Recreational activities such as boating, fishing, and swimming.	Recreational activities such as punting, kayaking and rowing.	Recreational activities such as sailing, walking and picnicking.

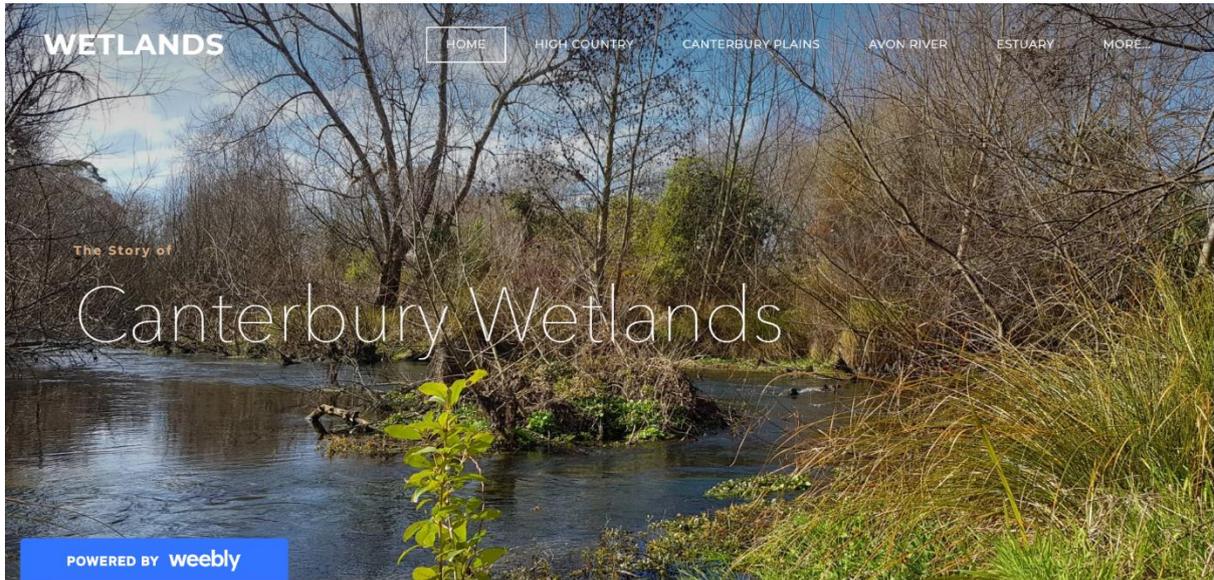
Appendix C

Table 3 Canterbury Wetland Excel file used to create shapefile of wetland locations.

ID	Wetland_Name	Lat	Long	Region	WetlandA	Wetland Type	Northing	Easting
1	Lake Pearson	43 05 58.7 S	171 46 57	High Country		Lake	5227401	1500928
2	Lake Grasmere	43 03 45.3 S	171 46 31	High Country		Lake	5231508	1500294
3	Lake Sarah	43 02 55.8 S	171 46 34	High Country		Lake	5233036	1500337
4	Lake Hawdon	43 06 14.1 S	171 50 57	High Country		Lake	5227003	1506376
5	Lake Letitia	43 03 18.8 S	171 57 12	High Country		Lake	5232521	1514764
6	Lake Marymere	43 07 01.8 S	171 51 12	High Country	Waimakar	Lake	5225536	1506717
7	Avon-Heathcote Estuary	43 32 30.0 S	172 43 30	Coast	Avon-Hea	Estuary	5178994	1577783
8	Waimakariri River	43 26 52.40000 S	172 28 18.47000 E		Waimakar	River	5189311	1557261
9	Boat Sheds	43 32 03.0 S	172 37 40	City			5179797	1569934
10	Victoria Square/Puari Pa	43 31 40.9 S	172 37 59	City	Christchurch	City Wetland	5180480	1570351
11	Cambridge Terrace	43 31 58.7 S	172 37 59	City			5179931	1570353
12	Oxford Terrace	43 31 40.6 S	172 38 16	City			5180491	1570741
13	Place of Tautahi	43 31 36.0 S	172 38 36	City			5180635	1571199

Appendix D

The link to the website designed is as follows: <http://wetlandsofcanterbury.weebly.com>



Appendix E

Outside of brochure:



Avon Heathcote Estuary (Ihuta)

Ihuta connects Christchurch's urban rivers to the sea. It was once a key area for mahinga kai and maintaining connections between South Island iwi. Today it is part of the East Asian-Australasian Flyway network for migratory birds and is commonly used for yachting, water-skiing, windsurfing and rowing



Traws Wetland



Canterbury Plains, Waimakariri River

One of Canterbury's many braided rivers the Waimakariri flows from the Southern Alps to Pegasus Bay. Ngāi Tahu historically used the Waimakariri River as a food source due to the range of flora and fauna it supports.



Waimakariri River



Waimakariri Lakes Complex

Located a 3hr drive from Christchurch the complex is comprised of six high-country lakes. Historically a place of mahinga kai (resource gathering) today it is largely used for recreation.

SCAN ME

wetlands@canterbury.weebly.com

Created as part of
GEOG309 project at
 the University of Canterbury
 by Annaliese **Book**, Kaley
 Boyd, James **Hoare** and
 Jess **Holland**

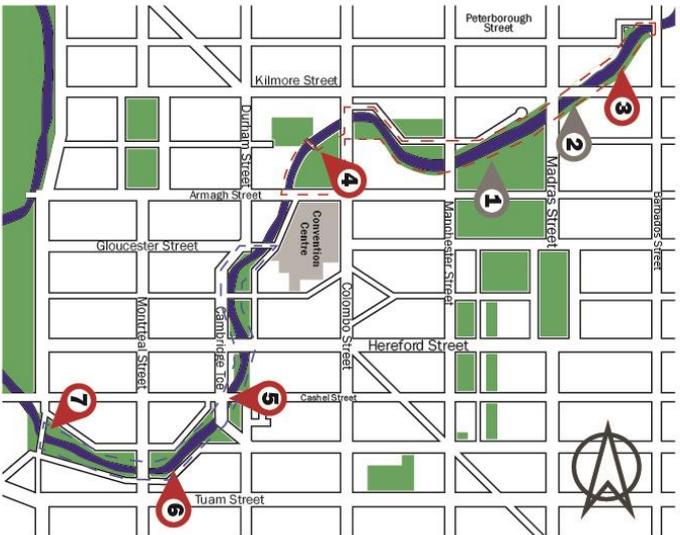
Image: Antigua Boat Shed Wetland

Christchurch Wetlands

A walking tour

Visit and find out about Christchurch's
 inner city and local wetlands

City Centre Wetlands



Key

--- Northern Loop, 30 minutes

--- Southern Loop, 25 minutes

3 Wetland Location

1 Points of interest

Wetlands 8, 9 & 10 are away from the city centre. Their locations are provided on the website.

For more information about each wetland, scan the QR Code on the back of this brochure.

1

Margaret Mahy

The Playground opened in 2015 on the banks of the Avon/Otakaro River. At 3500 square meters the playground is the biggest park south of the equator and attracts swarms of people of all ages. Named after the Christchurch writer, famous for her childrens and young adult books.

2

Fire Fighter Reserve

The Firefighters Reserve is a memorial made from twisted steel girders from the World Trade destroyed in the 9/11 attacks. The memorial holds significance for Christchurch firefighters as 343 of their associates died in the attacks in New York.

3

Otautahi

Te Potiki Tautahi was a Ngai Tahu chief that built his pa on the banks of the Avon/Otakaro on Kilmore Street near the fire station. Extending along the river to Barbados Street this pa was a seasonal mahinga kai site that Te Potiki Tautahi and his tribe would visit to gather resources from his settlement at Port Levy/Koukourarata. This stretch of river also was home to the first European settlement at The Bricks.



Puari Pa / Victoria Square

4

Puari Pa/Victoria (Market) Square

Puari Pa was an early Waitaha settlement between the 11th and 16th Centuries. Later Ngai Tahu used the site at Puari important source of mahinga kai. Market Square would later become Victoria Square in celebration of Queen Victoria's Diamond Jubilee

5

Bridge of Remembrance

The bridge opened on Armistice Day, 11 November 1924, after having the foundation stone laid on ANZAC Day 1923. The bridge serves as a memorial to servicemen and women of the two World Wars and other localised conflicts.



Bridge of Remembrance

6

Oi Manawa Canterbury Earthquake Memorial

Opened on the 6th Anniversary of the February 2011 earthquake. The memorial pays respect to all those who lost their lives in the disaster and also acknowledges the joint trauma and support received during the earthquake.

7

Antigua Boat Sheds

The Antigua Boat Sheds have been part of the Avon landscape for 130 years. Built in 1882 the sheds offer a vast array of boats to cruise the avon river with. With the Botanical Gardens of one side and the Hagley Woodland on the other, the journey is pleasant and peaceful.



Antigua Boat Sheds

Inside of brochure:

Appendix F

Link to Prezi presentation: <https://prezi.com/mifhr83hq-rc/wetland-warriors/>

