

**Food gathering practices at the Avon-Heathcote
Estuary Ihutai
Canterbury Aotearoa/New Zealand**



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Communities Working Together For:

Clean Water

Open Space

Safe Recreation

and

Healthy Ecosystems

that we can all enjoy and respect

Toi tū te taonga ā iwi

Toi tū te taonga ā Tāne

Toi tū te taonga ā Tangaroa

Toi tū te iwi

Avon-Heathcote Estuary Ihutai Trust Vision

(Avon-Heathcote Estuary Ihutai Trust, 2004)

Food Gathering Practices in the Avon-Heathcote Estuary Ihutai

Introduction / Te Whakatuwheratanga

The Avon-Heathcote Estuary Ihutai is an important ecological, cultural, and historical feature of the Christchurch City landscape. Shag Rock/Rapanui stands tall at the mouth, a well known Christchurch landmark (Figure 1). The Estuary is situated on the East Coast of the city, located twelve kilometres from the city centre. It covers an area of 880 hectares with each tide seeing around 11 million cubic metres of water flowing in and out (Christchurch City Council, 2006). The Te Huingi Manu Wildlife Refuge, which includes 240 hectares of the Bromley Oxidation Ponds and about 100 hectares of surrounding pastoral land, sits along side the Estuary. In recent years the shores surrounding the Estuary have experienced an increasing amount of urbanisation. The Avon-Heathcote Estuary Ihutai is Canterbury's largest semi enclosed shallow Estuary (Environment Canterbury, 2007) and has a long history of providing food for the residents of Canterbury.



Figure 1: Shag Rock/
Rapanui

Traditional settlement and mahinga kai

The Avon Heathcote Estuary Ihutai catchment includes two main tributaries the Avon/Ōtākaro and the Heathcote/Ōpāwaho Rivers (refer Map 1). Māori tribes Waitaha, Ngāti Mamoe, and Ngāi Tahu all made use of the Estuary and its' catchment for both settlement and food gathering. Archaeological evidence verifies people have lived beside the Avon-Heathcote Estuary for over 600 years (Christchurch City Council, 1992) with Māori tools, sinkers and spears, burial sites, middens, and stone artefacts all having been unearthed at Te Rae Kura (Redcliffs). Mahinga kai resources were valued by tangata whenua with Rāhui¹ controlling the gathering of animals and plants. The Estuary was a part of a

¹ Rāhui were used to guide harvesting or to allow a food source to recover - for example restrictions were put in place for when Godwits and eels could be caught. Rāhui were imposed in the interests of 'sustainability' and were also used to define tribal boundaries or prevent unauthorised harvesting (Nathan, 2009).

much larger resource sharing and trade network between whānau and these helped to maintain tribal connections within the South Island.

Figure 2: The Avon-Heathcote Estuary Ihutai



Mahinga kai resources included fish, shellfish, edible plants, and birds. Notable seafood species included eels (tuna), lamprey (kanakana), adult whitebait (inaka), flounder (pātiki) and pipi (Christchurch City Libraries, n.d.). The abundance of flounder in the mudflats across the middle of the Estuary resulted in the area being known as Waipātiki (flounder water). Food gathering methods were sophisticated and included the use of nets, fish traps, spears, and trawling from canoes and during eel migration Mānuka weirs were built around the mouth of the river (Christchurch City Council, 1992).

The establishment of the sewerage works

Te Ihutai reserve was established to recognise and preserve the fishing rights of tangata whenua as the settlement of Christchurch began to adversely affect the availability of mahinga kai resources (Lobb, 2009). In 1956 this reserve was confiscated under the Public Works Act and the Bromley sewerage treatment works were established. Tangata whenua

found the discharge of human sewerage into the Estuary highly offensive and became alienated from what had been a significant mahinga kai resource. The nature of the loss and the degradation of cultural values continue to offend tangata whenua and the Estuary is no longer the cultural and food resource it once was.

The Avon-Heathcote Estuary Ihutai Trust

In October 2002 the Avon-Heathcote Estuary Ihutai Trust was officially formed, supported by the Christchurch City Council and Environment Canterbury (Lobb, 2009). In 2004 the Avon-Heathcote Estuary Ihutai Trust released a non-statutory management plan (Ihutai Management Plan 2004) which includes a vision and a set of goals considered essential for the restoration of natural and cultural values. Tangata whenua interests in the Estuary are addressed within the plan with specific and clearly directed goals, targets, and actions, including a target to restore mahinga kai values.

Water quality monitoring

Water quality and the ecosystem health of the Estuary have been considered poor for sometime and are continuing to degrade (Bolton-Ritchie, Hayward & Bond, 2009). A comprehensive water monitoring programme - 'Healthy Estuary and Rivers of the City' - was developed in 2006 (Bolton-Ritchie, 2008) to monitor water quality at the Estuary. Monitoring of water quality is now carried out both within and just outside of the Avon-Heathcote Estuary Ihutai (see Figure 3: Beachville Road Jetty, water quality monitoring site).



Figure 3 : Beachville Road Jetty - Water Quality Monitoring Site

The need to involve tangata whenua was recognised by the Trust and in 2007 Te Rūnanga o Ngāi Tahu, in conjunction with members of Ngāi Tūāhuriri and Ngati Wheke, used its environmental monitoring tool 'Tākiwa' to gather, store, analyse, and report on water quality, the cultural health of significant sites, and natural resources within the Estuary catchment (Pauling, Lenihan, Rupene, Tirikatene-Nash, & Couch, 2007). The State of the Tākiwa Report concluded that the Ihutai catchment is in a state of poor to very poor cultural health.

Shellfish and fish food safety

Along with water quality shellfish and fish stocks have also been monitored, and the health risks associated with eating seafood from the Estuary well-documented. Shellfish are considered a high-risk food because they easily live in contaminated water and can accumulate and store any bacteria, viruses, bio-toxins and pollutants that are present (New Zealand Food Standards Authority, 2008). Bivalve shellfish (shellfish with two shells) are of particular concern as they are filter feeders; this means that they filter food particles from the seawater. Bivalve shellfish include mussels, tuatua, cockles, and pipi all of which pose a greater risk than other seafood.

In 2008 EOS Ecology (2008) published a report on metal concentrations in fish and shellfish in the Avon-Heathcote Estuary Ihutai. Although cockles, pipi, yellow-eyed mullet, sand flounder and eels had metal concentrations below the New Zealand Food Standard Authority (FSANZ) limit for safe consumption, *E.coli* bacteria are likely to occur in shellfish found at the Estuary (Greenwood, 2008). *E.coli* can cause vomiting, diarrhoea, and abdominal pain. While flounder, mullet, and short-fin eel are unlikely to have high levels of *E.coli* bacteria present, caution should always be taken when gathering food in urban environments as other contaminants may be present in the tissue of the fish or animals. This raises important questions about the extent of current seafood gathering practice in and around the Estuary.

The Current Project/ Tāhuhu Kōrero

For many Christchurch residents the Estuary holds little value as a food gathering site, yet a percentage of the population continues to gather seafood for both bait and human consumption. Signage at the site warns against the practice but seafood collecting is, in fact, a legal activity. It is somewhat paradoxical; regulations apply to seafood collection but these are not displayed at the site because displaying catch limits is a subtle endorsement of the practice. Nonetheless, overfishing and stock depletion is a concern. It has been reported (Ministry of Fisheries, 2006) that authorities are aware of people taking more than their quota (see Figure 4 below) and in 2006 two men were apprehended for being in possession of some 1,500 cockles (the legal limit is 150 per person).



Figure 4: Shellfish gatherers at Beachville Road

Study Aims and Objectives / Nga Whaingā

Aim

This research was funded by Environment Canterbury, Avon-Heathcote Estuary Ihutai Trust, Tertiary Education Commission and Lincoln University (as part of the Summer Studentship Programme)² and is part of a larger project on the Christchurch residents' awareness and use of the Estuary and surrounds.³ The purpose of this aspect of the larger research project was to explore current seafood gathering practices in the Estuary.

² The main objective of the summer research scholarship is to improve the quality of postgraduate training in the Faculty of Environment, Society, and Design at Lincoln University by providing students with the opportunity to gain research experience outside thesis/dissertation work.

³ Tourism and the Avon-Heathcote Estuary/Ihutai: the perspectives of key stakeholders regarding current and future demands; a historical assessment of its recreational and social history; tourism and recreation around the Avon-Heathcote Estuary/Ihutai and the population of Redcliff's shrimp (*Palaemon affinis*).

Objectives

Specifically we sought to:

- a) identify the types of seafood currently being collected;
- b) identify where seafood collection is taking place;
- c) investigate seafood gatherers' awareness of collection regulations;
- d) investigate seafood gatherers' awareness of health concerns associated with seafood consumption; and
- e) explore qualitative and experiential dimensions of seafood gathering.

Quantitative data were collected with the use of a telephone survey administered to the wider Christchurch population, and another survey targeted towards onsite visitors to the Estuary. Qualitative data were also obtained through both observations and a series of in-depth interviews with seafood gatherers.⁴

⁴ The research has Lincoln University Human Ethics approval.

Methodology / Ngā Kauneke

Literature review

Prior to data collection a review of the literature was carried out. This included a review of reports, books, websites, journals, magazines and newspapers. Information relating to the history of the Estuary and the species found there was readily available. Government agencies and departments were useful sources of information with Environment Canterbury, Christchurch City Council, Food Standards Australia and New Zealand, and Ministry of Fisheries all providing useful material. Management plans, strategies and programmes were also reviewed so as to gain an understanding of how the Estuary is being managed and what the long term goals for the area are.

Field visits

Numerous field visits to the site were carried out throughout the research. These observations facilitated a very good understanding of the area, its changeable nature, and mahinga kai practice. At the beginning of the research a day was spent covering all areas with the other three Lincoln University summer studentship students also researching topics relating to the Avon-Heathcote Estuary Ihutai. A field visit with Professor Islay Marsden, a marine biologist at Canterbury University, was especially beneficial. Her local knowledge and expertise regarding the ecology of the area and her awareness of current seafood collection practices were extremely valuable. Two shellfish collecting field visits were carried out, one with a personal family member and the other with the research supervisor Dr Suzanne Vallance. These field visits were extremely enjoyable and participation in the practice opened up opportunities to observe, meet and talk with other collectors. The administration of the on-site survey also provided numerous opportunities to observe people at the Estuary and gain a thorough knowledge of the area.

Surveys

Quantitative data were collected with the use of a) a telephone survey of 385 Christchurch residents and b) an on-site survey of 140 Estuary visitors (Appendix 1). The surveys were completed by Kelly Fisher and Sheena Crawford, both Lincoln University students, throughout December 2009 and January 2010.

Telephone surveys

The telephone survey was based on a random sample of Christchurch residents with numbers taken from the Christchurch City Telecom White Pages. The first and last numbers on a given page were selected and page numbers were randomly chosen with the use of a random number selection website. Residents over the age of 18 who had had the most recent birthday and had heard of the Estuary were invited to participate in the research. Respondents who agreed to participate were told that the survey was voluntary and that any information given would remain anonymous. In total 385 phone surveys were completed (suburbs in which respondents reside are indicated in Appendix 2).

Onsite surveys

With some minor amendments to suit the location, the onsite survey was administered to 140 Estuary users. Various sites around the Estuary were selected; these included Pleasant Point Yacht Club, South New Brighton Park, South New Brighton Caravan Park, the Windsurfing Reserve, Tidal View, the Causeway, Mount Pleasant Yacht Club, Beachville Road, the Spit, Christchurch Yacht Club, Moncks Bay, and Shag Rock. These on-site surveys were carried out across a broad range of days, times, tides, and weather conditions. As with the telephone survey, the interviewers first ensured that the participants were over the age of 18. Participants were then informed that the survey was voluntary and that all information they provided would remain anonymous.

Qualitative interviews

Qualitative data were collected with a series of semi-structured in-depth interviews. Interviews were carried out either at the respondent's home or in a location suggested by them where they felt comfortable. Interviewees were obtained through several methods. Both the onsite and telephone surveys included questions relating to the gathering of seafood. On completion of a survey, anyone who had answered that they currently collect seafood from the Estuary (or have done so in the past) were asked if they would be willing to be interviewed. Seven respondents agreed to participate. A leaflet drop asking for interviewee's generated one response, as did an article placed in the two of the local newspapers. In total nine interviews took place.

Interview Schedule

An interview schedule was constructed (Appendix 3) to help achieve the research aims and objectives. The interview was designed to aid in identifying what it is that respondents find attractive about gathering their own seafood, where they go to gather different types of seafood, what species they are targeting, and what they do with the seafood once obtained. Information about the respondents' seafood gathering history, reasons for collecting, and awareness of regulations was also sought.

Quantitative Results/ Ngā Hua

Response rate

In total 986 potential respondents were called; 385 agreed to participate in the telephone and 601 declined giving a response rate of 39 per cent. Given that the surveying was carried out over the Christmas and New Year period people had many and varied reasons for not wanting to participate. Onsite most people appeared happy to participate in the research, with the only exception being shellfish gatherers. The most common reasons for shellfish gatherers gave for not wanting to participate was lack of time or poor English language skills.

Respondent demographics

The most common age group of telephone respondents was 40-49 (20.5%) and 30-39 (28.6%) for onsite respondents (see Appendix 4). More women (55.8%) participated in the telephone survey and more men (58.6%) participated in the onsite survey. The majority of respondents in both surveys identified themselves as New Zealand European and the most frequently cited highest qualification was a high school qualification.

Previous visits

Of the 385 people surveyed over the telephone 59.7 per cent (230 respondents) had visited the Estuary. The majority of those surveyed (55.1%, 212 respondents) did not recall hearing anything about the Estuary in the last twelve months.

Seafood gathering and fishing

Of the 230 telephone respondents who had visited the Estuary 3 (0.77% of the total sample) respondents cited seafood gathering as the main purpose for their last visit. Another 2 respondents reported that they had collected seafood during their last trip to the Estuary but it was not the main purpose for visiting. Based on these figures, and using inferential statistics, we can estimate an 'active' seafood gathering population of about 4000 people. Of these active gatherers, 4 were Pakeha and 1 Maori and, interestingly, 3 were female and 2 male.

Of the telephone respondents 11 (2.9 % of those sampled) reported that they had fished or gathered seafood at the Estuary *at some stage*; an additional 19 of these respondents (4.9 %) indicated that it is an activity that they used to do. Consequently, there is a much higher ‘latent’ population of up to 24, 000 potential gatherers who have collected seafood from the Estuary, and may be inclined to do so again with the completion of the ocean outfall.⁵

Of the onsite survey respondents, 10 (7.1%) were visiting the Estuary with the main purpose of collecting seafood or fishing. Of those who were at the Estuary collecting seafood (whether or not it was their main purpose), 6 were Pakeha, 1 Maori, 1 Polynesian, 2 Chinese and 2 other Asian; twelve were male and 2 female.

Frequency of seafood gathering

Table 1 shows the frequency of seafood collection participation for both telephone and onsite responses. The majority of telephone respondents who have participated in seafood gathering at the Estuary have only done so in the past and it is not an activity that they continue to do regularly.

Onsite results differed in that most of the respondents who indicated they have participated in the activity continue to do so on a regular basis.

Table 1: Seafood Collection Frequency

	On-site (N)	Telephone (N)
Used to	2	19
Daily	1	2
Weekly	3	0
Monthly	3	0
Yearly	1	3
Other	8	6





⁵ This question has a confidence level of 95% and a confidence interval of 1.13, so we can be 95% sure that between 563 and 8053 people are actively gathering seafood from the Estuary.

Target species and locations in the Estuary

Respondents who had gathered seafood or fished at the Estuary were asked what species they were targeting and the most frequent response was that they were not targeting anything in particular but were happy to catch or collect anything that they came across. The most common species actually caught in the Estuary was herring, but other fish included mullet, sea-run trout, travelly, red cod, elephant fish, and flounder. Mollusc catches included pipi, tuatua, mussels and cockles.

Figure 5: Seafood Gathering Species and Locations



 = fish,  = cockles, pipis and tuatua,  = mussels,  = worms (for bait)

Reasons for not gathering seafood at the Estuary

Respondents who had stated that they 'used to' fish or gather seafood at the Estuary were asked why they no longer do so. Some of the more common response categories were poor

water quality and or pollution; that they would rather buy it; that they now go elsewhere; that there are no fish left in the Estuary; that the children have grown up; or that they have grown too old.

Respondents who stated they had ‘never’ fished or gathered seafood at the Estuary were asked what their reasoning was for this. Respondents were able to give more than one response, but the most common reason cited by both the telephone and onsite respondents was that they felt that they thought the seafood was not safe to eat (see Table 2).

Table 2: Reasons for Never Collecting Seafood from the Estuary

	On-site (N)	Telephone (N)
It is not safe to eat	61	105
Not interested	31	52
Do not eat seafood	15	9
No equipment	7	17
Do not know how	11	7
Do not know regs.	1	2

Results for the location of seafood gathering activities did differ between telephone and onsite respondents (Figure 5). While onsite respondents only mentioned four locations for gathering seafood (The Spit, Beachville Road, Moncks Bay, and Shagrock), telephone respondents gave an additional six locations. These locations were the streets off Rockinghorse Road, the Causeway, South New Brighton Park Jetty, Christchurch Yacht Club, and the Heathcote and Estuary Mouths.

Fishing/seafood gathering along the Christchurch coastline outside of the Estuary

All respondents were asked if they had ever collected seafood from along the Christchurch City coastline *outside* of the Estuary. The results indicate that this area is a more popular choice for fishermen and collectors than the Estuary itself with 14.3 per cent of telephone respondents and 15.0 per cent of onsite respondents having participated in the activity in this area.

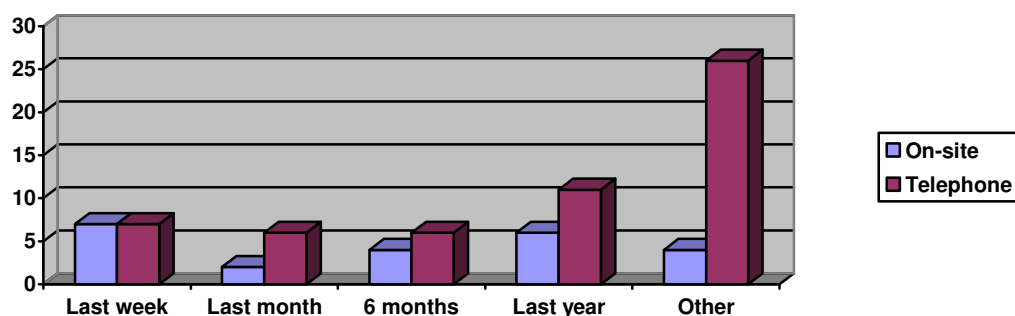
Reasons for not gathering seafood along the coastline outside of the Estuary

Respondents who had never fished or gathered seafood along the coastline outside of the Estuary were asked what their reasoning was for this. While the most common reason respondents had given for not collecting seafood in the Estuary was that it was unsafe, the main reason cited for not gathering seafood along the coast a was lack of interest and or time. This result was the same for both the telephone and onsite data collected.

Frequency of coastline fishing and seafood gathering

When respondents were asked when they last went fishing or seafood gathering along the coastline the most frequent response from the telephone respondents was 'other'. This category included such responses as it was a very long time ago, an activity that they used to do, that it was the last time that there was school holidays, or that they had children to entertain (for example grandchildren). Onsite results differed with the most common response being 'last week' (Figure 6).

Figure 6: Telephone Frequency of Coastal Gathering



Target species and locations of coastal gathering

Respondents who had gathered seafood or fished along the Christchurch coastline outside of the Estuary were asked what species they were targeting and which locations along the Christchurch coastline they had tried. Respondents were able to give more than one response for each question. Results were similar to that of the target species of the Estuary with most respondents reporting that they were not targeting anything in particular but

were happy to catch or collect anything that they came across. The most common fish species actually caught along the coast was kahawai, followed by red cod and elephant fish. Other fish mentioned were flounder and herring. Other catches included paua, cockles, mussels, pipi and crabs.

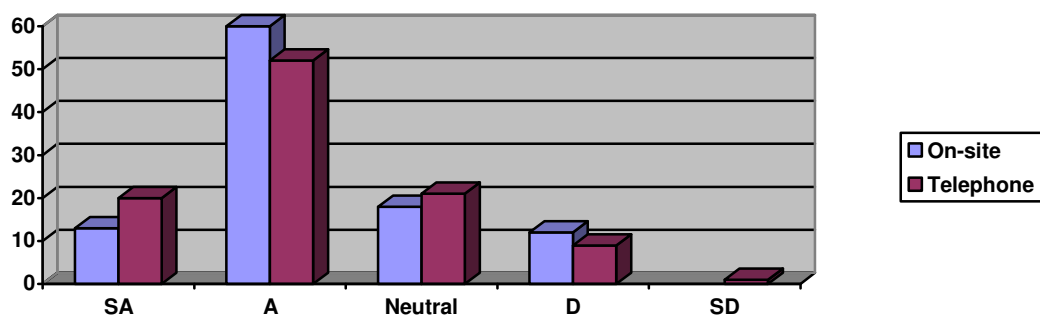
Locations for coastal gathering outside of the Estuary

The most popular locations along the coastline varied between the telephone and onsite respondents. Taylors Mistake was most popular with telephone respondents whereas the beaches outside of the Estuary, particularly along the New Brighton coast, were most popular with onsite respondents.

Perceptions of pollution

Both the on-site and telephone surveys included the statement ‘the water at the Estuary is polluted’ and respondents were asked to what extent they either agreed or disagreed. In total 267 telephone respondents (69.3%) either strongly agreed (74 respondents, 19.2%) or agreed (193 respondents, 50.1%) with that the Estuary is polluted. Results were similar onsite with 100 respondents (71.4%) either strongly agreeing (16 respondents, 11.4%) or agreeing (84 respondents, 60.0%) with the statement. Whilst a clear majority of respondents agreed that the water at the Estuary is polluted a minority either disagreed (telephone 8.3 %, onsite 12.1%) or were neutral (telephone 22.1%, onsite 15.7%), and this suggests perceptions of pollution in the Estuary are quite mixed (Figure 7).

Figure 7: Percentage of Respondents Agreeing Estuary is Polluted



Signage

Respondents who had visited the Estuary were asked if they recalled seeing any signage there. If they had noticed signage they were asked where they had seen it, and whether they could remember what it was about. Two thirds of onsite respondents, and half of those surveyed by telephone, had noticed signage at the Estuary. Respondents were able to give more than one response to location of signage and signage topic.

Telephone respondents had noticed signage most often at South New Brighton Park, while onsite respondents had noticed signage most often along the South Brighton Park Walkway. In total 6 respondents said that they recalled seeing signage at the yacht clubs, 1 respondent had noticed signage at the Estuary access points, 6 had noticed signage in car-parking areas, and 9 respondents stated that they could recall signage at various locations all around the Estuary (Table 3). No survey respondents recalled seeing signs at Beachville Road; this is interesting given it is one of the most common seafood collection sites.

Table 3: Signage Topics

Signage Topic	Telephone Frequency	Onsite Frequency
Shellfish	39	36
Swimming	39	12
Information- Maps, History...	20	13
Dogs	16	10
Water Quality	11	2
Can not Remember	10	1
Boating	7	4
Tidal/ Current Warnings	5	0
Pollution	2	2
Health	2	1
Area Activities	2	0
Lock Cars	2	0
Outlet / Sewerage	2	0
No Camping	1	1
Water Sports	1	0
Litter	1	0
Parking	1	0
Restricted Areas	0	2
Fishing	0	2

Participants were also asked about the information these signs conveyed. The two most common themes recalled concerned shellfish collection and swimming.

Behaviour changes with the new ocean outfall

The Christchurch City Council's new ocean outfall became operational in March 2010, just after data collection for this project was completed. The ocean outfall pipeline now takes the city's wastewater from the oxidation ponds at the Christchurch Wastewater Treatment Plant and transports it by an underground pipe three kilometres out into Pegasus Bay. This means sewerage will no longer be discharged into the Avon-Heathcote Estuary Ihutai. Respondents were asked if this would affect their behaviour in, or use of, the Estuary.

The majority of respondents from both the telephone and onsite surveys stated their food collecting behaviour *in the Estuary* would not change. Nonetheless, of those surveyed, a small minority of 27 telephone respondents (7.0%) replied that they would gather seafood or fish in the Estuary more often, as did 17 (12.1%) onsite respondents.

When asked how the outfall pipeline will affect the frequency with which they fish or gather seafood *along the coast*, ten onsite respondents (7.1%) replied that they would participate more often while three (2.1%) replied that they would participate less often. Telephone results were similar with 22 (5.7%) replying that they would fish along the coast more often and 11 (2.9%) replying that they would be less likely to do so.

Qualitative Results

Interviewee demographics

Of the nine people interviewed, eight were men. Ages ranged from early twenties to over 70. Four of the nine people interviewed identified themselves as Māori, with three stating that they were Ngāi Tahu. One interviewee was Samoan, three Pakeha, and one ethnicity was not recorded. All of those interviewed had many years experience fishing and collecting seafood in the Estuary with five respondents having lived in the area since they were children.

Experiences of seafood gathering

A feeling of connection to the area was repeatedly expressed throughout the interviewing process. Learning to fish and gather seafood as a child while attending fishing/gathering trips with family/whānau and or friends was commonly discussed. Family tradition and bonding stretching throughout childhood and into adulthood were spoken of at length. Both Maori and non-Maori emphasised the cultural significance of the Estuary, and emphasised its importance as a food gathering site, providing for their community and whānau. Familiarity with the Estuary, and participating in such fundamental activities as food gathering over time, helped build a very strong sense of place. The respect for place, and the practical knowledge of how to actually find and process the seafood, was often passed onto children and grandchildren.

It became clear that the interviewees enjoyed a range of experiences while out collecting seafood. For some it is leaving the city and of going to a place where they can smell the ocean air and enjoy the open space. For others it is time with family, communicating, educating, socialising, and interacting. Yet others spoke of the anticipation, the thought of the unknown, and the excitement of catching something. Others found it quite difficult to articulate what it was, exactly, that they enjoyed about the experience but spoke of an urge to fish, or alluded to a cultural tradition born into them that “runs pretty deep”.

The respondents were divided on whether the collection of seafood from the Estuary was a matter of cost. Some respondents stated it has never been a matter of money and that they

“can afford to buy it”, whilst others suggested that the Estuary is a valuable food resource for “struggling families” and “people on the bones of their bum”.

‘The catch’

Interviewees’ target species were similar to the survey respondents and included whitebait, sea-run trout, herring, red cod, flounder, kahawai, elephant fish, sea-run eel, shrimp, pipi, cockles, and tuatua. Species caught but not necessarily targeted included dogfish and pufferfish. Interviewees were generally keen to point out that fishing trips were still an enjoyable pastime even when no fish are caught. The seafood gathering experience is, perhaps, less about what is ‘caught’ (though this certainly adds an interesting dimension to the process) and more about enjoyment.

Observations in the field seem to support this. Seafood gatherers were seen laughing, competing for the largest cockles, looking around to admire the scene and smiling. Even when people were obviously quite purposeful about the collection (such as those there to collect a fairly guaranteed catch of cockles and mussels) they usually seemed quite relaxed. In terms of procuring seafood, it is obviously a vastly different experience to buying it at the supermarket. For example, one respondent was clear in his belief that only what is going to be eaten should be killed and another respondent shared that they always take the time to thank Tangaroa for the kai moana before leaving the Estuary.

Food safety

All of the interviewees had eaten their catch from the Estuary with varying degrees of confidence. Some choose to eat only the fish while others choose to eat only the shellfish. While some reasoned that shellfish are filter feeders that accumulate pollution, others reasoned that this allows them to be kept in clean water to filter out over night or over a period of a few days making them safe to eat. Others are clearly not so careful: During field visits to Beachville Road both children and adults were observed eating both mussels and cockles raw.

Some interviewees reported being approached by other members of the public and told not to eat seafood from the Estuary, but they had made the choice to continue the practice

because they believed that they had never suffered any adverse effects from consuming the food. Most of the interviewees stated that they had never experienced so much as an upset stomach as a result of eating their catch. One interviewee did say that one of his friends had got food poisoning from eating shellfish from the Estuary and another knew someone who had had a reaction to the Estuary's pipi; his body had broken out in hives. This seemed likely to be a reaction to all pipi, not just those from the Estuary. This had led both of these respondents to be more *wary* of the possible effects of eating the Estuary's shellfish, but had not dissuaded them from the practice.

Cooking

A collection of different cooking methods were shared. Some shellfish collectors like to eat their catch raw, while others preferred steaming them or barbequing them until they were just open. Shellfish condiments included sweet chilli sauce, lemon, salt, and pepper. Boiling, baking, sousing, frying, and smoking were all methods mentioned for fish, whitebait, and eel. One respondent described a more traditional method that he continues to use for eels today. "I hang them out to dry, I salt them. I put vinegar on them or brown sugar and leave them hanging there for a couple of days and then I smoke them."

Changes

All those who had grown up around the shores of the Estuary, or who had lived there prior to the sewerage treatment works, had noticed considerable changes in both the fish stocks and Estuary environment over time. The youngest participant had not noticed any change in the fish stocks at the Estuary since he started fishing there in 1995. Respondents shared stories of large catches in the years gone by. The catches discussed were large in both number and size. Red cod, sole, flounder and kahawai were all described as numerous in the past, but more scarce now.

A noticeable reduction in the shrimp population was also observed by two interviewees, one from Southshore and the other from Moncks Bay. Both recall an abundance of shrimp in past decades but say shrimp have disappeared from the Estuary. Both respondents believe that this is due to the discharge regime at the oxidation ponds and feel that the shrimp absence has had a detrimental effect on other species further down the food chain, such as the piper which is endemic to New Zealand. One of the respondents explained "At one time you could get a lot of shrimp out there, a lot; I mean bucketfuls, then suddenly in about

1975, gone. That was the time they changed the release regime from the ponds”. He explained that the release regime changed from continuous to high tide only. This meant that on the high tide there is “a huge slug of ammonium nitrate rich water coming down and over the whole Estuary and basically killing everything”.

The sea lettuce generated a great deal of comment with the Christchurch City sewerage outfall commonly blamed for the problem. Some of the participants explained that the weed was not present in the past and attributed foul odours to the decomposing sea lettuce. Algal blooms were thought to be a relatively new occurrence at the Estuary; with respondents having only noticed warning signs regarding algal blooms in recent years. On high tide white foam has often been observed travelling on the top of the Estuary water after pumping from the oxidation ponds occurs.

Signage



Figure 8: Sign at Beachville Road

Respondents had all seen signs located around the Estuary but debated their utility and purpose. One interviewee claimed “signs are a dime a dozen” in the area and others felt that signs were only present at the Estuary to cover authorities against liability. The Beachville Road jetty is interesting in this regard. It is a popular seafood gathering site but the sign is located at the back of the car park. When people facing the sea, as they inevitably do, the sign is behind them and is therefore unlikely to be noticed. Some interviewees (and several survey respondents) reported seeing numerous signs but paying little or no attention to them.

An exception to this were signs about fishing and seafood gathering which interviewees believed were relatively new, erected in the last 4 or 5 years. Signs warning about water quality and algal blooms were appreciated. Interviewees said that when they noticed articles in the papers or warning signage related to these issues they would not eat the fish or shellfish until the water quality returned to normal.

Regulations

Most, but not all, of the interviewees knew that there are regulations surrounding fish and shellfish collection at the Estuary. Trout fishermen were more likely to know about the regulations as they are printed on their fishing licenses, but few knew off-hand the size and limit for other species. Most interviewees said that they could easily find out about seafood collecting regulations from the internet, Fish and Game, Ministry of Fisheries or their local fishing shop. One respondent had called the Ministry of Fisheries and they had sent out a variety of brochures, some of which included information about fishing regulations.

Respondents expressed that they felt that the shellfish regulations were generous and there was no need for over exploitation.

Knowledge of the regulations is perhaps not as important as a healthy respect for the Estuary's seafood resources. It was suggested that even when people are aware of the regulations, it is not always enough to deter them from over-collecting or taking fish and shellfish smaller than is legally permitted. Furthermore, visits from Ministry of Fishery officers and other authorities who might enforce the regulations were seen as sporadic. Though some interviewees had noticed authorities counting and measuring gatherers' catches, the possibility of getting caught with an illegal catch seemed remote.

Many of the interviewees reported seeing people taking more than their legal limit. They believed that those people taking more than they should were aware that they were doing something wrong but were willing to take the risk anyway. Some interviewees reported feeling annoyed when they saw people taking fish that were under-sized, and the interviewees tended to blame people from other cultures for illegal catches. Rightly or wrongly, illegal catches were often attributed to Asian people who, the interviewees believed, were more likely to keep under-sized fish and shellfish.

One interviewee suggested that blatant over-collecting could lead to violence. He explained that he feels a certain degree of ownership over the Estuary's tuatua, and said "I always think of them as my shellfish". He has been unhappy to see gross over-collection taking place on numerous occasions and recounted this story: 'These people, honestly, they take sack-full's away. Anyway I would try to explain to them and suddenly they cannot speak any English. And I say "you are way over your limit" and I say "what are you taking it for", as it is pretty obvious that they are doing it on a commercial basis'.

The new ocean outfall

Interest in the development of the new ocean outfall was evident. One interviewee had taken a special trip over to Brighton Beach from the other side of the city to observe the construction progress of the project, whilst others had followed the progress of the new pipe through the media. Most of the interviewees felt that the new ocean outfall will eventually have a positive impact on the health of the Estuary's ecosystems. By and large, the interviewees believed the new outfall will, over time, encourage more people to use the Estuary for both recreation and seafood gathering. Two respondents questioned the impacts of nutrient reduction on the Estuary's productivity when the new ocean outfall is completely operational. All felt that the impacts of the new outfall would take some time to emerge.

Limitations of the Research

The biggest limitation of this research was time. There are so many different aspects that could have been further researched over a longer time period. The second limitation of this research was people's willingness to participate. Language was an obvious obstacle when trying to survey and involve Asian participants. It was found that people were a lot more approachable when personally participating in the activity along side them. One interviewee explained that they are very private about their food gathering practices at the Avon-Heathcote Estuary Ihutai. They shared "We do not like to tell too many people. It is something that people, especially Māori, keep to themselves". They are aware of the stigma associated with the sewerage outfall into Estuary and choose to keep the practice secret unless asked directly. It is thought that this "stigma" also stopped some people from being completely open about their experiences gathering seafood at the Avon-Heathcote Estuary Ihutai.

Discussion / Korero

We began with several questions about food gathering practices in the Estuary. These concerned:

- a) identifying the types of seafood currently being collected;
- b) identifying where seafood collection is taking place;
- c) investigating seafood gatherers' awareness of collection regulations
- d) investigating seafood gatherers' awareness of health concerns associated with seafood consumption.

Our results revealed an 'active' food gathering population of approximately 4000 people who collect seafood fairly routinely. They come from all walks of life and identify with a range of ethnicities, including Maori. At least some report seafood collection as being a family, if not cultural, tradition; something that is 'in the blood'. There is also a much larger 'latent' population of up to 24, 000 people who have gathered seafood from the Estuary at some stage, though it is difficult to tell if this seafood is for human consumption or for bait. Given many respondents no longer gathered seafood because of the pollution – particularly from sewerage – there is certainly the potential there for those latent collectors to become active now the ocean outfall is operational and levels of pollution are perceived to be reduced. There is optimism among current gatherers that the water quality and ecosystem health of the Estuary will improve when the new ocean outfall becomes fully operational.

With regards to identifying the types of seafood currently being collected we now know that there is a range of targets, with popular Estuarine species including herrings, pipi, cockles, kahawai, elephant fish and red cod. While collectors appeared pleased to catch anything, some species provided a more reliable catch than others: Pipi and tuatua are found at the Spit, mussels at Shag Rock and cockles at Beachville Road. Seafood collection outside the Estuary, along the coast, is more common with gatherers targeting a variety of both molluscs and fish.

Our observations, and that of our interviewees, suggest people often observe some kind of catch limit, though this tends to be through common sense rather than an awareness of the official regulations. Though the actual catch limits could not be reported 'off-hand' interviewees spoke of a 'bucket full' or 'enough for a couple of feeds'. Though we could not actually verify reports of exceeding catch or size limits, anecdotal evidence for such violations was strong and seemed to be a practice attributed to Asian people. There is a

possibility that any violation of catch limits and sizes can be attributed to poor signage; our results indicate there is certainly potential to improve signage in and around the Estuary in terms of both location and content.

Though not specifically related to signage, information about food safety was greatly appreciated by the interviewees and it is likely this would be reflected in the wider population. At least some gatherers, new to the practice, thought cooking cockles would make them safe to eat.

Conclusions / Te Whakamutunga

The collection of seafood at the Avon-Heathcote Estuary is a traditional practice and one that continues today. Although the estuary has experienced substantial degradation as a result of the sewerage treatment works and run-off, moves are being made to restore value to the area. The Avon-Heathcote Estuary Ihutai Trust has recognised the importance of relationship with tangata whenua and progress is being made in relationship restoration. Currently the Estuary is considered by most residents to be polluted and the shellfish unsafe to eat; however, the new ocean outfall pipe and gradual removal of sewerage from the Estuary is likely to effect people's perceptions of the mahinga kai opportunities there.

Yet, the uninitiated face dangers in terms of both tide and food safety, and there is room for improvements in terms of both the positioning and content of signs. Content could include regulations and penalties in several languages, and greater enforcement in the area could also help to greater protect the biodiversity found there. This may be necessary if 'latent' collectors become more active now that the ocean outfall is operational. While different species have different levels of resilience, few could withstand the impact of tens of thousands of active collectors.

The Estuary's reputation is, at present, not entirely positive and we have heard it described in very unflattering terms. Yet, it is a time of considerable change for the Estuary and its ecosystems, in both physical terms and in people's perceptions. The qualitative research made it clear that seafood collection is one way of gaining an intimate knowledge of, and respect for, the Estuary. Mahinga kai in the Estuary may even be considered a barometer of Christchurch residents' appreciation for this area and its level of restoration in a social, if not ecological, sense. This being the case, the numbers of people indicating an interest in the Estuary as a food gathering site is encouraging; if carefully managed, the practice is clearly capable of driving considerable concern for, and attachment to, an area of myriad cultural, social and ecological value.

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Appendices

Appendix 1. The Survey

Date: _____ Time: _____

1. What, if anything, have you heard about the Estuary in the past twelve months?

If 'Nothing' skip to Q.3

2a. What sources have you heard about the Estuary from in the past twelve months? (multiple)

2b. *If more than one answer given:* What is your main source of information about the Estuary? (single response)

	2a.	2b.
Previous visits	1	1
Signage on site	2	2
Word of mouth (friends/relatives etc)	3	3
Driving past	4	4
News item (TV, newspaper etc)	5	5
Newspaper/radio advertising	6	6
Newspaper – forecast/tides	7	7
Website (Specify: _____)	8	8
Brochure/Pamphlet (Specify: _____)	9	9
Other (specify: _____)	11	11

3. Have you ever visited the Estuary? [definition of 'visited': travelled to & stopped at]

Yes	1
No	2 <i>Skip to Q.21</i>

4. When did you last visit the Estuary?

Within the last week	1
Within the last month	2
Within the last six months	3
Within the last year	4
One to five years ago <i>Skip to Q.9a</i>	5
More than five years ago <i>Skip to Q.9a</i>	6

5. On average, how often do you visit the Estuary?

Daily	1
Weekly	1
Fortnightly	2
Monthly	3
Less than once a month <i>Skip to Q.9a</i>	4

6. What time of the day do you usually visit the Estuary? (multiple response)

Early mornings (before 9am)	1
Mid-late mornings	2
Afternoons	3
Early evenings (5-7pm)	4
Later evenings (after 7pm)	5
No regular time	6

7. Do you usually visit the Estuary on week days, the weekend or both? (single response)

Weekdays	1
Weekend	2
Both	3

8. Do you visit the Estuary all year round, or in particular seasons? (multiple response)

All year round	1
Spring	2

Summer	3
Autumn	4
Winter	5

9a. Thinking about your last trip to the Estuary, what was the main purpose of your trip?

9b. What other activities did do you at the Estuary on that trip?

	9a.	9b.
Walking dog	1	1
Exercise (walking, bike riding)	2	2
Bird watching	3	3
Picnicking	4	4
Kayaking	5	5
Windsurfing	6	6
Sailing	7	7
Kite-surfing	8	8
General sightseeing	9	9
Seafood gathering/fishing	10	10
Other (specify: _____)	11	11

10. Thinking of your last trip, who did you visit the Estuary with? (*single response*)

Visiting alone	1
Partner/spouse	2
Friends	3
Family	4
Family and friends	5
Visiting as part of a special interest group	6
Other, Specify:	7

11. How did you get to the Estuary on that trip? (*single response*)

Private Car	1	Public Bus	2
Rental Car/ Campervan	3	Walked	4
Bicycle	5	Tour bus	6
Other: _____			7

12. Which location or locations around the Estuary did you visit on your last trip?
 [Try to ascertain as well as possible, using marked map for guidance]

13. Do you have a favourite place around the Estuary?

Yes	1 <i>continue</i>
No	2 <i>skip to Q.14</i>

What is your favourite place? Why is it your favourite place? [PROMPTS: What do you do there? What memories do you have of this place? Anything else that makes it special for you?]

Place: _____

14a. I'm going to read out a list of reasons why people might visit the Estuary. Which of these activities have you ever participated in at the Estuary?

14b. *For each participated in:* how often to you participate in this activity there?

1= I used to participate in this activity at the Estuary but I do not anymore; 2= I sometimes participate in this activity at the Estuary; 3 = I frequently participate in this activity at the Estuary

	14a.	14b.
Walking dog		
Exercise (walking, bike riding)		
Bird watching		
Picnicking		
Kayaking		
Windsurfing		
Sailing		
Kite-surfing		
General sightseeing		
<i>Seafood gathering / fishing</i>		

Are there any other activities that you participate in regularly at the Estuary?

15. What do you like best about the Estuary?

16. Are there any things you would like to see improved about the Estuary?

I've now got some questions about seafood gathering

Check response to 'seafood gathering' in Qu.14 above:

17. *If never fished/gathered at Q.14:* Why have you never gathered seafood/fished at the Estuary?

Don't eat seafood	
Don't know what seafood is available	
Don't know how to collect/catch seafood	
The estuary seafood is unsafe to eat	
Don't know about the regulations	
Don't have the equipment	
Not interested in gathering seafood/fishing/don't have time	
Other (specify: _____ _____	

Go to Qu.21

18. *If answered 2,3,4 at Q.14:* When was the last time you gathered seafood/fished in the Estuary?

19. How often do you gather seafood/fish from the Estuary?

Daily	
Weekly	
Monthly	
Yearly	
Occasionally	
Not for years	

20. What do/did you (try) to collect/catch?

ALL:

21. Have you ever fished or gathered seafood from the Christchurch coastline outside the Estuary (from North New Brighton to Taylor's Mistake)?

Yes	1 <i>Skip to Q.23</i>
No	2

22. Why have you never fished or gathered seafood from along the Christchurch coastline?

You don't eat seafood	
You don't know what seafood is available	
You don't know how to collect/catch seafood	
The estuary seafood is unsafe to eat	
You don't know about the regulations	
You don't have the equipment	
Not interested in gathering seafood/fishing/don't have time	
Other (specify: _____ _____	

Go to Q.26

23. When was the last time you gathered seafood/fished along the coast?

24. How often do you gather seafood/fish along the coast?

Daily	
Weekly	
Monthly	
Yearly	
Occasionally	
Not for years	

25. What do you (try) to collect/catch?

26. I'm going to read out a list of statements regarding the Estuary. I'd like you to tell me to what extent you agree or disagree with each statement on a scale of 1 to 5 where 1 is Strongly agree, 2 is agree, 3 is neutral, 4 is disagree and 5 is Strongly disagree

	Strongly agree	2	Neither	3	Strongly disagree	5	N/A
The Estuary is a great recreation resource for Christchurch residents	1	2	3	4	5	0	
The Estuary water is polluted	1	2	3	4	5	0	
There should be more facilities for visitors around the Estuary shoreline	1	2	3	4	5	0	
The Estuary is a wetland of national significance	1	2	3	4	5	0	
The Estuary should be promoted to visitors to Christchurch	1	2	3	4	5	0	
The Estuary should be kept as it is	1	2	3	4	5	0	
Water quality in the Estuary has improved in the last few years	1	2	3	4	5	0	
Current restoration work has improved the shore surrounding the Estuary	1	2	3	4	5	0	
There needs to be more information about what activities are available at the Estuary	1	2	3	4	5	0	

There needs to be more information about what facilities are available at the Estuary	1	2	3	4	5	0
Contact with the Estuary water would be bad for my health	1	2	3	4	5	0
The Estuary needs to be better promoted to Christchurch residents	1	2	3	4	5	0
I do not want to see more people using the Estuary	1	2	3	4	5	0
Access to the Estuary needs to be improved	1	2	3	4	5	0

27. How likely is it that you will visit the Estuary in the next twelve months?

Definitely	1
Very likely	2
Quite likely	
Not very likely	3
Not at all likely	4
Don't know/Unsure	5

Finally a couple of questions to help us analyse our results

28. How old are you?

18-19	1
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
Over 70	7

29. What is your highest educational qualification?

No formal qualification	1
High school qualification	2
Trade qualification	3
Degree	4
Higher degree	5
Other tertiary qualification	6

Specify: _____	
----------------	--

30. What is your ethnicity?

Pakeha/NZ European	1	Maori	2
Polynesian	3	Chinese	4
Other Asian (Specify: _____)			5
Other: _____			6

31. *Don't ask: record correct response*

Male	1
Female	2

For seafood gatherers -Ask if they would be willing to talk with us in more detail about their past and/or recent experiences seafood gathering in the estuary and note name and telephone number on separate piece of paper

That is the end of the survey, I would like to thank you very much for your participation, it has been a great help. If you have any questions about this research or the findings, you are welcome to contact Dr Joanna Fountain at Lincoln University, on 3253 838.

Appendix 2: Respondents by Suburb

Suburb	Respondents	Suburb	Respondents	Suburb	Respondents
Addington	1	Heathcote Valley	2	Redwood	4
Aranui	4	Hei Hei	3	Rolleston	4
Avondale	5	Hillmorton	3	Russley	4
Avonhead	6	Hillsborough	1	St Albans	14
Avonside	3	Hoon Hay	1	St Martins	2
Beckenham	3	Hornby	6	Shirley	7
Belfast	3	Ilam	5	Sockburn	1
Bexley	4	Islington	1	Somerfield	1
Bishopdale	2	Kaiapoi	2	South Brighton	13
Bromley	7	Lincoln	4	Southshore	10
Brooklands	1	Linwood	10	Spencerville	1
Broomfield	1	Mairehau	4	Spreydon	6
Burnside	5	Merivale	6	Springston	2
Burwood	11	Mount Pleasant	7	Sumner	8
Bryndwr	6	New Brighton	32	Sydenham	8
Casebrook	2	Not Available	7	Tai Tapu	3
Cashmere	16	Northwood	2	Yaldhurst	2
Central City	6	Oaklands	2	Wainoni	7
Dallington	3	Opawa	6	Waltham	2
Edgware	1	Papanui	11	West Melton	1
Fendalton	9	Parklands	10	Westmorland	3
Ferrymead	2	Phillipstown	1	Wigram	2
Halswell	6	Riccarton	17	Woodend	1
Halkett	1	Richmond	2	Woolston	10
Harewood	7	Redcliffs	9	Total	385

Appendix 3: Interview Schedule

History

Can you please tell me a little bit about when you first started fishing/seafood gathering?

Who taught you?

What do you enjoy about it?

When was the first time you fished or gathered seafood at the Avon-Heathcote Estuary?

What species have you traditionally caught there?

Do you have any good fishing stories from the Estuary?

Changes

Have you noticed a change in the fish/shellfish stocks over time?

Have you noticed a change in the size and distribution of the fish/shellfish?

Have you noticed changes in the productivity of the Estuary?

Have you had to change your seafood gathering practises at the Estuary over the years?

What has changed? Why? (Techniques, locations, seasons, etc)

If not originally from New Zealand, can you tell me about how fishing in the Estuary differs from your home town/ country?

Is the water quality better or worse?

Is there more or less pollution?

Are there more or less shellfish/ fish available to be caught?

The Seafood

Can you tell me what it is about collecting your own food that you find attractive?

Do you feel that the seafood gathering is just a food resource or is it something more?

Is it a family tradition?

What do you do with the seafood that you collect at the Estuary?

Do you have any concerns with eating the catch?

What do you do about these concerns?

Does the wastewater discharge or the stormwater outlets and runoff concern you?

Signage and Regulations

Have you seen any warning or information signs about seafood around the Estuary?

What do you think of them?

Do the warnings fit with your experiences?

If you wanted information about seafood gathering where would you go or who would you ask?

Do you know what the regulations are for shellfish and fish?

How valuable do you feel the Estuary is as a food resource to the residents of Christchurch?

Has this changed over time? Could this change in the future?

Appendix 4: Respondent demographic characteristics

Telephone Survey		Respondent Demographics	Onsite Survey	
Frequency	Percentage		Frequency	Percentage
		AGE		
1	0.3	Not Recorded	0	0
9	2.3	18-19	2	1.4
63	16.4	20-29	20	14.3
72	18.7	30-39	40	28.6
79	20.5	40-49	24	17.1
68	17.7	50-59	24	17.1
49	12.7	60-69	21	15.0
44	11.4	70 and over	9	6.4
385	100.0	Total	140	100.0
		GENDER		
2	0.5	Not Recorded	0	0
168	43.6	Male	82	58.6
215	55.8	Female	58	41.4
385	100.0	Total	140	100.0
		ETHNICITY		
284	73.8	NZ European/Pakeha	110	78.6
44	11.4	Maori	5	3.6
5	1.3	Polynesian	4	2.9
8	2.1	Chinese	3	2.1
6	1.6	Other Asian	3	2.1
26	6.7	European	9	6.4
3	.8	Australian	0	0
3	.8	American	1	.7
1	.3	Indian	0	0
1	.3	Russian	0	0
4	1.0	South African	4	2.9
0	0	Other	1	.7
385	100.0	Total	140	100.0
		HIGHEST QUALIFICATION		
0	0	Not Recorded	1	.7
27	7.0	No formal qualification	9	6.4
142	36.9	High school qualification	57	40.7
52	13.5	Trade qualification	25	17.9
100	26.0	Degree	37	26.4
34	8.8	Higher degree	7	5.0
30	7.8	Other tertiary qualification	4	2.9
385	100.0	Total	140	100.0