An aerial photograph showing a coastal city with a dense urban area, a large green field, and a wide estuary. In the background, there are blue mountains under a clear sky. The image is split vertically, with the left side showing the city and the right side showing the estuary and field.

BEHAVIOUR OF DOGS AND THEIR OWNERS AT KEY ESTUARY ECOLOGICAL SITES

**Laura Hutchinson, Ashley Dai, Imogen Eglesfield,
Aimee McQuillan-Reese, and Rose Bayldon
GEOG309**

Table of Contents

Contents

Table of Contents	2
Executive Summary	3
Introduction	4
Research Question and Aims.....	4
Research.....	5
Cultural and Ecological Values.....	5
Dog By-laws	5
Value of Birdlife	7
Human and Dog Disturbance	7
Community Engagement.....	7
Methods	8
Results.....	10
Surveying	10
Observations	11
Discussion.....	13
Natural Barriers	14
Educational Signs	16
Seasonal Signs.....	19
Information Packets.....	20
Conclusion	21
Acknowledgements	21
References.....	22
Appendix	24
Appendix A – Detailed explanation on Section 3.2 of the Dog By-laws	24

Executive Summary

- This research aims to find how effective the current dog by-laws in place at Avon Heathcote Ihutai Estuary are at protecting birdlife from the adverse effects of dogs. Dogs disturb birds in their habitat which is an increased risk at the estuary. The space is shared and treasured by the local community, so we aim to find a balance between birdlife and the community.
- Our research question is: What is the nature of dog and owner behaviour at Avon Heathcote Estuary? Are the by-laws fit for purpose or could they be improved and implemented differently?
- We surveyed community members, aiming to understand what dog owners knew about the current by-laws, and common beliefs surrounding dogs and their effect on birds. There were also observations taken to observe people not under prestige bias.
- While they are a disturbance, we found that people greatly appreciate the estuary for recreation and dog walking. Not everyone knew about the by-laws, and we found inadequate information for dog owners about restrictions, as well as about the reasons for those restrictions.
- Our limitations included covid-19 and the uncertainty of lockdowns. We were able to proceed as planned fortunately but we had to spend time creating alternative plans. We also had a relatively short time frame, so were unable to evaluate the efficacy of any recommendations.
- In future we would recommend looking into different effective ways to educate the community and create barriers along the estuary to protect birdlife more robustly. We discuss some of the results in our recommendation section.

Introduction

Dogs are common pets, with ownership continuing to grow in the 21st century (Banks & Bryant, 2007). There are many aspects of dogs that entice people into owning one, such as physiological, psychological, and therapeutic health benefits (Wood, Giles-Corti, & Bulsara, 2005). Studies show that dog walking provides motivation for outdoor recreation and in some countries, it is also a legal requirement for animal welfare (Banks & Bryant, 2007). However, dogs have many tendencies such as predation and excretion habits, which negatively impact the health and diversity of ecosystems. Because of this, some countries such as New Zealand, enforce dog by-laws to control the level of freedom dogs and their owners have in certain areas that are deemed important. An example of this is the Avon-Heathcote Estuary, which has been named an area of ecological importance, due to the extensive flora and fauna of both native and endemic background which thrive there.

During this research project we worked alongside the Avon Heathcote Estuary Ihutai Trust (from here referred to as “the Trust”). The Trust is a non-profit organisation that was formed in 2002, who work in partnership with the Christchurch City Council, Environment Canterbury and Ngāi Tūāhuriri. The Trust’s vision is to restore the Mauri of the estuary through: Communities working together for clean water, healthy ecosystems, open space, and safe recreation that everyone can enjoy and respect. Their projects focus on the restoration, planting, and weeding, with help from community volunteers at McCormack’s bay, Thistledown, Charlesworth, and Bexley wetland reserves as well as South New Brighton Park.

Research Question and Aims

The research question we hoped to answer for this study was: what is the nature of the relationship between dogs and birdlife at Avon-Heathcote estuary? And are the dog by-laws in place fit for purpose or could they be improved?

With information and past studies given to us by the Trust we decided that we should focus on three objectives when researching our topic. The first being what kind of behaviours dogs exhibit around the estuary, what the users of the estuary think about dog behaviors they have observed and what they think about the by-laws which are in place at the estuary, if they know about them at all.

Research

Cultural and Ecological Values

Te Ihutai was one of the food baskets of the South Island for Ngāi Tahu. It provided a site for mahinga kai, gathering food and other resources. Other Iwi such as Ngati Mamoe and Waitaha used this area for connectivity and relations. It was settled productively for generations until European colonisation occurred, when they confiscated fishing reserves and placed them in sewage plants that caused great detriment to water health and cultural values. This alongside damage to the surrounding land through urbanisation and development has clearly left a damaged relationship which continues to this day. There are attempts being made to mend this relationship and restore spaces at Te Ihutai. Estuaries are known globally to support diverse habitats and ecosystem services such as increased water quality, nutrient cycling, pollination, and carbon sequestration (Dong et al., 2018). This benefits the surrounding environment and community.

Dog By-laws

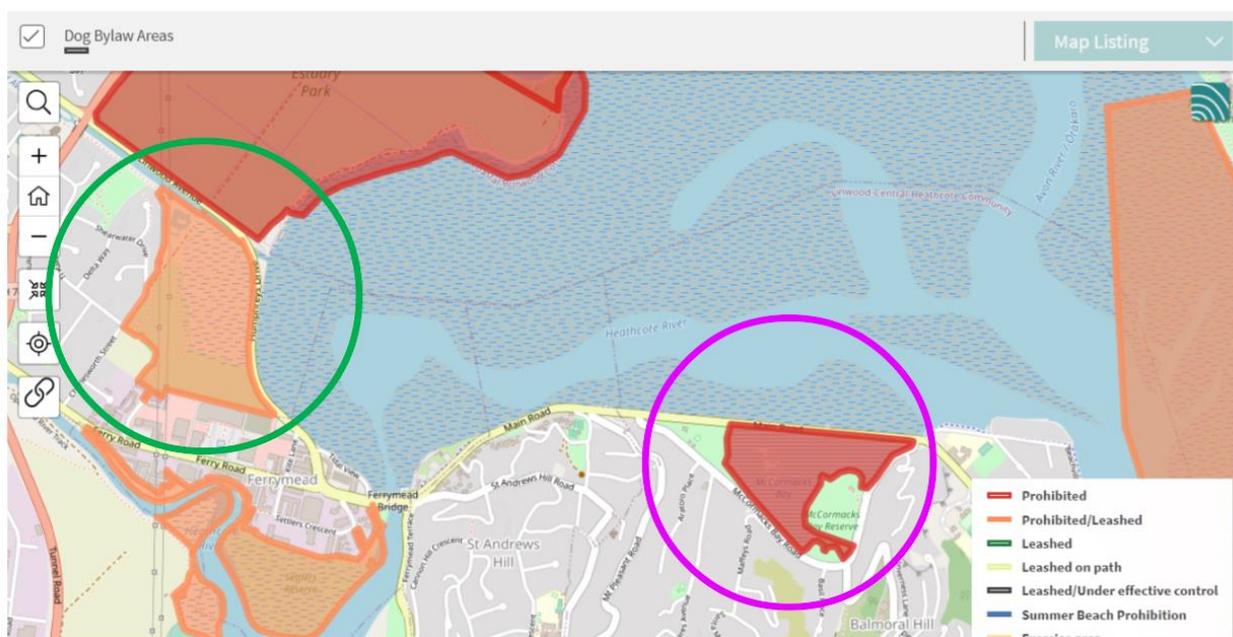


Figure 1: A map taken from the Christchurch City Council (CCC) that shows McCormacks Bay (in the purple circle) and Charlesworth Reserve (in the green circle). McCormacks Bay is highlighted in red as it is considered a prohibited area, but we surveyed people along the green space of the boundary of the restricted area which is an area of effective control (Section 3.2). Charlesworth Reserve is highlighted in orange as it is considered a prohibited/leashed area.

We are most focused on Section 3.2 (Figure 2) and Section 14 (Figure 3) which both focus on how dogs must behave in public areas. Figure 1 is a visual example of the dog by-laws in place in Christchurch

3.2 Keeping your dog under effective control

Dog owners are required to keep their dog(s) 'under effective control' at all times when in public places.

The owner or person in charge of a dog in a public place must:

- be aware of where the dog is and what it is doing;
- ensure the dog is responsive to commands; and
- ensure it is not creating a nuisance.

Figure 2: Effective control is a common definition used in the Christchurch City Council Dog By-laws, so it is important people understand what it means otherwise their ability to follow the by-laws is limited.

and shows the areas dogs are allowed in our study sites, Charlesworth Reserve and McCormacks Bay Reserve. Figure 3 shows us Section 14 of the by-laws. Our study site in McCormacks Bay was not just the islands and mudflats, it included the green space around it

(as shown in Figure 1). This area is not included in section 14 and is simply considered an area where an owner must keep their dog under "Effective Control." Section 3.2 and Section 14 are both hard to find if an owner were simply to google the dog by-laws as they are amongst an entire a whole lot of by-laws. A better explanation of how the dog by-laws work is provided in Appendix A.

Table 1: Section 14 of the Christchurch City Council Dog By-Laws explains where dogs are allowed on Department of Conservation land under section 10(5) of the Dog Control Act. McCormacks Bay Reserve is a restricted area and Charlesworth Reserve is a Prohibited/Leashed area.

Section 14: Controlled or open dog areas under the Conservation Act

Area	Restriction	Details	Policy Status
Southshore Spit Reserve and foreshore	Prohibited/Leashed	Dogs are prohibited from the foreshore and sand dunes area to protect wildlife (particularly godwits and oyster catcher.) Dogs are allowed on a leash when walking around the boundary between the vegetated reserve area, and the foreshore and sand dunes area. Dogs are allowed under effective control on the vegetated reserve.	Effective
McCormacks Bay islands, Mudflat, and saltmarsh.	Prohibited	Dogs are prohibited on roosting/nesting islands and on wet areas. Dogs are permitted in other areas as long as they are under effective control at all times.	Effective
Te Huingi Manu Wildlife Reserve	Prohibited	Wildlife reserve - dogs are prohibited to protect wildlife and wildlife values (particularly up to 15,000 wetland birds including many threatened species.)	Effective
Linwood Paddocks	Prohibited	Dogs are prohibited to protect wildlife values (particularly native and migrating birds, including threatened species)	Effective
Charlesworth Reserve	Prohibited/Leashed	Dogs are prohibited in the wildlife habitat and regenerating bush areas. On the grass area with no wildlife values, dogs are allowed if leashed.	Effective
Raupo Bay Saltmarsh	Prohibited	Lower Avon saltmarshes Raupo Bay, Saltmarshes, Rat Island Reserve and the estuary and margins. Dogs are prohibited to protect wildlife values (particularly estuarine birds)	Effective

Value of Birdlife

Literature research on birdlife values at the Avon Heathcote Estuary revealed social, cultural, and ecological values. Te Ihutai Estuary has been granted international significance due to the bird species currently present, as outlined above. There are 10 species recorded that meet or exceed the 1%

Ramsar international significance criteria, these include the famous Godwit (*Limosa lapponica baueri*) and more well-known birds like the Oystercatchers (*Haematopus*) or Paradise Shelduck (*Tadorna variegata*). This criterion gives international significance alongside its inclusion in the East Asian Australasian Flyway Partnership (East Asian Australasian Flyway Partnership, 2018). It currently hosts 38 wetland species, some of which are nationally endangered, threatened or at risk. These species mean a lot to the local Iwi Ngāi Tūāhuriri as kaitiaki of the land, and traditionally some species were used for mahinga kai purposes. Birds bring the community together in annual events like Farewell to the Godwits and people love birdwatching and protecting what is present at the estuary. The birds provide ecological benefits and are key players in the ecosystem.

Human and Dog Disturbance

Human disturbance on birdlife studies were based on observational methods. Some research used meta-analysis, and some used surveying. The effects of this was negative, as more disturbance reduced the time birds spent incubating or foraging for food (Burger, 1981; Glover et al., 2011). Certain species were found to leave their original site altogether when disturbed, exposing them to harsher conditions and a potential lack of resources (Navedo & Herrera, 2012). Flight initiation distance (FID) was significantly impacted by the intensity of the disturbance. Walkers produced less of a response than joggers or people walking dogs because their movements are slower (Burger, 1981; Glover et al., 2011). Birds also react to proximity, where the closer the activity occurs the more likely they are to be frightened off. In extreme cases, the fitness of birds was significantly reduced by the extra energy costs of flying away, leading to higher mortality rates (Samia et al., 2015). Banks & Bryant (2007) found that dog walking can lead to a 35% reduction in bird diversity and a 41% reduction in numbers of birds detected when dogs are present. Another key finding showed that dogs walking on leash can still disturb birds, even when the dog itself is invisible to surrounding bird species.

Community Engagement

Our findings on community engagement show that decisions are more likely to be upheld if they are made by the community (Howard et al., 2020). Allowing the community to participate in the design not just the implementation of the rules allows for more creativity, buy-in, and community cohesion. When a community regularly visits a space and comes to depend upon it the way visitors may depend on the estuary for leisure and exercise, they are more likely to take care of the space and advocate for it at a policy level (Vaske & Kobrin, 2010). Involving the community and empowering them to take care of communal space takes a combination of methods, such as putting formal rules in places, and then creating social and ethical norms around care (Bollier, 2014). This also avoids making a community feel “done-to” which could create resentment amongst users of the space (Howard et al., 2020).

Methods

Our research was conducted at Avon Heathcote estuary which is situated to the east of Christchurch City. The estuary is enclosed by the South Brighton spit and meets the sea between Sumner beach and Southshore. The area is composed of 880ha intertidal mudflats, 100ha Linwood paddocks and 240ha oxidation ponds (Avon-Heathcote Estuary Education Resource, 2019). We focused on two main sections, those being, Charlesworth Reserve and McCormack's bay (Figure 1) (Google, n.d.).



UC UNIVERSITY OF
CANTERBURY
Te Whare Wānanga o Waitaha



Avon-Heathcote
Estuary Ihutai Trust

Date: _____ Time: _____ Area: _____

We are working with the Avon-Heathcote Estuary Ihutai Trust (Estuary Trust) to establish a baseline for the impact on birds of current behaviors of people and dogs in the estuary area. We are trying to determine if the current City Council dog by-laws are suitable, and what people think of them. The research we are doing will result in a report for the Estuary Trust, who will use it to recommend changes to the dog by-laws and to develop measures to minimize conflict between dogs, their owners, and estuary birdlife.

- How often do you come to the estuary?

Daily	Weekly	Occasionally	Rarely
-------	--------	--------------	--------
- What is your primary reason for coming to the estuary?

Close to my house	The scenery	Social Reasons	To keep fit/healthy	To take my dog for a walk	Other
-------------------	-------------	----------------	---------------------	---------------------------	-------
- How valuable or important is the estuary to you? (Scale of 1-10, one being little)

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----
- What do you think the effects of dogs on birds are?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----
- Please circle what statement you agree with the most.

Purpose of the estuary:		
The Estuary should be solely for conservation	The estuary should be available for recreational activities as well as conservation	Recreation should be prioritized over conservation by the trust and city council
- Purpose of the rules**

Did you know that there are dog by-laws for where dogs are allowed within the estuary?
yes/no

If yes: I follow the rules OR I do not follow the rules

Any comments:
- Have you seen any signage around the estuary regarding the dog regulations?
 - Are there enough signs?
 - Are they clear?
- The dog bylaws require dog owners to keep their dogs under "effective control" What do you think effective control means
- The current dog by-laws require dog owners to ensure their dog is responsive to commands and is not creating a nuisance (barking, rushing, attacking, or intimidating.)
- Do you think the dog by-laws should be stricter, more relaxed, or clearer? *
- In your opinion should there be dog-free zones around the estuary?
- Do you know where your nearest dog park is?

Figure 3: The survey that we used at both McCormacks Bay and Charlesworth Reserve.

Our research methods incorporated questionnaires and observational studies. We visited both reserves on multiple days for 2-3 hours per visit, totalling at approximately 20-25 hours. We completed surveys on both weekdays and weekends at a variety of times to better represent the users of the space, focussing primarily on dog walkers and owners, with some non-dog owners being questioned as well. Our questionnaire consisted of 12 questions that each aimed to give us a deeper understanding of our research question.

These questions aimed to give us an understanding of how people use the estuary and how valuable they perceive it to be. It provided us with insight regarding how well advertised and understood the by-laws are around the estuary, and whether people respected them.

Some questions served the dual purpose of educating the public on the current by-laws and provided insight as to how they are interpreted and what is understood about the issues the estuary faces.

In total we surveyed 30 people. All members of this research project are either dog owners or dog lovers. We used this to our advantage to make those being surveyed feel more relaxed. We did not want this bias to affect our results or recommendations, so sought lots of feedback and tried to make it as objective as possible.

LOCATION; TIME; DATE; NAMES;

#	Male/ Female	Age	Group/Single	Walking	Walking with dog	Type of Leash	Controlled/ Uncontrolled	Dog Disturbing Birds	Human disturbing birds

Figure 4: This is the observation table we used to carry out our observations. We decided on different variables that would indicate to us how the community used the estuary.

27 individuals or groups of people we observed recording data such as the age, gender, dog control, activity and bird disturbance as seen in figure 4. Some people who we surveyed were also included in the observational data, particularly where we observed the by-laws being broken.

Results

Surveying

40% of people visit the estuary weekly and over 35% of people visit daily.

We found that the most common reason for going to the estuary was dog walking, making up 55%. The large number of responses indicated that convenience was a key factor when choosing where to walk one's dog.

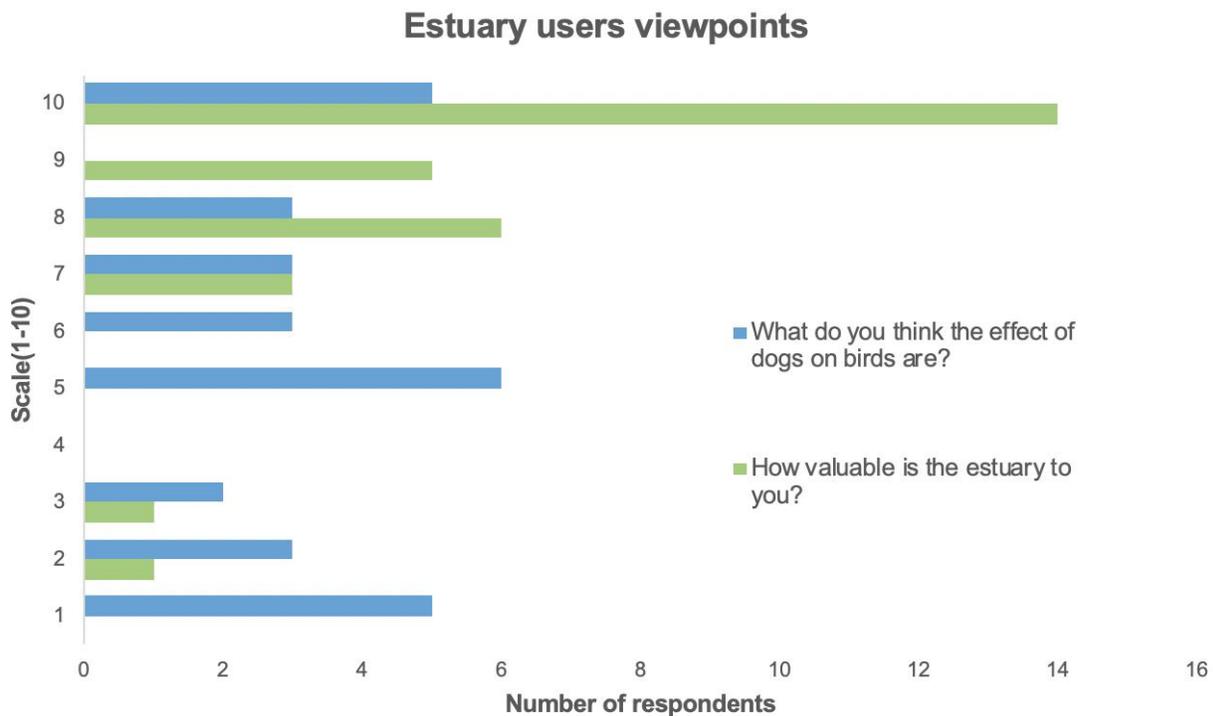


Figure 5: Result of Question 3 and 4 of our survey. Both answers were based on a scale ranging 1-10, where 1 is the lowest effect/value and 10 being the greatest. The value of the importance of the estuary placed an average of 8.6 on the 1-10 scale, and the effects of dogs on birds placed an average of 5.3.

83% of respondents viewed the estuary to be 8 or higher of importance. Over 90% of respondents believed the purpose of the estuary should provide both recreation and conservation practices. The effect of dogs on birds averaged a 5.3 on a scale of 1-10 as seen in figure 5. However, many dog owners based these responses on the behaviour of their own dog which introduced a bias.

There were three main definitions people provided of what they thought effective control meant. 26% thought it was defined as on a lead at all times, 26% thought that dogs off leash should be under verbal command, and 40% of people thought a combination was appropriate. Many people also remarked that if an individual's dog could not be trusted to be responsive to commands it must be kept on a leash.

While 73% of people stated that they knew about the presence of by-laws, most did not appear to know the specifics. Majority of response who knew of the by-laws believed that they personally followed them at least some of the time (70% of people who were aware). Those who answered honestly and

admitted to not following them believed that since their dog was well behaved, they did not have to be leashed.

Observations



Figure 6: This shows a dog that was observed entering the estuary (left) whilst its owners walked along the walkway outlined in figure 10. The right photo shows the dog then exiting the estuary.

The main age group we observed was 65+, no group was well-behaved than the others. We found 21/27 dogs were controlled and leashed. “Uncontrolled dogs” was defined by being off leash and not under effective control. We observed around 20% (22.22222%) of people had uncontrolled dogs according to this definition. One dog was observed actively chasing birds in the estuary (Figure 6). Our survey with them showed they did not believe their dog was a danger to wildlife as he did not run toward the sanctuary islands. We were also given more anecdotal examples of dogs actively disturbing birds at the bay. Many people used a retractable leash, which can extend up to 5 metres. This is potentially a loophole as the dog is technically on a lead but can still run into prohibited areas and disturb birds. The range of responses showed us that while people may know that there are by-laws, many of them do not know the specifics.

During our time at the estuary we also noticed multiple signs are the estuary that made little to no sense. Figure 7 was a great example of this. One of the great examples of a sign can be seen in figure 8.



Figure 7: These three signs are found along the wetland edge at Charlesworth Reserve. We find that they all hold different pieces of information and can be interpreted in different ways by the public. One of the icons shows dogs can be walked in this area but the other icon indicates no dogs at all. It does state no dogs allowed in the wetland, but people may not read this small print and choose which symbol to follow when walking a dog.

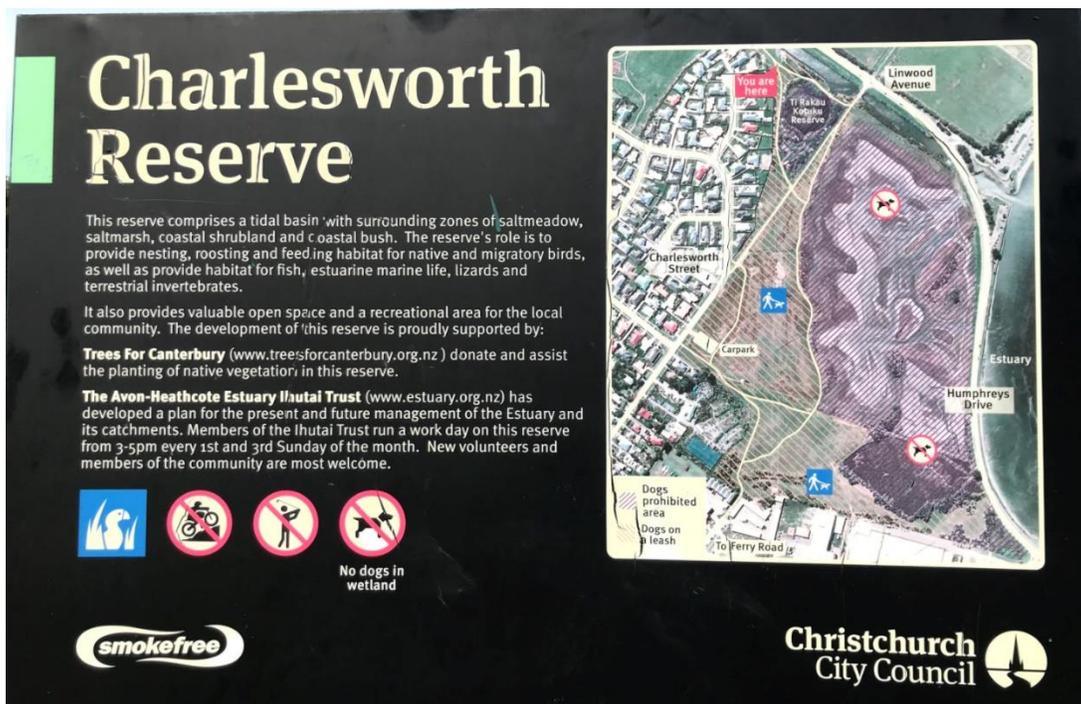


Figure 8: This sign was found at two entrances at Charlesworth Reserve. It shows the users of the estuary physically where they can and can't walk their dogs along the estuary which is good. However, it is quite outdated and lacks information about the current dog by-laws.

Discussion

Our research question aimed to observe the relationship between dogs and owners at the estuary and



Figure 9: A mock-up of an educational sign that could be used to inform members of the public.

Vaske & Kobrin (2010), helping people to create a place-dependency will mean they are more likely to act in an environmentally friendly way.

We have already seen evidence of this where locals formed relationships through frequent visitation and had a strong desire to maintain the tidiness of the space. The Trust, alongside other bird advocates, has a

vision of protecting biodiversity, especially that of birds (Avon Heathcote Estuary, n.d). In the face of a climate crisis, and the declared emergency by Christchurch City Council and Environment Canterbury in 2019, there is an understanding that the surrounding wildlife must be prioritised. From the input we received from the community in our survey we think it is most appropriate to strive for a balance of recreation and conservation, however, this will be carefully strategised.

the effect on birdlife, allowing us to review the present dog by-laws and their effectiveness. While designing our survey questions, we had to ensure the wording was appropriate. Previous literature stated the importance of avoiding prestige bias when interviewing people. Leading questions can encourage participants to exaggerate their answers, so that they are framed in a more positive light (Schneider et al., 2019). Therefore, we tried to create unbiased questions that did not lead to answers we hoped for. Conducting research through observations in tandem with this had many benefits such as being efficient to collect and independent from what a respondent wanted us to believe. Observations also minimised the contact between us and members of the public which was useful when only one group member was available to visit the estuary.

We found the community seemed to care for the estuary, valuing it highly as recorded in our survey. People used it for a multitude of reasons, the main being dog walking. There was also an awareness of the conservation values at the estuary and willingness to maintain present birdlife. Based on



Figure 10: Mock-up of what a sign could look like between the walkway where we found bird disturbance to be at its worse.

Although the effects of dogs on birds are large, there are measures that can reduce this. Dogs may cause birds to relocate, leading to territorial issues, energy expenditure, reduced feeding, and more adverse effects (Figueiredo de Almeida Silver, 2020). Forest and Bird policies outline that dogs should not be present in intertidal zones or at the very least be consistently leashed (Forest and Bird, 2017). McCormacks Bay is adjacent to the intertidal zone and provides high biodiversity on the man-made islands. As Section 14 of the by-laws state in this space, dogs are prohibited, and in adjacent areas need to be under constant effective control. In this example of the estuary, it is advised that boundaries are changed to best protect ecologically valuable areas. In areas such as the rugby field at McCormacks Bay, which is directly connected to the islands, dogs must be under effective control. As defined, effective control can provide a safer zone for birds, but in addition to this it is beneficial to add barriers, which we discuss in the following section.

Natural Barriers

Multiple people mentioned seeing dogs running into the estuary in certain areas, which we also witnessed during our observations (Figure 6). From these observations, we suggest placing a natural barrier along this walkway as this will be one of the best deterrents, we must protect birds in the estuary (Figure 11). This figure outlines areas that would create more protected space for birds than is currently present. Natural barriers would not fully stop dogs



Figure 11: A mock map of what a sign could look like at the McCormacks Bay Reserve to show users of the estuary where they can and can't take their dogs (based off signs seen in Charlesworth Reserve) the asterisk shows the walkway that connects the Mt Pleasant Community Centre to the rugby fields.

from entering the estuary, but act as a visual deterrent for dogs and owners, with thicker shrub being more effective. Inserting a physical fence would prevent birds from using the estuary, so a natural barrier of salt tolerant plants would be preferable. The estuary could benefit further by using a plant such as

Mākaka, (saltmarsh ribbonwood) (Auckland City Council, 2009) which increases water quality and carbon sequestration. Natural barriers could also be supported by signage at either end of the walkway that would let users know that their dogs are not allowed on the estuary (Figure 11). We know that

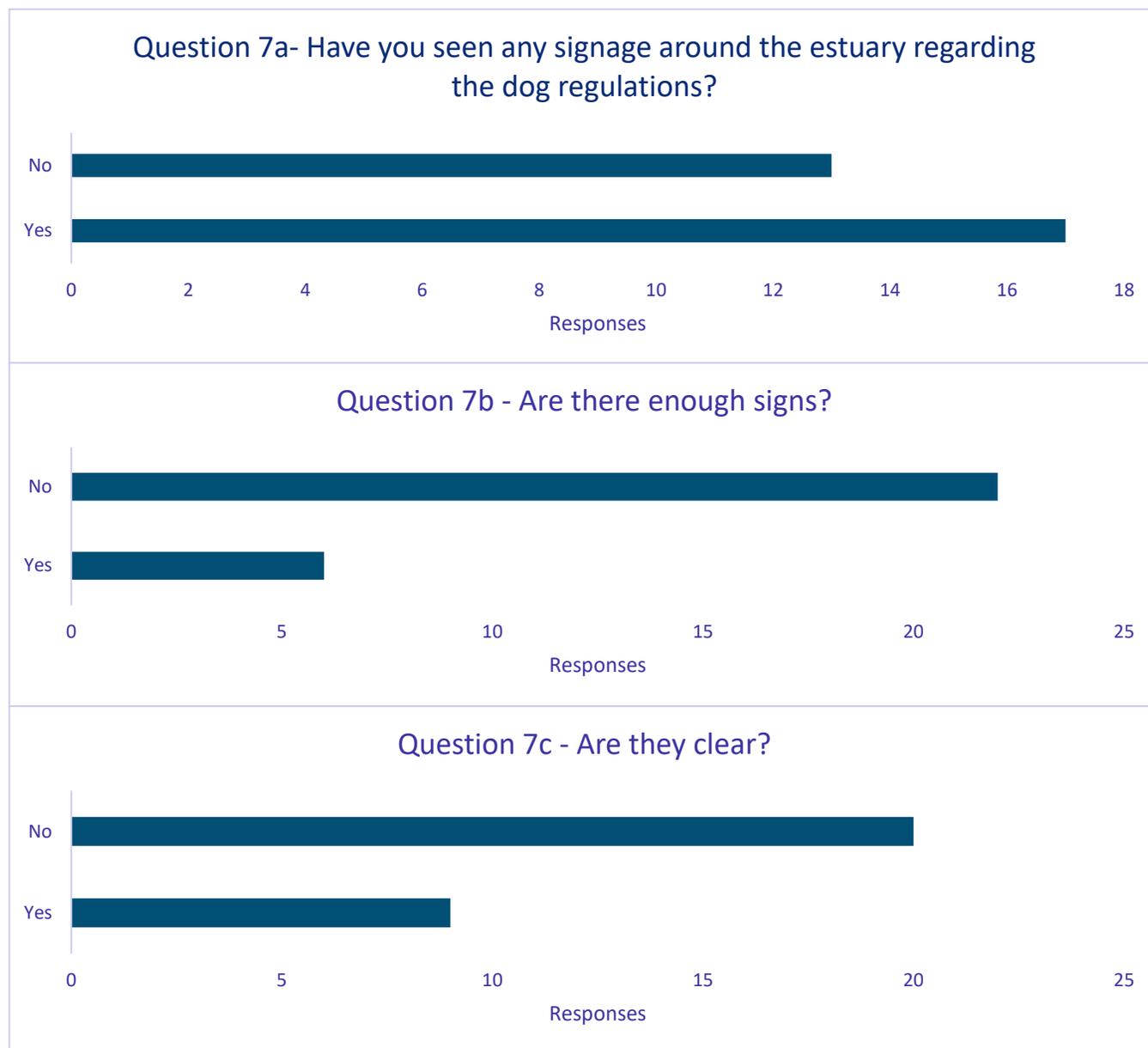


Figure 12: Show the responses to question 7 of our survey. 7a shows that out of 30 respondents, 43% had not seen any signs and 57% had seen signs. 7b shows us that out of 28 respondents, 21% said that there were enough signs and 79% said that there were not enough signs. 7c shows us that out of 29 respondents, 31% thought the signs were clear enough and 69% thought the signs were not clear enough.

to influence pro-environmental decisions within the public they need a “nudge” (Byerly et al., 2018). This means changing their social norms and facilitating pro-environmental decision making. Our nudge could be the use of a natural barrier and signage to deter people from walking into/close by the edge of the estuary. Ensuring dogs do not enter the wetland and roosting areas we are hoping to mitigate some of the issues, however, unless the Trust wishes to revert the grassed rugby field space back to wetlands it will not be possible to completely eliminate disturbances, so we suggest natural barriers as a way to reduce the disturbances.

We think a mix of education and barriers will be most effective in ensuring that owners do not allow their dogs to enter the bird areas. Members of the public were not always aware of the by-laws or why they were in place and there was not enough clear signage, as shown in our results (Figure 12). The implementation must be improved first, we do not believe that changing the by-laws to restrict people further will have much effect if these changes are not communicated or policed clearly. The Trust highlighted that the balance of estuary use must not be taken lightly, it must represent both our growing population of people and our declining number of birds. However, we do not think that the status quo of implementation is sufficient.

Educational Signs



Figure 13: McCormacks Bay Reserve (Google Maps. 2020). Edits made by the authors. The blue dot represents the only information sign about the ecology and the area. The red dot represents the only sign denoting dog rules. The yellow dot represents the "Welcome to McCormacks Bay Reserve" sign which has no information on dog by-laws. The green dot shows where we would recommend the trust put a duplicate information sign.



Figure 14: The McCormacks Bay Reserve sign that is found outside the rugby fields car park. It has no mention of any dog by-laws on it.

From our survey, we found that only 57% of interviewees had seen a sign regarding dogs during their time at the estuary (Figure 12). A key finding was also the high number of signs counted at Charlesworth Reserve (9) but very few signs at McCormacks Bay (3). There were three signs total, excluding the rugby club sign, and only one had information about dogs. The location of this is shown in figure 3 and denoted by the red dot. The main sign welcoming estuary users makes no mention of regulations surrounding dogs (Figure 14). 69% of estuary users acknowledged the need for clearer as well as more signs. We recommend that this is the first step

the Trust takes as we cannot expect people to follow the rules when there is no opportunity to learn what they are. Our question regarding the value of the estuary, showed us that it is highly valuable to most people, even if they do not visit regularly. Many people love the view of the estuary from their home or alternately visitors not from the area expressed a similar sentiment of valuing the estuary. This shows us that most people visiting have a high respect for our ecosystems and would be willing to take steps to care for the space better.

One sign that we found at McCormacks Bay Reserve was a two-sided educational board that explained numerous things about the estuary e.g. the birdlife, ecology, Māori history (figure 15). We thought that this sign could be replaced in a more high-traffic area, such as at the rugby park. The sign is currently in a relatively low traffic area and is sun-bleached, making it unattractive to look at and hard to read. A potential location change at McCormack's bay for a new information sign as seen in Figure 13. Creating a sense of shared responsibility can also help to shape people's behaviours toward taking care of the estuary in a better way. The demonstration sign in figure 9 and figure 16 aims to include people in the care for the space, as well as welcoming them.



Figure 15: The sun-bleached information sign that is found at McCormacks Bay Reserve. The information on the sign is good, just slightly outdated. The sign itself also has major water damaged so deters people from looking at it.

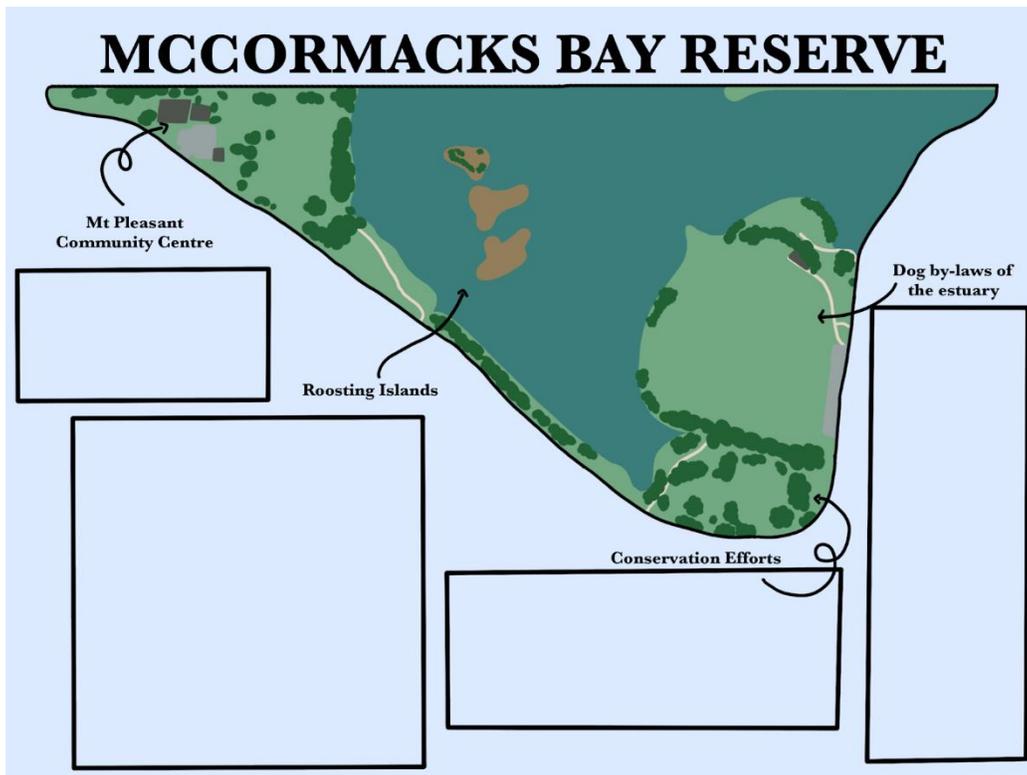


Figure 16: Another updated version of the information sign from figure 14 which focuses on the estuary but also the community. The Trust could include information on its conservation effects, the dog by-laws, the birds and their roosting islands and a bit about the sense of community found at the community centre.

Seasonal Signs



Figure 17: A mock-up of the warning signs that the estuary trust could use to inform people that they need to put their dog on a leash to avoid bird disturbance.

Our third recommendation links to the second and was recommended by multiple people we spoke to around the estuary. Many estuary users thought that even if more signs are placed around the estuary, people wouldn't necessarily read them, or may forget what was on them due to seeing them so often that they become a part of the scenery. Placing signs seasonally at the estuary would mean it is more visually engaging and would allow people to become more familiar with bird species and cycles around the estuary. We were made aware in the literature review that dogs disturb birds especially during nesting times, they cause site shifts and decrease time spent in the nest, likely decreasing nesting success (Navedo and Lord). Anecdotally, many people believed that their dog had no impact on birds because they were well behaved, even when off the leash. This did not always align with observations or prove steadfast. Dogs can disturb birds even on-leash initiating flight and disturbance, and often off leashed dogs that are believed to be under effective control, can lose control (Navedo, 2012). Providing signage explaining what the effects of dogs on birds are and why this is so vital, would allow people to understand that the effect of dogs on birds is complex.

Placing Signs with pictures of specific birds as well as information would be interesting to many members of the public. This is like the signs up at the port hills when it comes to lambing season. Not only will people be aware of the wildlife at the estuary, but they can begin to understand why some of the by-laws are in place. We understand that a challenge of this is that people may disturb nesting birds after they see the signs as they want to see the birds for themselves or take photos. The Trust has

found that they need to keep the hatching period of the Little Blue Penguin secret for this reason. We recommend that the Trust does not disclose locations on the signs and makes a specific request not to seek the birds out. The Trust may also withhold the seasons of some more vulnerable species.

Information Packets

Finally, a good way of educating owners would be during dog registry, this could be used as the first point of contact for education. Legally, dog owners are required to register their dog/s to the Christchurch City Council. Information packets could be provided, which contain numerous pieces of advice informing owners how to best use public spaces with their dog. The dog by-laws for Christchurch, and a clear explanation on what effective control means, could be included to ensure an understanding and acknowledgement of the restrictions in place. As well as this, maps could be provided as a visual aid to show where dogs can and cannot go and whether they need to be leashed or under effective control. Interviewees indicated that dog parks were too far away and felt that the dogs there were untrustworthy and aggressive. Extensive maps would educate dog owners on where it is appropriate to let dogs off lead and provide alternative options to dog parks.

Generally, we found there were many avenues to explore in solving this problem to suit both the community and birdlife. We wanted to ensure our research methods were sufficient and that we avoided any limitations. There was the limitation of COVID-19, but this was easy to overcome for our group and caused no great hindrance. In hindsight we may have explored more avenues of voices, such as non-dog owners and general community members to create a more diverse set of answers, but time and resources was a limit on this. There was also not enough time and resources to look further into other activities that we observed at the estuary and how they were affecting birdlife.

Conclusion

This report aims to explore the way dogs behave at the estuary and their owners' understanding of the dog by-laws. In the future, it would be beneficial to investigate a wider range of variables that influence birdlife at the estuary, such as cats which many respondents believed had a large, if not greater, impact on surrounding birds than dogs. The recommendation of including natural barriers also would help to decrease the impact of dogs on birds by providing extra protected space and other environmental benefits, we believe the implementation of this would be highly beneficial. Another future research opportunity would be in terms of the signage around the estuary. From our recommendations, a new design layout may be necessary to grab people's attention. The survey showed that most estuary users would like signage to be clearer. Having distinct, informative, and engaging signs would be beneficial for the public, raising the level of education. The last research gap is the implementation of the by-laws. Some respondents commented "*who is going to catch me*" when talking about following the current dog by-laws, this shows a lack of enforcement perceived around the estuary. Enforcing the by-laws 24/7 is a difficult task and has many limitations, therefore educating the public on why the rules are there in the first place is essential. This research could be influential for the wider community as we continue to see significant losses of biodiversity worldwide.

Acknowledgements

We would like to acknowledge our community partner from the Avon-Heathcote Estuary Ihutai Trust, Philippa Mein Smith for her valuable and constructive guidance throughout the research project, her help has been invaluable to our learning process. As well as a special mention to Tanya Jenkins for providing us with resources on the Avon-Heathcote estuary, as well as the treats provided to us for our survey participants.

Assistance provided by Jillian Frater was greatly appreciated, her constant support during the planning and development of our research has been critical to our success.

References

- Auckland City Council (2006) *District Plan Hauraki Gulf Islands Section - Proposed 2006*
<http://www.aucklandcity.govt.nz/council/documents/hgi/hgiapp13.asp>
- Avon-Heathcote Estuary Education Resource. (2019). Avon Heathcote Estuary Ihutai Trust.
Retrieved from <http://www.estuary.org.nz/events/newsletters.html>
- Avon-Heathcote Estuary Ihutai Trust. (n.d) *Our vision statement*. <http://www.estuary.org.nz/>
- Banks, P. B., & Bryant, J. V. (2007). Four-legged friend or foe? dog walking displaces native birds from natural areas. *Biology Letters* (2005), 3(6), 611-613.
doi:10.1098/rsbl.2007.0374
- Bollier, D. (2014). Many Galaxies of Commons. In, Think Like a Commoner: A Short Introduction to the Life of the Commons (pp. 127-146). Gabriola Island, Canada: New Society Publishers.
- Burger, J. (1981). The effect of human activity on birds at a coastal bay. *Biological Conservation*, 21(3), 231-241. doi:10.1016/0006-3207(81)90092-6
- Byerly, H., Blamford, A., Ferraro, P.J., Hammond-Wagner, C., Palchak, E., Polasky, S., Ricketts, T.H., Schwartz, A.J., Fisher, B. (2018). Nudging pro-environmental behavior: Evidence and opportunities. *Frontiers in Ecology and Environment*, 16(3), 159-168.
doi:10.1002/fee.1777
- Christchurch City Council Dog Control Policy (2016)
<https://ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Bylaws/Dog-Control-policy-2016.pdf>
- Christchurch City Council (n.d). *Dog Bylaw Areas* [Photograph].
<https://ccc.govt.nz/the-council/plans-strategies-policies-and-bylaws/bylaws/dog-control-policy-and-bylaw-2016>
- Dong, Y., Rosenbaum, R.K., & Hauschild, M.Z. (2018). Metal toxicity characterization factors for marine ecosystems – considering the importance of the estuary for freshwater emissions. *The International Journal of Life Cycle Assessment*, 23(8), 1641-1653.
Doi:10.1007/s11367-017-1376-x
- East Asian Australasian Flyway Partnership (2018, October 15). *The Avon-Heathcote Estuary/Ihutai as New Zealand's new Flyway Network Site*. EAAFP.
<https://www.eaaflyway.net/the-avon-heathcote-estuary-ihutai-as-new-zealands-new-flyway-network-site/>
- Figueiredo de Almeida Silver, L. (2020) *Effects of human disturbances on birds at the Avon-Heathcote estuary*. Retrieved from <http://www.estuary.org.nz/f/45a1260657c7f16f.pdf>
- Forest and Bird. (2017) *Forest and Bird Conservation Policy - Dogs*. Retrieved from <https://www.forestandbird.org.nz/sites/default/files/2018-05/Forest%20%26%20Bird%20Conservation%20Policy%20on%20Dogs.pdf>

- Google. (n.d.). [Avon Heathcote Estuary]. Retrieved October 8, 2020, from <https://www.google.com/maps/place/Charlesworth+Reserve/@-43.5461187,172.7033755,5921m/data=!3m1!1e3!4m5!3m4!1s0x6d31894a04405003:0x20318c517d9bb5bf!8m2!3d-43.5514039!4d172.7009059>
- Glover, H. K., Weston, M. A., Maguire, G. S., Miller, K. K., & Christie, B. A. (2011). Towards ecologically meaningful and socially acceptable buffers: Response distances of shorebirds in Victoria, Australia, to human disturbance. *Landscape and Urban Planning*, *103*(3), 326-334. doi:10.1016/j.landurbplan.2011.08.006
- Howard, M., McDermont, M., & Innes, M. (2020). Introduction: From the regulation of engagement to regulating for engagement. In M. McDermont, T. Cole, J. Newman, & A. Piccini (Eds.), *Imagining Regulation Differently* (1 ed., pp. 1-22). Bristol: Bristol University Press.
- Lord, A., Waas, J. R., Innes, J., & Whittingham, M. J. (2001). Effects of human approaches to nests of northern New Zealand dotterels. *Biological Conservation*, *98*(2), 233-240. doi:10.1016/s0006-3207(00)00158-0
- Navedo, J. G., & Herrera, A. G. (2012). Effects of recreational disturbance on tidal wetlands: supporting the importance of undisturbed roosting sites for waterbird conservation. *Journal of coastal conservation*, *16*(3), 373-381. doi:10.1007/s11852-012-0208-1
- Samia, D. S. M., Nakagawa, S., Nomura, F., Rangel, T. F., & Blumstein, D. T. (2015). Increased tolerance to humans among disturbed wildlife. *Nature Communications*, *6*, doi:10.1038/ncomms9877
- Schneider, T. J., Maguire, G. S., Whisson, D. A., & Weston, M. A. (2019). Regulations fail to constrain dog space use in threatened species beach habitats. *Journal of environmental planning and management*, *63*(6), 1-15. doi:10.1080/09640568.2019.1628012
- Vaske, J. J., & Kobrin, K. C. (2010). Place Attachment and Environmentally Responsible Behaviour. *The Journal of Environmental Education*, *32*(4), 16-21. doi:https://doi-org.ezproxy.canterbury.ac.nz/10.1080/00958960109598658
- Wood, L., Giles-Corti, B., & Bulsara, M. (2005). The pet connection: Pets as a conduit for social capital? *Social science & medicine* (1982), *61*(6), 1159-1173. doi:10.1016/j.socscimed.2005.01.017

Appendix

Appendix A – Detailed explanation on Section 3.2 of the Dog By-laws

Explanation

When a dog is under effective control, it means the dog is not creating any sort of nuisance to people, domestic animals or any other wildlife. Nuisance in this sense means things such as barking, rushing at, intimidating, attacking or otherwise causing injury, damage or harm.

Going for a walk with your dog unrestrained (not on a leash) is fine in areas where there are no dog restrictions. However, the dog must still be 'under effective control'. This means you can see the dog or you are aware of what it is doing, and you are close enough to prevent issues or quickly bring it to heel. Having your dog under effective control is as much about the safety of your dog as it is about the safety of others.

The Dog Control Act requires all dog owners to carry a leash when taking their dog into a public place, whether or not the public place is a leashed area (section 54A). This is because unexpected situations may arise that require a dog to be leashed to keep the dog under control or to keep it safe.

Another requirement that is set out in the Dog Control Act is that the legal owner of a dog must be over the age of 16 (section 2). The owner or person in charge of a dog in a public place should also be physically capable of controlling the dog.