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What Makes Dog Owners Unique?

Understanding the differences in behavior and motivations among dog owners in the Greater Wellington Area

Wellington, New Zealand

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Project Sponsor: Department of Conservation
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ABSTRACT

This project aimed to help the New Zealand Department of Conservation address the effects that domestic dogs have on coastal birds. Survey, interview, and focus group methods helped us to understand current dog owner behavior, knowledge, and motivations when they exercise their dogs on beaches, and to differentiate types of dog owners. Based on our findings, we recommended a wide variety of intervention methods designed to reach dog owners effectively to encourage safe dog-wildlife interactions and responsible dog management. Our intervention methods include supplemental signage, community events, pledge campaigns, and web-based approaches.

EXECUTIVE SUMMARY

The purpose of this project was to address the negative effects that domestic dogs have on coastal bird conservation efforts by increasing public awareness of wildlife and encouraging responsible dog ownership. The New Zealand Department of Conservation (DOC) works to enhance public awareness and understanding of wildlife on New Zealand coasts to better protect it. By working with people to understand the needs of all types of dog owners, DOC wants to decrease the harm to wildlife caused by dogs while keeping dog owners' wants and needs in mind. DOC tasked our team with understanding the different types of dog owners present on beaches in the Greater Wellington Region, as well as their behavior, knowledge, and motivations when exercising their dogs on beaches. The categories of dog owners that we identified were used as a basis to develop effective intervention methods.

Background

Domestic dogs, *Canis familiaris*, present a threat to coastal birds because of their drive for predation, and because they disturb vital ecosystem functions in their primary habitats. As a direct descendant of the wolf, *Canis lupis*, dogs display behavior similar to that of its ancestor, making them a natural predator. Habitat disturbance and the direct killing of wildlife are not the only significant threats that dogs pose; harassment of wildlife by dogs increases stress levels of a bird, which results in wasted energy that could have been used for other means of survival. Even the presence of a predator when it is not engaging in threatening behavior can influence prey, causing both behavioral change and physiological change in response. Dogs may also disrupt the incubation of ground nesting birds. This does not necessarily cause the death of the bird, yet it may result in low hatching success during breeding season. A bird disrupted by a dog may stray from its nesting area in response, leaving the eggs or chicks alone. This leaves the chicks in the nest vulnerable to other dangers such as overheating or starvation. Furthermore, disturbances that involve dogs result in higher disruption of shorebird incubation than disturbances in which only humans are involved. Because of these reasons, it is crucial to find a way to manage dog behavior in areas with threatened bird species.

Methodology

In order to achieve the goals set by DOC, we identified different types of dog owners and tailored intervention tools towards these categories of dog owners, with the purpose of inducing behavioral change and thus reducing the impacts on coastal wildlife by dogs. To accomplish our goal, we looked to complete the following objectives:

1. Understand the behavior of dog owners on beaches, their beliefs about how to manage their dogs, and their knowledge of coastal wildlife
2. Draw from experts in human-wildlife management to determine characteristics that define the ideal dog owner in a beach environment
3. Identify key dimensions that differentiate dog owners and formulate specific categories of dog owners based on those dimensions
4. Design and develop effective messaging and intervention tools tailored to specific categories of dog owners

For our first objective, we focused on dog owners who walked their dogs on beaches in the Greater Wellington region to understand dog owner knowledge, opinions, and behavior. We specifically explored five beaches in the Wellington-Kapiti-Porirua region. These beaches encompassed a variety of beach types and represented multiple socio-economic statuses, in order to achieve a diverse and well-represented sample of dog owners. The beaches we chose were Oriental Bay and the Wellington waterfront area, Lyall Bay, Ngati Toa Domain, Whitireia, and Paekakariki, shown below in Figure A. Primarily, we used the method of surveying to gather information from dog owners on these beaches, supplemented by observations made on beaches and by coding the qualitative responses that we collected. We collected data on site at beaches and chose participants through convenience sampling. Coding analysis was performed on long answer survey questions once all the data had been collected.
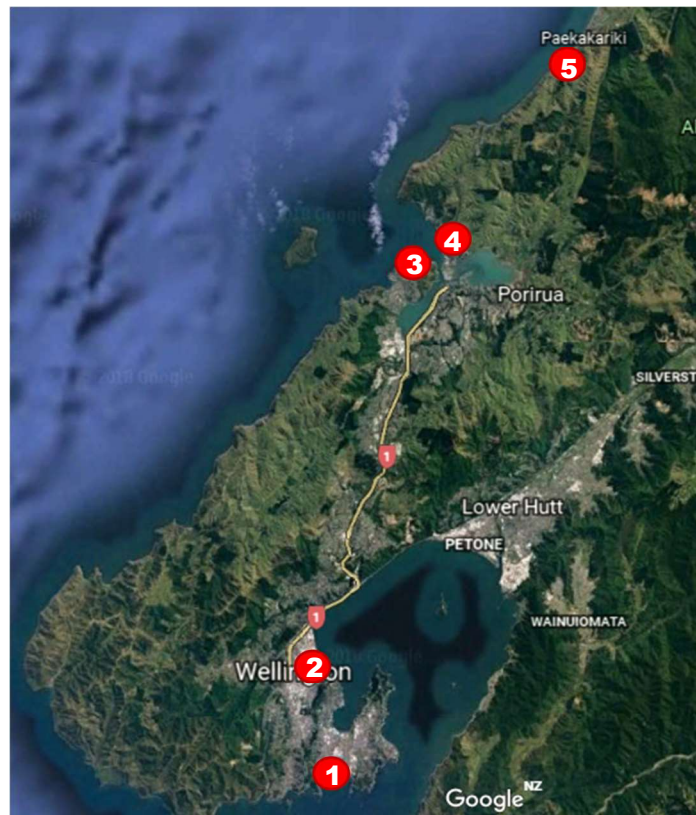

Figure A. (1) Lyall Bay (2) Oriental Bay/Waterfront (3) Whitireia Park (4) Ngati Toa Domain (5) Paekakariki

The next objective of our project focused on how the behaviors of dog owners on beaches needed to change in order to protect coastal species. To incite a desired change in human behavior, we first had to clearly define that desired change; we needed to determine what the ideal dog owner looked like. Included in this description was the knowledge and behavior that responsible dog owners show have to protect coastal wildlife from any dangers their dogs pose. We interviewed experts in human-wildlife interaction to inform our definition of the ideal dog owner behavior. Through these interviews, we gathered information such as the needs of wildlife and the nature of dogs. These interviews also helped to inform and guide our work regarding other objectives. We conducted semi-structured interviews with each of these experts. In the interviews, we asked a predetermined set of questions according to the interviewee's area of expertise, but also asked other questions as the interviews progressed. We took detailed notes during interviews and audio recorded each of them with the permission of the interviewee to further aid our data collection.

Our third objective aimed to identify key dimension that differentiate dog owners in order to divide dog owners into various categories. To do so, we had to first define the dimensions, or qualities, that would differentiate those segments. The method we used to evaluate the most significant dimensions was cross-tabulation, which involved the ability to evaluate patterns between data variables. These dimensions informed the axes that the segments would fall between, according to a multi-axis model. The labelled multi-axis model then helped us describe the categories that were created. We could then use the survey results to describe the categories in more detail.

Finally, our last objective aimed to create intervention methods by comparing each category to the ideal dog owner and by assessing the risk of their behaviors. Information from expert interviews and our focus group also gave us information about effective intervention methods. We then brainstormed initial intervention methods using rapid ideation, a method that allows a group to generate a large volume of new ideas. Lastly, we evaluated the validity of the intervention ideas by using a design matrix, as well as input from a focus group. These methods all assisted in developing our final recommendations.

Results and Discussion

Our survey helped us paint a general picture of the dog owners in the Greater Wellington region regarding demographics of the dog owner, information about the owner's dog, and the dog owner's knowledge. By analyzing survey results of each of these categories, we were able to understand the behavior of dog owners on beaches, their beliefs about how to manage their dogs, and their knowledge of coastal wildlife. We found that most dog owners let their dog off lead when at the beach and bring their dog to the beach at least once a day. Additionally, many dog owners indicated that their dog has not gone through formal obedience training, which can lead one to believe that the dog is not well trained. Regarding dog owner knowledge, we were able to see that most participants were aware of the coastal bird species and considered them part of wildlife. We also determined that most people let their dog off lead for their dog's well-being, and that participants were also reluctant to understand that their dog is a threat to coastal wildlife.

In order to describe the knowledge and behavior associated with the ideal dog owner with respect to wildlife, we conducted seven expert interviews on this topic with individuals experienced in conservation and human-wildlife management. Based on the information obtained from those interviews, we were able to identify the key knowledge and behavior associated with the ideal dog owner, as shown below in Figure B

Knowledge	Behavior
What wildlife is present on beaches	Train the dog well so it responds to commands
Where wildlife is present on beaches	Stay alert to the dog and surroundings
The true level of danger dogs pose to wildlife	Avoid wildlife and possible distractions
The personality and limitations of the dog	Put the dog on lead when appropriate
The dog's level of training	Obey all leashing regulations
How to react if wildlife is encountered	Report incidents to DOC

Figure B. Knowledge and Behavior of the Ideal Dog Owner

To understand dog owners other than the ideal, we analyzed responses of the questions that targeted the dimensions of knowledge and behavior. By cross-tabulating questions about knowledge and behavior with other survey questions, we were able to identify patterns. For example, there is a connection between the level of training of a dog and the frequency of leashing. In order to understand categories of dog owners, we formed a Dog Owner Model from these relationships, as shown in Figure C. The axes of this model reflect the types of characteristics that ideal dog owners have and that we cross-tabulated: dog owner's behavior and awareness. The four categories found include: Conscientious, Uninformed, Reckless, and Negligent.
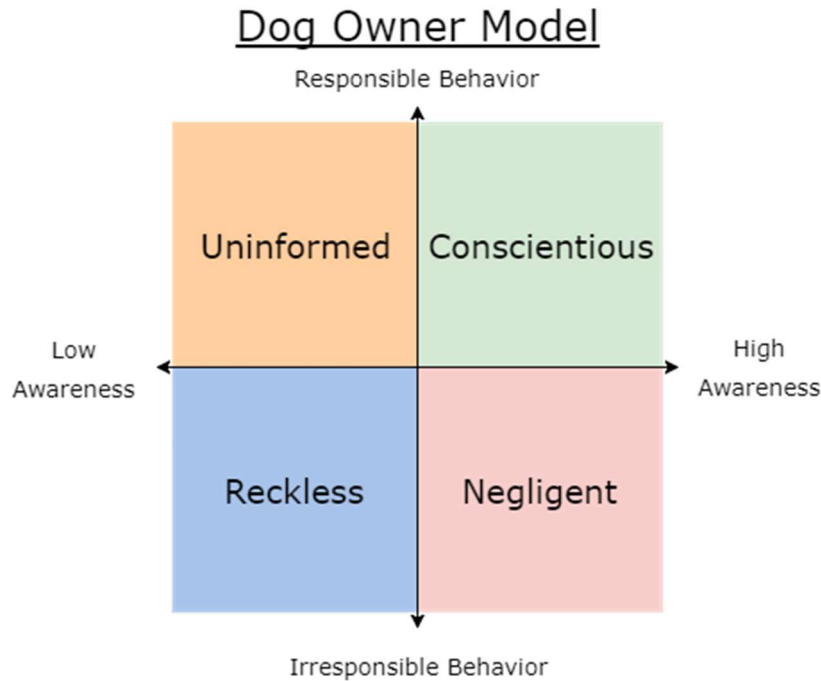

Figure C. Dog Owner Model

Recommendations and Conclusions

After classifying dog owners, we were ready to address the knowledge and behavior of each category. Firstly, we assessed the risk associated with the actions of each type of dog owner, then explored solution techniques through brainstorming, followed by analysis and selection of valuable characteristics when designing intervention methods and techniques. A risk assessment breakout was created for each category, describing their common behaviors and which behaviors were most critical to address. From there, we explored how these behaviors could be addressed through intervention methods. Expert interviews informed what intervention methods have not worked in the past, as well as gave recommendations as to what information or strategies should be explored in our intervention methods. Our focus group with dog owners also informed what their preferred methods of receiving information were. We were able to generate a checklist of guidelines for effective intervention methods. This included tips about what information to present, how the information should be presented, and who to target. After reviewing all these pieces of information, we brainstormed intervention methods and used a rank order and design matrix to refine our best ideas. The key types of intervention methods included signage, community events, pledge campaigns, advertisements, and technological tools.

For our intervention methods, we decided to focus on reaching the Reckless and Uninformed categories of dog owners. We chose to target these groups because Conscientious Dog Owners already exhibit the necessary knowledge and behavior, and Negligent Dog Owners would likely only respond to enforcement or increasing social pressures. In terms of signage, our survey results, focus group feedback, and expert interviews all primarily stressed the importance of good signage. Most dog owners agreed that they would like to know the reasoning behind leashing regulations. A sign indicating that a dog owner should keep their dog on lead or keep their dog under control is much more likely to elicit the correct reaction if it also states if threatened wildlife is present. Additionally, we believe that dynamic signage that changes periodically to reflect the different levels of risk depending on the season or other wildlife patterns would be more effective than a generic sign that stays consistent year-round. Another feature of signage that we incorporated was a size comparison between dogs and birds. We recommend that small wooden signs be placed on the ground next to the main signage. They would have a picture of a bird printed on them, and they would be to the correct scale of that bird. The feature of the sign would provide a powerful visual representation of the threat their dogs pose to wildlife and incentive to act responsibly.

To supplement the information presented with on-site signage and to make that information readily available otherwise, we recommend that a website be developed and maintained by DOC. Currently, each city council has their own website and resources with information regarding dog exercise areas and the leashing regulations in their respective districts. Many dog owners find leashing regulations online, and these regulations are divided by council and can be difficult to find. We recommend that DOC create a website with a complete list of dog exercise areas and their regulations, including all those in the Greater Wellington area and perhaps in all of New Zealand. The website could also have a "bird of the month," where a specific bird and information about it could be highlighted as featured on the website. This could be shared on Facebook to garner attention. In addition to digitally, a "bird of the month" informational postcard could be mailed to Wellington residents. One side could contain information about the bird with photos, and the other side could concisely state what the individual can do to protect the bird.

Because we found that many dog owners want solutions that are personal and face-to-face, it is possible that community-based outreach may be another effective method of targeting dog owners. If DOC sent representatives to educate and assist with awareness at these events as a partner, there is the potential for positive change. Most dog owners do not want their dog to be a threat to coastal wildlife but do not know the proper methods to keep their dog under control and away from wildlife. With opportunities for training sessions and for obedience competitions, the community events would serve as public examples of good canine behavior. Other activities that could be run at a community event include giveaways and crafts. Incorporating as many different tactics to educate people at one of these events would prove most fruitful.

The researched conducted for this project gave us valuable insight into the wants, needs, opinions, and knowledge of dog owners in the Greater Wellington region. We were also able to better understand into how dog owners perceived the threat of their dogs to coastal wildlife. By limiting the threat that dogs poses to threatened coastal species, New Zealanders can help to promote the establishment of thriving communities of birds on their shorelines. If dog owners understand the great danger that their actions pose to this success, they can start to make a difference in the lives of species that call New Zealand home.

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AUTHORSHIP

All members of the team collaborated to draft the entirety of the paper. Additionally, the team collectively coded open-ended survey responses. The whole team was involved in implementing the design and decision matrix. Each member participated in collecting surveys at the different beaches, conducting expert interviews, and facilitating the focus group.

Madeline Burke was the lead user of the Weka data analysis software. She also designed the community outreach event flyer, and the "bird of the month" postcard. Madeline photographed beach landscapes and signage.

Kaleigh Iler was the primary editor for the paper and was in charge of keeping the groups communication timely by responding to emails from advisors and sponsors. Kaleigh additionally created the pledge campaign graphic.

Kellen Randall was the primary observer of dog owners. He also was in charge of creating the survey in Qualtrics and using its analysis methods. Additionally, Kellen created the "bird to scale" poster and the recommended dynamic signage.

Ana created the multi-axis model. She also designed the small signage for threatened and endangered species and the trail-side reminder signage. Ana made the leashing regulation map for Ngati Toa Domain.

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CHAPTER 1: INTRODUCTION

New Zealand is the land of birds. Isolated for centuries as a remote island, bird species thrived without the threat of land mammals. This caused the evolution of many flightless birds and ground nesting birds, traits that left many species vulnerable to invasive species with the arrival of humans. The first non-human mammals that threatened New Zealand birds were rats, which were brought by the first Polynesian settlers in the thirteenth century. Possums were then introduced to be used for fur by European settlers in the mid-1800s, and stoats were introduced to control rabbits around the same time (Brockie, 2007). These new predators had a devastating impact on New Zealand bird species, which were not prepared to defend themselves from the unfamiliar dangers. Paired with urbanization and habitat changes caused by humans, native bird species are increasingly at risk. New Zealand is home to twenty-three species of threatened birds, fourteen species of nationally endangered birds, and thirty-six species of nationally vulnerable birds, each of which needs protecting from these increasing threats (DOCa, 2017). The New Zealand government and private organizations are putting substantial effort into preserving the native wildlife in which New Zealand residents put so much pride.

While significant focus is placed on predators such as stoats and weasels, canines are also an increasing threat to the wildlife that lives in New Zealand. When New Zealanders go to the beach, they often bring their dogs with them. While this action by itself seems harmless, the implications for wildlife are serious. Actions such as barking, digging, or tramping impact the delicate habitats in which dotterels, penguins, and other coastal species live. Wellington and its surrounding landscape provide the habitats for species like the little blue penguin, and easy access to the habitats of these species lends itself to greater interaction between dogs and wildlife. The lack of natural land predators for coastal bird species leave them even less prepared for introduced threats such as dogs. In the Greater Wellington region of New Zealand, there were five little blue penguin deaths related to off-lead dogs between May and July of 2017. A representative from the Western Bay Wildlife Trust said that in 2015 and 2016, at least 24 penguins had been killed by dogs in the Western Bay of Plenty region (Otago Daily Times, 2016).

The New Zealand Department of Conservation (DOC) works to create a public awareness and understanding of the wildlife on New Zealand coasts to better protect it. Conservation is

paramount to DOC; by working with people to understand the needs of all types of dog owners, DOC wants to find a solution to eliminate the harm to wildlife caused by dogs. Analyzing the reasons why dog owners want to walk their dogs on or off lead along coastal and beach sites could inform how DOC might develop signage and solutions for targeted audiences. The balance between dog freedom and respect for wildlife is difficult to manage, but solutions must be found to meet the needs of dogs and dog owners without putting vulnerable coastal bird species at risk.

The purpose of this project was to address the negative effects that domestic dogs have on shoreline bird conservation efforts by increasing public awareness of wildlife and encouraging responsible dog ownership. In order to achieve this, we evaluated dog owners on beaches to understand their behavior, beliefs about how to manage their dogs, and knowledge of coastal wildlife. Then we identified key dimensions that differentiated dog owners, used those key dimensions to formulate specific categories of dog owners, and developed intervention tools designed for these categories. We also used expert opinions to establish what the "ideal" dog owner looks like, and therefore what information should be included in our intervention methods to achieve that ideal. We used a variety of processes to complete these objectives, including methods such as surveys, interviews, cross-tabulation, and risk-assessment matrices. The intervention methods and recommendations developed by this project may be further refined and tested by another WPI group of students who will continue work on this project with our sponsor next year.

CHAPTER 2: BACKGROUND

This project explores the interactions that dogs have with coastal wildlife. The background that is relevant to the goals and purpose of the project is outlined in this chapter. Firstly, the threat that dogs in New Zealand pose to wildlife is addressed. To analyze the cause and implications of these threats, this chapter discusses the current regulations regarding dog leashing and past Department of Conservation (DOC) efforts to protect coastal wildlife. Additionally, this chapter examines the public perceptions of this problem as expressed through social media and previous surveys. Finally, the chapter outlines possible means by which public behavior can be changed.

2.1 Threats to Wildlife by Domesticated Dogs

Domesticated dogs present a significant threat to wildlife in many different environmental settings. In the Greater Wellington region of New Zealand, there were five little blue penguin deaths in May, June, and July of 2017, related to off-lead dogs. In late May, an off-lead dog killed a little blue penguin in central Wellington (NZ Herald, 2017). In June, two more little blue penguins were killed by a dog in an off-lead exercise area on a beach near Frank Kitts Park (Devlin, 2017). A month later, two nesting penguins were mauled to death by an off-lead dog on a Porirua beach in an on-lead walking area (Fallon & Paul, 2017). Regarding the recent penguin deaths, Jack Mace from DOC named dogs as the biggest threat to little blue penguins (Hunt, 2017). Additionally, a representative from the Western Bay Wildlife Trust said that in 2015 and 2016, at least 24 penguins had been killed by dogs in the Western Bay of Plenty region (Otago Daily Times, 2016).

Domestic dogs, *Canis familiaris*, present a threat to coastal birds because of their drive for predation, and because they disturb vital ecosystem functions in their primary habitats. As a direct descendant of the wolf, *Canis lupis*, dogs display behavior similar to that of its ancestor, making them a natural predator (Evolution of the dog, 2001). A study found that domestic dogs outperformed native raptor species in carrion scavenging and consumption on beaches in Eastern Australia, environments that are similar to those of the Greater Wellington area (Schlacher et al., 2015). Ken New, a volunteer with a Forest and Bird project called Places for Penguins, notes that due to dogs' natural instincts, penguins are in great danger around them. "The smell of penguins is very attractive to dogs. This is not the fishy smell that [humans] may associate with penguins,

but a subtler smell that we cannot detect," says Ken. Due to the attractiveness penguins pose to dogs, even the most highly trained dogs who work with conservation organizations wear muzzles to prevent any accidental penguin attacks (K. New, personal communication, Feb. 7, 2018). Habitat disturbance and the direct killing of wildlife are not the only significant threats that dogs pose; harassment on wildlife by dogs "resulted in increased stress and energetically costly behavior to wildlife" (Young et al., 2011). Even the presence of a predator that is not engaging in threatening behavior can have an effect on prey, causing both behavioral change and physiological change in response. Dogs may also disrupt the incubation of ground nesting birds. This does not necessarily cause the death of the bird, yet it may result in low hatching success during breeding season. A bird disrupted by a dog may stray from its nesting area in response, leaving the eggs or chicks alone. This leaves the chicks in the nest vulnerable to other dangers such as overheating or starvation. Furthermore, disturbances that involve dogs result in higher disruption of shorebird incubation than disturbances in which only humans are involved (Lord, 2001). Because of these reasons, it is crucial to find a way to manage dog behavior in areas with threatened bird species.

2.2 Regulations Surrounding Dog-Wildlife Interaction

New Zealand and the Greater Wellington area have laws and regulations surrounding dog control, but they do not set specific regulations concerning leashing dogs. The Dog Control Act and its amendments set a standard for microchipping and registering dogs, taking care of dogs, keeping dogs under control, and having the ability to classify dogs as "menacing" or "dangerous" (Dog Control Act 1996). Under the Act, dog owners must comply with the obligations outlined in Appendix A. These include obligations regarding dogs being registered, owners keeping the dogs under control at all times, dog health and exercise, and threats posed by dogs to humans, stock, poultry, domestic animals, protected wildlife, or property. To accomplish this, the Dog Control Act gives recommendations for overarching regulation, but individual city councils determine the specific laws and consequences. Each city's regulations vary slightly but ultimately have similar content. The Act gives power to city councils to set registration requirements and their associated fees, to designate certain public places as off- or on-lead dog areas, to limit the number of dogs per owner or per property, and to impose other relevant powers.

Additionally, each city has the power to classify dogs as menacing or dangerous. A dog is classified as menacing if the observed behavior of the dog or the typical characteristics of the dog

breed suggest that the dog would be a threat to people, poultry, domestic animals, or protected wildlife. A dog is classified as dangerous if it meets the qualifications of menacing, and one of the following:

- the dog's owner has been convicted of an offense related to the dog
- a territorial authority has sworn evidence that this dog is a threat
- the owner admits that their dog is a threat

According to the city, these classifications may require a dog to be muzzled in public, neutered, kept on a lead at all times, and kept in a fully fenced area. A dog owner may be classified as a probationary owner if they are convicted for an offense against the Act, or if they commit three or more infringements of the Act. A dog owner may also become disqualified as a dog owner if they commit three or more infringements against the act, if they are convicted of an offense against the Act, or if they have been convicted of certain offenses under the Animal Welfare Act 1999, the Conservation Act 1987, or the National Parks Act 1980.

Wellington's specific regulations and bylaws concerning dog control and care are collectively referred to as the Dog Policy and were set in 2016. Concerning dog-wildlife interaction, the Policy's purpose is, "to prevent any potential danger caused by dogs to the public, wildlife and natural habitats . . . to minimize the risk of distress and nuisance caused by dogs to the public, wildlife and natural habitats" (WCC, 2016). The Council also designates public places where dogs are allowed, be it on or off-lead. Generally, there are differences in leashing regulations due to geographic location. Parks in the center of the city typically have more off-lead access than public beaches. Public places are classified as:

- Controlled public places – dogs are allowed on-lead
- Exercise areas – dogs can exercise and socialize off-lead
- Prohibited places – dogs are not allowed in these areas at any time

Further classifications set by the Council include beach exercise areas, beach areas restricted during summer, exercise areas during specified times, and prohibited places during specified times. These are areas where dogs are allowed off-lead during specific times of day and/or year, or where dogs are wholly prohibited at all times during a certain part of the year, respectively. The City of Wellington maps both inland and beach areas according to their leashing designation. Examples are shown below in Figure 1.

Figure 1. Maps of dog exercise areas in Seatoun Beach (L) and Stebbings Dam (R)
(Wellington City Council 2016a), (Wellington City County 2016b)

DOC also has guidelines for dog access on national conservation land around New Zealand, including types of access and types of dogs that are allowed. Types of access to different conservation areas include open dog areas, controlled dog areas by permit, and controlled dog areas with no access at all. Types of dogs allowed in controlled areas include disability assistance dogs, hunting dogs, and avian awareness and avoidance training dogs (DOCb, 2017). If a dog owner ignores the conditions set by DOC about controlled access areas, the dog owner may face prosecution, and a dog found in a controlled access area may be seized and impounded or euthanized. DOC recommends that owners keep their dogs under control at all times, keep their dogs in sight, prevent them from disrupting others at the park, carry and use a lead, and clean up after their dogs (DOCe, 2017). DOC also administers the Wildlife Act of 1953, which outlines the protection of native New Zealand vertebrate species, as well as a number of terrestrial invertebrates and marine species. No one may hunt, kill, eat, or possess protected species, and those who do so may be fined up to $100,000. This act also sets a foundation for wildlife sanctuaries, refuges, and reserves (Wildlife Act 1953). Following these guidelines, it is possible for dog owners to face prosecution for the endangering of animals protected by this Act if their dog attacks or kills an

animal. However, this Act implies a need for malicious intent in order to prosecute, so it is difficult to prosecute dog owners. Additionally, there is again no specific enforcement for keeping dogs on-lead, since leashing restrictions are often difficult to enforce. Because dogs pose such a large threat to nesting shorebirds, it may be helpful to find a way to enforce dog leashing or prohibition in important beach areas.

2.3 Protected Species in New Zealand

Wildlife conservation in New Zealand is closely rooted to the culture of the people who live there. Because New Zealand was left untouched by humans for thousands of years, the flora and fauna that are unique to this environment are multitudinous. Flightless birds and unique palms were found throughout the two islands. Native bird species such as the kiwi were without natural predators, but the introduction of new warm-blooded species threatened and continue to threaten their survival. Since the arrival of humans, the landscape and organisms of New Zealand have changed to present new challenges to native birds. Dogs, cats and stoats are particular species that were introduced to New Zealand's wild environment and since their introduction, people have struggled to manage the interaction between native and non-native species. New Zealand and DOC search for ways to protect native species and keep pet-owners happy.

New Zealand has many endangered and threatened species living on their islands. This coastal environment provides niche habitats for specialized bird species, and the variety of creatures that live in this country is vast. Due to the isolated nature of the country, bird species have been able to specialize. The lack of natural predators leaves species like the little blue penguin, which lacks the capability to fly, vulnerable to threats. New Zealand is home to 23 species of threatened birds, 14 species of nationally endangered birds, and 36 species of nationally vulnerable birds (DOCa, 2017). These species include birds like the banded dotterel, an endemic species that has faced threats due to predation, habitat loss, and disturbance.

DOC published backgrounds on different bird species. In addition to including an annual report with regard to the conservation status of different birds, DOC provides background and information on certain species of birds. Many species of New Zealand birds are directly affected by human interaction and threats from predators. Such predators include cats, dogs and stoats. Some of the species of interest include the black-billed gull, black-fronted tern, variable oystercatcher, dotterel, and little shag, each shown in Figure 2. Each of these species has

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experienced threats from dogs (DOCd, 2017). For example, baby chicks of the New Zealand Dotterel will "crouch and freeze when danger threatens" (Dowding, 2017). Dogs that sniff out chicks are tempted to play with the motionless birds because they resemble play toys. Different birds can be grouped into their areas of threats. The identified birds below are each threatened by predation from dogs. However, one specific genus of birds has been affected the most by dog interaction – the penguins of New Zealand. Species of penguins in New Zealand include the yellow-eyed penguin, the Fiordland crested penguin and the little blue penguin. The little blue penguin is the most present in the Wellington area, and its picture can be found in Figure 2.

| Black-billed Gull | Black-fronted Tern | Variable Oystercatcher |

| Dotterel | Little Shag | Little Blue Penguin |

Figure 2. Birds of New Zealand (Creative Commons)

The Department of Conservation (DOC) in New Zealand is responsible for accepting calls for issues related to coastal wildlife and dog interactions. Ranger stations act as a contact for beach-goers to report instances of injured birds and other species. The ranger is in charge of setting the appropriate course of action from there, and they are usually involved in questioning and collecting resources to help the injured animal. In each case that a ranger responds to, there are two courses of action; either a bird is determined dead on arrival or the bird is sent to bird rescue where doctors perform the necessary treatment. Unfortunately, dog attacks frequently go unreported due to the reluctance of dog owners to admit that their dog has injured an animal. According to a ranger in

Taranaki, dogs have been responsible for the deaths or injuries of 35 birds there since 2010 (Lilley, 2017). DOC is proactive in their prevention of attacks, however. They station rangers in different beach locations to ensure the protection of wildlife. Some of the violations that people have been guilty of are as follows: walking dogs in prohibited areas, camping or hunting without a dog permit, and allowing dogs in prohibited areas (Wilson, 2017). The policing of dog owners and what they do on beaches is not favorable with the dog owner community.

2.4 Public Knowledge and Perception of Dog-Wildlife Interactions

After a dog attack on two penguins of Houghton Bay in June 2017, members of the Wellington City Council emphasized how important the education of dog owners regarding dog-wildlife interactions is to the protection of coastal species (Devlin, 2013). Studies completed in Wellington in 2017 show that most of Wellington dog owners exercising their dogs on the beach wish to do so by letting their dog off lead. However, it was shown that few of these dog owners were aware of the protected wildlife that line the beaches (Banatoski et al., 2017). In addition, comments posted by New Zealand residents on articles relating to dog-wildlife interaction demonstrate the differing opinions amongst New Zealanders regarding how to protect coastal wildlife from dogs.

2.4.1 New Zealand Public Perception

Between the months of January 2017 and March 2017, another team of students from Worcester Polytechnic Institute (WPI) observed beaches of Wellington and Dunedin to understand the interactions local dogs and their owners have with the coastal wildlife (Banatoski et. al, 2017). The team worked with DOC, with the mission to understand the dog owners' perceptions of the potential risk of dog and wildlife interactions on the beach. They collected over 200 surveys of people walking on the beaches, both dog owners and non-dog owners. Participants were asked questions regarding their preferences for walking their dog, awareness of dog regulations, and knowledge of present coastal wildlife. The results from these surveys revealed that an overwhelming number of dog owners prefer to walk their dogs off-lead on beaches. Owners justified that letting their dogs run free provided the dogs with more freedom and a better ability to exercise and socialize, despite the increased threat to present coastal wildlife. Additionally, it

was found that 80% of participants were aware of some dog-regulation policies of the beaches. Most participants sighted the local signage as their source of this information.

Despite the signage present in these areas, the beachgoers' knowledge surrounding the existing wildlife, such as penguins and shorebirds, was lacking. Only 30% of participants were aware of the potential penguin presence on beaches. This lack of awareness and the desire to let dogs off-lead increases the potential of an interaction between coastal wildlife and roaming dogs. When asked whether interactions between dogs and wildlife are acceptable, Wellington participants were divided, as shown in Figure 3.
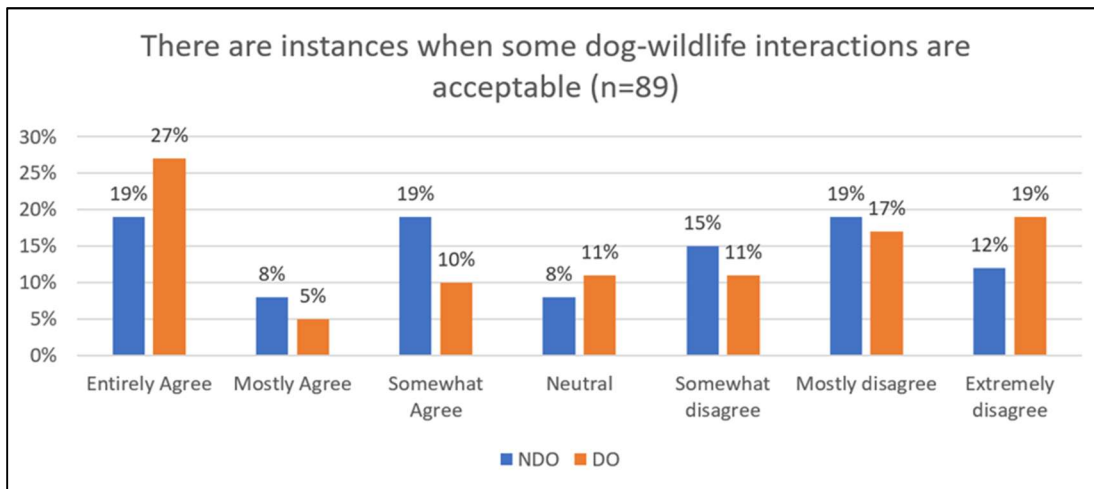
Figure 3. Wellington participants response to 'There are instances when some dog-wildlife interactions are acceptable' (n=89) (Banatoski et al., 2017)

Twenty-seven percent of dog owners (DO), shown in orange, completely agree that "some" dog-wildlife interactions are acceptable, while only 19% completely disagree with the statement. Furthermore, only 19% of non-dog owners (NDO), shown in blue, entirely agree that these interactions are acceptable, and 12% entirely disagree. These results demonstrate that the people of Wellington are divided when it comes to handling dogs and with respect to coastal wildlife. As it seems, some residents believe that dogs are a threat to coastal wildlife and that the way to protect the wildlife is to eliminate dog-wildlife interactions. Conversely, other residents believe that it is okay for dogs to interact with wildlife and that allowing dogs to connect with the wildlife is not wrong. (Banatoski et al., 2017).

In addition to the surveys completed by the previous WPI team, there have been other surveys conducted by New Zealanders to gain a better understanding of the public perception of walking dogs on beaches. In October 2017, the West Coast Penguin Trust posted a survey on their

Facebook page for their dog owner fans to take. A total of 86 people took the survey. Questions pertained to habits of dog owners with their dogs on beaches and any interactions with penguins on the beach. Several questions of the survey focused on the practice of keeping dogs secure on and around beaches. It was found that most participants see benefits in keeping their dog secure on their property and on-lead at the beach. Many cited the decreased risk of disturbing wildlife as a benefit. Nevertheless, it was found that nearly 50% of respondents always allow their dog off lead at the beach. It should be noted, however, that many respondents claimed that they are able to keep their dog under control while on the beach and keep it from harming any wildlife. Many felt that their dog is well enough trained that it would never harm any wildlife, despite being allowed to roam free on a beach with penguins. These responses agree with the conclusions made by the previous WPI team in that New Zealanders believe wildlife protection is a good thing, however, these dog owners do not see it as an issue when dealing with their own dog. (West Coast Penguin Trust Dog Owner Survey 2017).

2.4.2 New Zealand Public Reaction to Dog-Wildlife Interaction

Since the time the surveys described in Section 2.4.1 were conducted, there have been several dog attacks on little blue penguins throughout New Zealand. In addition to the penguin attacks in May, June, and July of 2017, a little blue penguin was found dead on September 21, 2017 near the Oruaiti Reserve at Seaton Beach (Te Motu Kairangi-Miramar Ecological Restoration, 2017). The Te Motu Kairangi-Miramar Ecological Restoration posted about the penguin death on their Facebook page, stating that an off-lead dog was to blame. Of the seventeen comments on the post, five addressed how sad the penguin death is, six criticized the negligence of the dog owner, four gave suggestions on how to handle the situation, and two explicitly stated how they are responsible dog owners and would never let their dog kill a penguin. While these comments come in response to this particular event, they suggest that many New Zealanders' reactions to violent interactions between a dog and coastal wildlife is more sympathetic towards the wildlife.

Some of the commenters of the Te Motu Kairangi-Maramar Facebook post stated that unlike other dog owners, they are responsible and would never let their dog hurt a poor penguin. While this may be true, believing that one's dog and/or their handling of said dog is better than another dog owner's is a common theme, as shown by the West Coast Penguin Trust survey results.

This opinion can also be found in the comments section of an article written by DOC regarding the work of the previous WPI team. A New Zealand dog owner posted about how they felt it was unfair that there is such a limited amount of space for owners to walk their dogs. They found it to be irrational they could not take their "well behaved pooch on a walk on a DOC track where the likelihood of encountering or endangering any native wildlife is minimal" (*Mack goes to the beach and doesn't chase wildlife* 2017). Similar to the commenters of the Te Motu Kairangi-Miramar post, this dog owner felt that their dog, specifically, does not pose a risk to the wildlife on beaches. Unlike the Te Motu Kariangi-Miramar commenters, this dog owner felt punished for having to keep their dog on a lead and reacted negatively to the regulations put in place for dog owners. This reaction differs from the sympathetic response New Zealanders gave to the Te Motu Kariangi-Miramar Facebook post. This comment shows that not all dog owners react in an understanding manner regarding coastal wildlife protection from dogs. Some see it as a minor issue and one that should not affect them.

2.4.3 Categories of Perception

Based on the results of these various surveys and social media posts, specific subgroups of dog owners can be identified. There are dog owners who are motivated to walk their dogs off-lead because they highly value the freedom it allows. Another motivation is for the dogs to get better exercise, or for the dogs to have the opportunity to socialize with other dogs. Geographic location is also a factor, in that a beach may be closer and more convenient to travel to than a dog park designated for off-lead exercise. Furthermore, there are four groups of dog owners who walk their dogs off-lead in relation to wildlife knowledge. There are those who (1) are not aware that wildlife is present; (2) know that wildlife is present but prioritize the believed well-being of their dogs more highly than that of the wildlife; (3) know that wildlife is present and care about its conservation, but believe their dogs are well-trained enough to not be a danger to that wildlife; and (4) those who are aware of the wildlife and the dangers that their dog poses but do not care. Each of these groups will have to be approached differently when encouraging them to control their dogs. Demographics sometimes have an impact on the activities of dog-owners, as well. For example, older people tend to be more aware of the importance of managing their dogs and are more likely to establish boundaries (Cimarelli et al., 2016).

2.5 Methods of Public Intervention

Different methods of public intervention can serve to change a social norm and incite human behavior change. These can take many forms and have a variety of approaches to the presentation of information. One common form of public intervention is signage. As stated previously, signage is the most common form of getting information to beach-goers in New Zealand. For that reason, improving the signage is the natural first step to improving overall public knowledge of wildlife protection and leashing regulations. Signs can vary greatly in their effectiveness, based on factors such as placement, message, color scheme, and use of symbols. Therefore, it is crucial to understand the role of signs and how to maximize the effectiveness of each of those aspects. In addition to signage, other means of public intervention are important to employ in order to reach the widest population of people. This could include strategies such as guerilla marketing, social media, community involvement, or any alternative tool that relays information to the target audience. Guidelines for what makes public intervention methods effective are outlined in the following sections. Each of these components will contribute to the goal of increasing the awareness of coastal wildlife and changing the social norm of dog walking on beaches.

2.5.1 Signage on Wellington Beaches

The signage pertaining to dogs on beaches in the Greater Wellington area has many weaknesses that need to be addressed. Figure 4 indicates the dog leashing regulations and observed signage at various sites across those areas, as well as the signage present (Banatoski et al., 2017). The dog signage in the Wellington and Lower Hutt coastal regions is highly variable, in type, number, placement, and message, and an alarming number of signs are incorrect in their information. Thirty-five percent of the sites have signage that does not accurately represent the site's regulations. Fifty-nine percent of the sites have non-uniform types of signs, and eighteen percent of the sites have no signage whatsoever. These inconsistencies may be attributable to the variety of organizations putting up different signs, such as various conservation group and government organizations. Additionally, the signs prohibiting and allowing dogs are often so similar, one cannot quickly distinguish between them. Some of the sites only have signs present on the road leading into the beach parking area and not placed on the beach, and many of the signs are not concise or clear. A common direction used on the signs is to keep dogs "under control,"

yet that phrase is not defined, and different people have different ideas of what a dog "under control" means. Many dog owners define "under control" as obedient, but not necessarily on-lead, while many non-dog owners define "under control" as on-lead (Banatoski et al., 2017). Amending the current signage conditions is an important step to improving the quality and quantity of information to beach-goers about dog regulations.

Site	Dog Regulations			Observed Signage		
	On-Lead	Off-Lead	Prohibited	Total	Types	Correct
Days Beach			X	4	2	Y
Port Nicholson Yacht Club	X			0	0	N
Balaena Bay			X	4	3	N
NIWA	X			2	1	Y
Cog Park		X		2	1	Y
Hataitai Beach	X		X	3	1	Y
Evans Bay			X	3	3	Y
Shelly Bay*				0	0	N
Kau Bay		X		0	0	N
Scorching Bay			X	3	3	Y
Churchill Park		X	X	3	2	Y
Tarakena Bay			X	8	4	N
Lyall Bay		X	X	20	3	Y
Eastbourne		X	X	12	3	Y
Oriental Bay		X	X	6	2	Y
Red Rocks Reserve	X	X		1	1	Y
Island Bay	X	X	X	13	3	N
* Indicates that regulations cannot be found						

Figure 4. Dog signage and regulations in Wellington and Lower Hutt Regions (Banatoski et al., 2017)

2.5.2 Guidelines for Effective Signage

There are various considerations that must be kept in mind when developing effective signage. The first consideration is how to capture the attention of individuals, since signs will not accomplish anything if it they are not read. Aside from the convenience and visibility of signs, one reason a sign may be ignored is because the actions of people around signs are highly programmed. This means that if a common, unoriginal sign is displayed, it is more likely to be overlooked automatically than a unique message because it fades into the unnoticed surroundings of a person. Another reason for a sign to be overlooked is how familiar the person feels they are with the topic. If someone feels as though they already know the rules and therefore the sign is not worth reading, or if they feel like they have already seen the sign and assume they know what it is saying, they are less likely to stop and read it. Capturing the attention of onlookers is the main obstacle in the effectiveness of the signs' messages (Hall et al., 2010).

The use of novel designs and vivid information has been shown to break through the programmed behavior and stimulate attention. Novel designs may involve interesting placement of a sign or creative artistic design (Hall et al., 2010). A clear color scheme is necessary to ensure that a sign is visible and easy to interpret. Symbols are also important to include for quickly conveying information, especially to an audience who is executing routine behavior and failing to read the information (Wogalter et al., 1999). Furthermore, vivid information engages emotions through the use of text, such as appealing to empathy, personal anecdotes, humor, and telegraphic titles (Hall et al., 2010). Clearly stating the desired course of action is important but stating *why* in order to give people an additional incentive is equally as important. An example of this is a sign indicating to turn off the shower when soaping. The sign is more effective when linking this action with the sub-goal of reducing energy consumption (Meis & Kashima, 2017).

A study performed in Yosemite National Park, California U.S.A, tested the effectiveness of signs in persuading the actions of visitors (Hall et al., 2010). Four different sign messages were developed telling people to put their food in food lockers while camping, with the appearance of the sign kept constant (Figure 5). The messages included focus on each of the four types of text, and observational data was taken. It was observed whether 963 passersby ignored, glanced at, or stopped to read the signs of each message. It was concluded that sign location often determines if a sign is read. Empathic and narrative texts were the most effective, but the results were still highly variable. These variations were attributed to inconsistent site and audience characteristics, which seemed to have the largest effect on the effectiveness of sign design, though the study did not test in what way (Hall et al., 2010).

Top 10 Reasons to Put Your Stuff in the Locker 10. The rangers will like you a lot. 9. Avoid being dubbed the "park dunce" by your fellow visitors. 8. No forking out 500 bucks for the window that a bear busted out of your car. 7. Keep bears wild. 6. Have food left for breakfast in the morning. 5. Make your fellow campers way happy. 4. Avoid getting a ticket from a ranger. 3. Keep bears, squirrels, and raccoons away from camp. 2. Avoid the "aromas" that bears can leave behind in your car. 1. Keep bears from drinking all the beer in your cooler.	**Leave it in the Locker--Not in Your Car!** How do you keep your car, truck or van from being mangled by a bear? Don't leave food or scented things in autos. Bears break into cars for canned foods, drinks, toiletries (like sunscreen, soap, toothpaste), or trash. So thoroughly search your car! Store all food and scented things in the bear-proof storage lockers. Lockers are provided for your use and should be kept closed and latched at all times (not just at night)! Protect your property and the lives of Yosemite bears!
My Bear Story A bear broke into my family's car last night. I was real scared. We accidentally left some cans of food, drinks, and trash in the car trunk. The bear made a huge mess of our car. It broke the back window and ripped up the backseat. Bears can sure smell things better than I can. Last we heard, they were tracking him down. It's too bad bears get hurt or killed just for liking our food. Please be sure to put all of your food and smelly things in a locker!	**Attention Humans!** This is our home, and we've been here for a long time, living off natural food. But we're really tempted by your human food. Did you know that we can smell anything with an odor, including canned food, drinks, toiletries (like sunscreen, soap, tooth- paste), and trash? When you don't store these things properly, we might break into your car, a backpack, or an ice chest that's left out. Sometimes we get hurt or killed just for liking your food. Don't help a good bear go bad. Please do us both a favor and store your food and scented items the right way! The Bears

Figure 5. Examples of vivid information on signage, with a focus on humor (top left), a telegraphic title (top right), personal anecdote (bottom left), and empathy (bottom right) (Hall et al., 2010)

A similar correlation was found between the effectiveness of signage and audience characteristics with a study conducted in Australia. Beach-goers were surveyed on their preferences for conservation signage, including what information should be present, where signs should be placed, and what makes a sign catch attention. There was a significant level of variation in perceived effectiveness with different types of beachgoers and how often they visited the beach. The study found that individuals who rarely use the beach believe authoritative content is more effective in signage, while those who use the beach more often react better to emotional content. People who are more involved with conservation issues prefer persuasion over enforcement, compared with those less involved with conservation issues who tend to more often prefer

enforcement. The study concluded that "the different perceptions of beach user groups suggests that target audiences for signs should be specifically identified and prioritized" (Rimmer et al., 2013).

Once a sign has been noticed and read, what an individual does with that information is the most important consideration. An example can be found in a study completed in 2009 regarding tourist interactions with fur seals at the Kaikoura Peninsula in New Zealand. Various signs were present telling viewers to stay at least ten meters away from marine mammals at all times. Three hundred sixty-two tourists were recorded interacting with seals over twenty days, and it was observed that 236 of those tourists had seen the signs while 126 of them had not. The percentage of tourist groups with a member who went too close to a seal was the same whether or not they had seen the signs. This was also true for the percentage of groups with a member who tried to touch a seal, and the percentage of groups who caused a seal to react away (Acevedo-Gutierrez et al., 2009). Unlike the study performed at Yosemite, this research was focused on the likeliness of signage to change behavior, rather than the ability of signage to draw attention. In this case, the signage was shown to cause no difference in compliance, even when it was read and the information was conveyed. While strategies such as appealing to sub-goals or a bright color scheme are useful, no signage alone will be entirely sufficient for changing how the public handles dogs on beaches in relation to wildlife. For that reason, one must consider how to alter the societal norms associated with dog-walking on beaches to inspire more reliable widespread change.

2.5.3 Changing Social Norms

The most significant factor in determining the actions of individuals is the prevalence of social norms. Social norms are expected and accepted standards of behavior within a social group. These norms define what society deems to be acceptable behavior, and therefore there is considerable pressure to conform to them (McLeod, 2008). While inaccurate signage and ignorance of the presence of wildlife may account for some incidents of destructive dog behavior on beaches, prevalent social norms may also be an important factor. For this reason, the best way to promote responsible dog management on all beaches would be to alter the social norms to encourage it (Williams et al., 2009). This would prevent social pressures from contrasting with the needs of coastal wildlife. Social norms are also often closely linked with habitual behavior; an action that is performed because it is a social norm could become habit over time. This suggests

that to change public actions, one must take into account how to disrupt established automatic behaviors.

Social marketing is one method of disrupting these behaviors aligned with the social norm. Social marketing is a way of targeting and influencing behavior for the public good that is efficient and sustainable. Social marketing prompts change in social norms by, for example:

- Showing consequences of risky behavior
- Empowering people to take personal responsibility
- Appealing to an intervener to affect the situation
- Using guerilla marketing tactics
- Engaging people in the conversation

Each of these methods has a different strategy for inspiring change. Showing consequences of a risky or destructive behavior, in this case letting dogs wander off-lead around fragile wildlife, can encourage people to evaluate their actions and see the negative impact they are causing. Empowering people to take personal responsibility poses a challenge, as well as a solution (Hayworth-Perman & Kue, 2015). This is a good strategy because it focuses on the solution rather than the problem and is therefore very positive; people tend to respond better to positive stimuli than negative (Marteau et al., 2012). Asking people to make a pledge and to eat healthy is more effective than telling them to stop eating junk food. Appealing to a bystander to affect the situation is useful because it calls to action more than just the target audience. For example, appealing to beach-goers in general might cause non-dog owners to intervene when leashing regulations are not being followed, even though they are not directly affected by those regulations. Guerilla marketing simply means using a large number of unconventional intervention tools, such as bar coasters, napkins, urinal mats, mirror clings, and any other unorthodox method that might be noticed. This may be more effective than the traditional fliers or radio commercials, since everyone is bombarded with so many that unique advertisements are more likely to be remembered. Finally, engaging people in the conversation, using social media for example, they might be engaging potentially thousands of others in the conversation (Hayworth-Perman & Kue, 2015).

Through their project, the previous WPI team made various recommendations pertaining to education and changing social norms (Banatoski et al., 2017). They created a brochure for people to read at medical offices and veterinary clinics. They wrote a magazine article, and they designed bumper stickers to raise awareness (Figure 6). They even wrote a children's book titled *Mack Goes to the Beach* (Figure 7), which explains coastal wildlife and dog interactions in a kid-friendly way.

Figure 6. Bumper sticker designed by the previous WPI team (Banatoski et. al, 2017)

Figure 7. Book written by the previous WPI team (Banatoski et. al, 2017)

To improve community involvement in the matter, they recommended that a live camera feed be placed inside a nest box, so people could gain an attachment and empathy for this wildlife, increasing their desire to protect it. They also presented ideas for a few community events, and they suggested that volunteers be placed on beaches to try to enforce the leashing regulations (Banatoski et al., 2017). These are all good ideas for raising public awareness and inciting change, however these generalized methods are likely to be more effective if tailored more specifically to different categories of dog owners.

2.5.4 Audience Segmentation

Audience segmentation is "the process of dividing a large audience into smaller groups of people – or segments – who have similar needs, values, or characteristics" ("Audience Segmentation," n.d.). Audience segmentation typically aims to, "minimize within-group differences and maximize between-group differences" (Hine et al., 2014). The tool was initially created to effectively market products to the general public by creating subgroups of people with similar wants, needs, and desires. With that information, marketers would develop tools that would appeal to each segment the most. Typically, researchers create segments by analyzing different categories of information about their target audiences. These would include size of target audience, demographics, knowledge and behavior, psychographics, and other relevant information of the audience ("Audience Segmentation," n.d.). In addition to being used in commercial marketing, audience segmentation has also been used to address politics, public health, climate change, and more. To further drive positive social change, the process of audience segmentation has been combined with social marketing. The ultimate goal of the combined process is not only to target and inform people, but also to encourage beneficial and responsible behaviors while discouraging socially undesirable ones. Successful social marketing depends on understanding the beliefs, motivations, and desires of an audience in order to develop campaigns and intervention methods. These beliefs, desires, and motivations, of course, can be discovered through audience segmentation (Detenber, Rosenthal, Liao, & Ho, 2016).

In the case of dog owners, the category of demographics may include gender, age, occupation, level of education, family status, and neighborhood. The category of knowledge and behavior may include information regarding knowledge of what wildlife is present and whether their dog is a threat, how often they walk their dog on the beach, and their habits in caring for their dog. The category of psychographics, or a person's opinion, values, interests, and preferences, may include why dog owners decide to walk their dogs off-lead, whether they value their dog's freedom over the safety of wildlife, how much they care about their dogs, and their preferences on how to receive information regarding leashing regulations. Social marketing campaigns and techniques will depend on the different segments identified and how these segments respond to the issue of dog-wildlife interactions. The themes found through audience segmentation could build upon the recommendations of last year's WPI team in a way to more effectively target a larger audience.

One possible way to use audience segmentation is to create a multi-axis model. Historically, the multi-axis model has been used to develop several political spectrums and personality types, among others. The dimensions, or axes, of the model are determined by identifying important factors. The dimensions are presented as a range, spectrum, or dichotomy of the factors. From there, the position on the model relative to the axes can define different types or categories. A well-known example of this kind of model is the Myers-Briggs type test, which is used to evaluate personality types. Results are typically used to do things such as determine learning styles, evaluate management skills, and facilitate teamwork and problem solving. People are put into personality types by assigning them to four dichotomies: introversion vs. extroversion, sensing vs. intuition, feelings vs. thinking, and judgement vs. perception. The result of the test is a four-letter personality type, with sixteen possible types (Ford-Martin & Frey, 2015). This same type of model can be used to define categories of dog owners, by determining significant dimensions that differentiate them and placing those dimensions on axes.

2.6 Summary

Reviewing the literature on topics relating to dog-wildlife interactions, the public perceptions of those interactions, and social marketing strategies is a valuable means to define and contextualize the problem that needs to be addressed. It is also a good tool for guiding approaches that will incite behavior change encouraging responsible dog ownership and preventing dog attacks. The public's knowledge and opinions regarding dog-wildlife interactions, as well as their reactions to such interactions, vary greatly. For that reason, they each need to be targeted in unique ways. Many methods of public intervention have been tried and tested, and audience segmentation is a common approach for designing more effective messaging tools. We have developed a detailed method of audience segmentation with regards to dog owners, aimed to help DOC more effectively change the social norm relating to dog management on Wellington coastal areas.

CHAPTER 3: METHODOLOGY

This project aimed to help the New Zealand Department of Conservation (DOC) address the effects that domestic dogs have on shoreline bird conservation efforts. We achieved this by identifying different types of dog owners and tailoring intervention tools towards these categories of dog owners, with the purpose of inducing behavioral change and thus reducing the impacts on coastal wildlife by dogs. To accomplish our goal, we looked to complete the following objectives:

1. Understand the behavior of dog owners on beaches, their beliefs about how to manage their dogs, and their knowledge of coastal wildlife

2. Draw from experts in human-wildlife management to determine characteristics that define the ideal dog owner in a beach environment

3. Identify key dimensions that differentiate dog owners and formulate specific categories of dog owners based on those dimensions

4. Design and develop effective messaging and intervention tools tailored to specific categories of dog owners

To complete these objectives, we used various methods, including surveys, interviews, data analysis, and a focus group. Our approach to meeting each objective through these methods is outlined in this section.

3.1 Understand the behavior of dog owners on beaches, their beliefs about how to manage their dogs, and their knowledge of coastal wildlife

To complete our first objective of understanding dog owner knowledge, opinions, and behavior, we first defined our target population. We chose to focus our study on dog owners who walk their dogs on beaches, and to achieve a diverse and well-represented sample of dog owners, we looked at five different beaches in the Wellington-Kapiti-Porirua region. These beaches encompassed a variety of beach types and represented multiple socio-economic statuses. They were also beaches to which we had the ability to find transportation. The beaches we chose were Oriental Bay and the Wellington waterfront area, Lyall Bay, Ngati Toa Domain, Whitireia, and Paekakariki. A map of the locations of these beaches is shown below in Figure 8. We primarily

used the method of surveying to gather information from dog owners on these beaches, supplemented by coding the qualitative responses we collected.
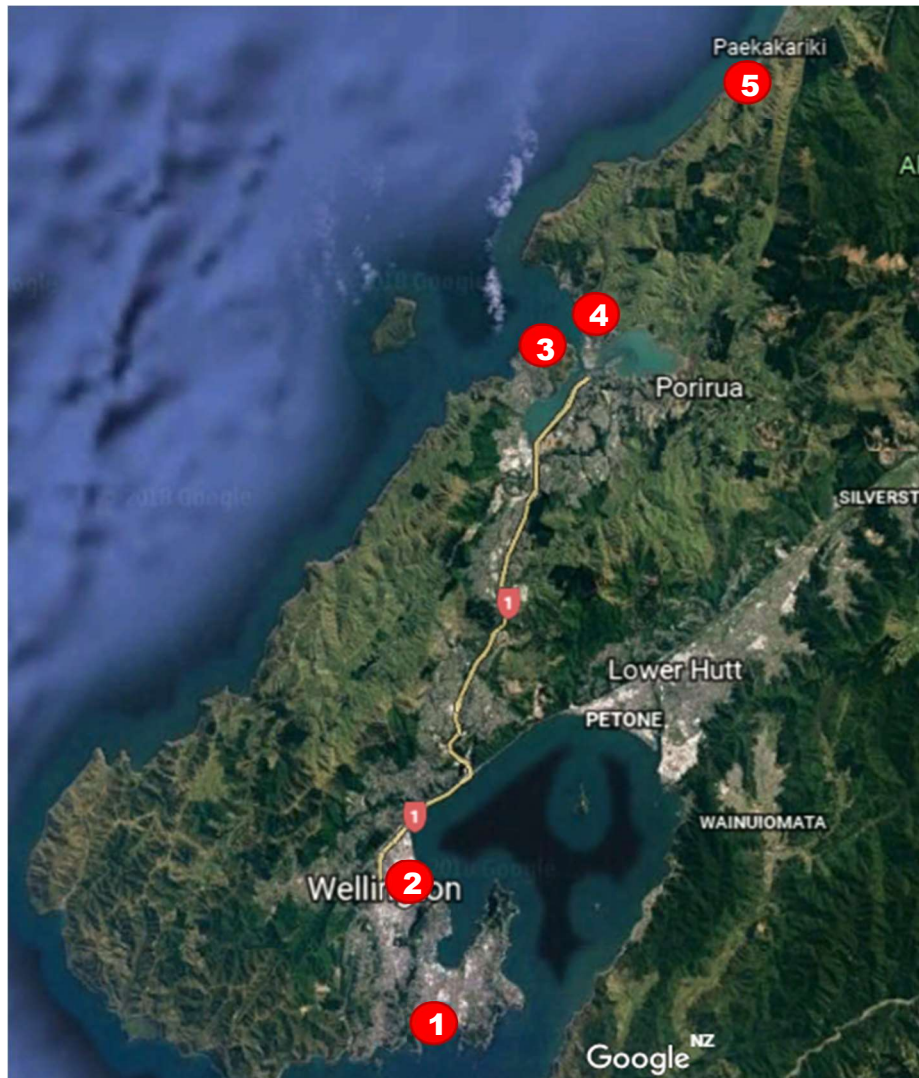

Figure 8. Map of Beach Locations – (1) Oriental Bay/Waterfront (2) Lyall Bay (3) Whitireia (4) Ngati Toa Domain (5) Paekakariki (Google Maps, 2018)

3.1.1 Survey Methods

Surveying is a method that gathers information about certain population groups, including information regarding opinions, insights, experiences, characteristics, and more (Wang et al., 2014). In this project, we mainly gathered data about our primary stakeholder of dog owners. Due to the geographic considerations of our project, we collected data on site at beaches in the Greater Wellington region, and we chose participants through convenience sampling. Our team split into pairs, each pair going to a different beach. This allowed for a greater number of surveys to be

collected simultaneously at varied locations. Additionally, approaching people in pairs made the survey seem less overwhelming to participants. We used Qualtrics, an online surveying tool, to make our survey, and we recorded responses on a phone or tablet through the Qualtrics app. As one team member read questions aloud and recorded the participant's answers, the other team member wrote observations regarding the participant and their dog. This made the surveys more like an interview, because we had the chance to record more detailed information as participants elaborated out-loud on their answers. This was also the method found to typically be preferred, because participants could continue watching their dog or holding a lead without attempting to fill out a physical form. In order to link our observations with the participant's survey responses, each survey was given a unique identification code, which was recorded in our notes. Since our survey was designed to collect information regarding dog owner demographics and psychographics, we asked questions regarding topics such as leashing habits, wildlife observations, the definition of a dog "under control," and knowledge of leashing regulations. The questions were pretested in the field and then modified for clarity of information before the survey was administered on all chosen beaches. The final survey can be found in Appendix B.

3.1.2 Coding

Coding analysis was performed on long answer survey questions once all the data had been collected. This helped us to format the data in a more useful way. Coding is the process of reading through qualitative data in search of themes, ideas, and categories with which similar passages of data can be labeled with a code for easy reference (Gibbs & Taylor 2010). With these codes, passages can be grouped together based on different themes. Our coding process followed Auerbach and Silverstein's (2003) approach. First, we read through the text and identified a repeating idea. We continued to read through the text and highlighted passages that referred to that idea. Once all passages relating to that specific idea had been highlighted, we then repeated the process by choosing another repeating idea to search for. Passages had to be coded in an impartial and consistent manner to make the analysis valid. In order to compile the coded information, we then entered the codes found for each response into Qualtrics according to each response's ID number. This then allowed us to more efficiently cross-tabulate all survey responses, as we will describe in Chapter 3.3.

3.2 Draw from experts in human-wildlife management to determine characteristics that define the ideal dog owner in the beach environment

In order to influence dog owners to manage their dogs responsibly around wildlife, we first had to clearly define what responsible dog management; we needed to determine what the ideal dog owner looked like. This included what knowledge and behavior a dog owner should have on beaches to protect coastal wildlife from any dangers their dog poses. We interviewed experts in human-wildlife interaction to inform the definition of the ideal dog owner behavior. Through these interviews, we gathered information such as the needs of wildlife and the nature of dogs. These interviews also helped to inform and guide our work regarding other objectives.

Interviews are an effective way to gain specific insight from professionals with experience or knowledge in an area of interest. In this case, two volunteers with Forest & Bird's Places for Penguins and four employees of DOC were helpful in determining the dog owner behavior we would work towards effecting. Places for Penguins is a volunteer project that aims to provide nesting sites for little blue penguins. Karin Wiley, the coordinator of Places for Penguins and an expert on the little blue penguin, was interviewed to hear her experience with little blue penguins and observations regarding dog behavior around penguins. Ken New is another volunteer with Places for Penguins who we interviewed; he gives presentations about the instincts of dogs to attack penguins, and he had insight into how dogs must be controlled for penguins to be safe. In addition to volunteers from Place for Penguins, multiple employees of DOC were interviewed. Graeme Taylor is a seabird specialist with DOC, so he gave us information on the risks of dogs around coastal birds and what dog owners should know about those risks. Lee Barry is a community ranger with DOC whose focus is community engagement, and her opinion on the goal for dog owner behavior was informed by her experience dealing with incidents in which wildlife was injured by dogs. We also interviewed Andrew Glaser, a senior ranger with DOC and a protected species detection dog certifier. His experience with conservation dogs and kiwi aversion training was valuable because of his extensive experience with dogs in the conservation field. Finally, Laura Boren, the science advisor for DOC's Marine Species and Threats team, had a unique perspective on the ideal dog owner. She is keenly aware of coastal birds and the threats dogs pose to them, yet she is also the owner of a large dog, so she lent us her opinions on what

makes the ideal dog owner, but from the combined point-of-view of dog owner and conservation expert. Together, these interviews gave us a clear picture of what the ideal dog owner looked like.

We conducted semi-structured interviews with each of these individuals, in which we had a predetermined set of questions according to the interviewee's area of expertise, but also asked other questions as the interviews progressed. The lists of these questions can be found in Appendix D. We took detailed notes during interviews and audio recorded each interview with the permission of the interviewee. While the recordings were not transcribed, we reviewed our notes against the audio recordings to ensure we did not miss important information or misquote any statements. Notes on the interviews can be found in Appendix E. In addition to informing the desired dog owner behavior, the interviews with these individuals also pertained to their experience and advice regarding intervention methods, described in Chapter 3.5.2.

Once these interviews were conducted, we evaluated the notes from each. We used a method of coding similar to the method described in Chapter 3.1.2 with long answer survey responses. Once we had reviewed our notes from each interview, we compiled all the material pertaining to the goal for dog owner behavior. We then divided those notes into categories of common themes. From those common themes, we could list aspects of knowledge and behavior that, according to these experts, every dog owner would have in order to best protect wildlife. This list allowed us to write a detailed description of the ideal dog owner.

3.3 Identify key dimensions that differentiate dog owners and formulate specific categories of dog owners based on those dimensions

As described in the background Chapter 2.5.4, audience segmentation is a social marketing strategy by which a population is divided into smaller, homogeneous groups that allow more targeted intervention methods. We employed this strategy with regard to dog owners in the Wellington area. To divide our audience of dog owners into segments, we had to first define the dimensions, or qualities, that would differentiate those segments. These dimensions informed the axes that the segments would fall between, according to the multi-axis model also described in Chapter 2.5.4. The method we used to evaluate the most significant dimensions was cross tabulation. This labelled multi-axis model then helped us describe the categories that were created.

3.3.1 Cross Tabulation

The analysis method of cross tabulation involves the ability to evaluate patterns between data sets. Other methods of data analysis to understand patterns include regression, correlation, derivatives, and analysis of variance (Michael, 2001). The method of cross tabulation was chosen due to its capability of addressing multiple questions in contrast to one or more, whereas other methods consider individual cases. This was important to our project because it allowed questions to be evaluated against other questions repeatedly. For example, we evaluated how the responses to the question "What size is your dog?" compared to the participants and their response to the question "How much of a threat to coastal wildlife do you perceive your dog to be?" By understanding how small dog owners responded to this question compared to how large dog owners responded to this question, we could understand if there were any significant correlations. This question of "What size is your dog?" could also then be compared with "What beach is this?" and so forth. The application, Qualtrics, which was used to collect survey respnses, provided the functionality of calculating cross tabulations between different survey answers. However, only questions that have multiple choices or matrix tables can be cross-tabulated. For questions that were open-ended in our survey, we had to code and differentiate responses so that they were quantitative instead of qualitative. This then allowed for some of our open-ended questions to be referenced in the cross tabulation. Through this method, we were able to compare our data efficiently and search for correlations between questions, noting if any interesting comparisons were made.

3.3.2 Multi-axis Model

Once we identified the key dimensions that differentiate dog owners, we used those dimensions to create more complete descriptions of different categories of dog owners. To do this, we used the multi-axes model, with each dimension labelling an axis. We could then use the survey questions to place dog owners in quadrants of the model according to their answers to the questions that pertained to each dimension. Once we assigned each dog owner to a quadrant, we could begin to describe the categories in more detail. We used Qualtrics to sort answers according to the questions relevant to each dimension. That allowed us to see how participants who answered those questions one way tended to answer the remainder of the survey. This was similar to the cross-tabulation that we used to identify the key dimensions, but instead of looking for the factors that

made the largest impact, we used those factors to record how they specifically impacted every other question and how those questions were then typically answered. The way the other questions were answered helped us then evaluate what each category looked like.

We also used the notes taken about each participant when they were completing the survey to supplement our category descriptions. We organized the surveys into groups according to their answering of the survey questions and the dimensions identified. Then within those groups, we compared the notes taken detailing our interaction with them and any elaboration they made on their answers. We looked for common themes within those notes; if a common theme was identified, it could be added to our detailing of the category. For example, the notes usually included the participants' handling of their dog as they were speaking to us. If we found that most surveys in a group were paired with participant notes that stated a certain way they were interacting with their dog, that could be included and help present a clearer picture of what that type of dog owner looks like. We ultimately took the data from the survey answers, and augmented by the notes taken, wrote descriptions of each category of dog owner.

3.3.3 Data Mining and Clustering

To evaluate our data with more scrutiny, we used the program Weka version 3.8. Weka is a data mining tool that started development in 1997 at the University of Waikato in Hamilton, New Zealand (Eibe, 2016). The features of this software that are relevant to our project and analysis are Weka's ability to perform association analysis and clustering. The association rules technique mines the data to find combinations of attribute value pairs that appear together frequently in the data, where "frequently" is defined according to a user-provided minimum support threshold. We used this technique to identify groups of questions that were similarly answered by respondents, therefore forming associations within the data. The other data mining technique that we performed with Weka was K-means clustering which looks to locate organically formed clusters within the data set (Trevino, 2016). The K-means algorithm randomly selects K data points within the data. These points are called centroids and the features of each centroid are the basis for each cluster. The remaining data set points are assigned to whichever centroid most closely related based on a given distance metric. The distance from which the point is from the centroid is considered the error of the data point (Trevino, 2016). The sum of the squared errors of all the data points indicates close data points are in the cluster. The higher the sum of squared errors, the further all the data

points are from their corresponding centroid, therefore the less organic the clusters are. These two techniques help to understand some of the patterns found in the cross tabulations and the multi-axis model. While the Weka results are not primary sources of patterns in our findings, they serve as supplemental information and verification.

3.4 Design and develop effective messaging and intervention tools tailored to specific categories of dog owners

In creating public intervention methods intended to keep wildlife safe from dogs, our final step was to brainstorm, design, and refine specific public intervention ideas. To accomplish this, we determined the information required in the intervention methods by comparing each category to the ideal dog owner and by assessing the risk of their behaviors. We gathered advice for effective intervention methods from more expert interviews, and we brainstormed using rapid ideation. We lastly evaluated the validity of the intervention ideas using a design matrix, as well as input from a focus group. These methods all assisted in developing our final recommendations.

3.4.1 Reaching the Ideal

Before brainstorming intervention methods that were intended to relay information and incite behavior change, we needed to establish what the information was that we needed to relay. Each category of dog owner had a unique level of knowledge, whether that be of wildlife, leashing regulations, or the nature of their dog. The purpose of the intervention methods was to bring each category of dog owner closer to what was determined to be the "ideal" dog owner, outlined in Chapter 3.2. In order to achieve this, we had to find what knowledge in each category was missing, and what behavior needed to be changed. We compared the descriptions of each category with the description of the ideal dog owner and identified what each category still needed to know; this would then advise what content would need to be included in the intervention methods for each category. Furthermore, we compared the behavior of each category to the ideal dog owner to determine how the behavior of dog owners within those categories needed to change. That would then serve to inform the message related to behavior that would be portrayed in the intervention methods. This comparison to the ideal would also advise any other changes that needed to be inspired by the intervention methods concerning each category.

3.4.2 Risk Assessment

Risk assessment matrices were used to determine the risk associated with different behaviors. A matrix comparing the likelihood and the severity of a threat is used to classify how much of a risk each behavior poses. By using a risk matrix and breakout to evaluate behaviors of dog owners, we prioritized the threatening behaviors to target. Using the ideal dog owner as a model, we could then determine what replacement behavior would lower the risk. This was helpful in brainstorming what types of information needed to be relayed using intervention methods.

With the help of Laura Boren from DOC, we defined the meaning of Insignificant, Minor, Moderate, Major, and Catastrophic levels of danger. An Insignificant level of danger means that the possible consequence of the corresponding behavior is a bird moves location but remains unaffected; a Minor level of danger relates to a more significant behavior change, such as a bird constantly changing location or becoming agitated; a Moderate level of danger relates to a behavior that causes injury or prohibits the function of a nest to reproduce; a Major level of danger is when a behavior results in death; and lastly a Catastrophic level of danger relates to multiple wildlife deaths. We listed several possible behaviors that each of the dog owner categories could perform, and although it was impossible to predict every possible behavior that would introduce risk to coastal wildlife, we chose behaviors that were the most common. We then listed a possible consequence of each behavior regarding wildlife. Based on the definitions listed above, we were able to classify that consequence as a certain level of danger. Paired with the likelihood of the behavior to occur, an estimation we made based on our own observations of dog owners at beaches, we were able to use the chart in Figure 9 to assess the risk of that behavior. An example of a risk breakout for a certain behavior is shown in Figure 10. The color highlighting the boxes specified for "Likelihood" and "Level of Danger" in the breakout indicates the risk level of that likelihood and level of danger according to the table. Blue indicates negligible risk; green indicates low risk; yellow indicates medium risk; orange indicates high risk; and red indicates extreme risk. The higher the risk, the more important it was for us to address the behavior in our intervention methods.

	Consequence				
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Low	Medium	Medium	High
Rare	Negligible	Low	Medium	Medium	High
	Insignificant	Minor	Moderate	Major	Catastrophic

Figure 9. Risk Assessment Matrix

Behavior	Possible Consequence of Behavior	Likelihood	Level of Danger	Desired Replacement Behavior
Dog walks out of owner's line of sight	Dog finds and animal and kills it	Possible	Major	Owner keeps dog in sight

Figure 10. Risk Assessment Breakout Example

3.4.3 Expert Interviews

As mentioned in Chapter 3.2, expert interviews were conducted to gather advice and suggestions for developing intervention methods, in addition to defining the criteria for an ideal dog owner. While only some of the expert interviews we conducted were intended to gather information about the ideal dog owner behavior, every expert we interviewed had useful input and

suggestions for intervention methods, based on their opinions and experience. A complete list of the individuals we interviewed, and their credentials is located in Appendix C.

3.4.4 Brainstorming Intervention Methods

Once the knowledge gap and desired behavior changes were established for each category, we began brainstorming possible intervention methods for these categories. The expert interviews served as inspiration and guidelines for our brainstorming. We used the technique of rapid ideation to come up with intervention method ideas. Within twenty minutes, each group member wrote down all the intervention methods that we could think of. We then compared where our ideas were similar and how many of us suggested the same ideas. Then, we used the process of circle sketching to refine the identified ideas in the rapid ideation step. This process involves each person starting with a basic idea and then every two minutes rotating who has the paper in front of them; as the paper rotates between team members, they add features and thoughts that they have on that specific idea. Through these two methods, more refined and creative ideas were found.

3.4.5 Rank Ordering

Once we had compiled a selection of possible intervention methods, we used a design tool called rank ordering to narrow down the methods that would be the most feasible. This technique uses a matrix with values across the top and the same values reflected across the side. Numbers are assigned to the intersections of these values to determine which values are the most important in the design matrix. If a value on the side is more favorable than the one on the top, then a "1" is assigned to the box; if the value on the side is less favorable than the one on the top, then a "0" is assigned to the box. If they are equal, a "½" is assigned to the box. The total values at the ends of the columns indicate the reliability of the value as a design characteristic.

We used the values determined by this rank ordering to develop our design matrix. Once ideas have been brainstormed, a design matrix can help to select the most effective solution. The rank ordering matrix defined the values and weights associated with characteristics and was used as the y-axis of the design matrix. For example, characteristics such as affordability, scalability, and ease of upkeep can be compared with their weights from design to design and scored using a design matrix. The design with the highest score ends up being the most effective solution for the

specified group of people. Figure 11 is an example of what a design matrix might look like. This helped us narrow down the intervention methods we would proceed to develop and design.

	Idea 1	Idea 2	Idea 3	Idea 4	Idea 5
Characteristic 1 (.75)	1	2	3	4	5
Characteristic 2 (.5)	5	4	3	2	1
Characteristic 3 (1)	2	1	3	5	4
Total	5.25	4.5	6.75	9	8.25

Figure 11. Design Matrix Example

3.4.6 Focus Group Methods

Focus groups are a research method where researchers organize, monitor, and record a group discussion about a specific topic to understand social norms, verify or extend data collected through other methods, and understand group narratives (Chadwick et al., 2008). In our project, we used a focus group to receive feedback from dog owners about the recommendations we developed in order to give us the opportunity to refine them or alter them accordingly.

Our focus group was comprised of our primary stakeholder of dog owners, with four participants. In order to recruit participants, we explored many different ways of contacting our stakeholders of interest. We reached out to dog interest groups such as Walkies!, a social network in Wellington for dog owners and enthusiasts to meet up and walk their dogs together. Additionally, we reached out to Titahi Bay Canine Obedience Club, a dog-training club in Porirua. Posting on the Facebook pages of Dog Lovers of Wellington NZ and Dog Lovers of Porirua was another tactic of recruiting participants, and this is where we received the most interest. Targeting these organizations for focus group participants ensured that the focus group would consist of enthusiastic dog owners and dog lovers, which was our intended focus group demographic. The focus group was held in a neutral location, the Titahi Bay Obedience Club, in order to ensure the comfort of the participants. We had two members of our group moderate the discussion of the focus group and ask the questions outlined in Appendix I. The remaining two group members took notes on the discussion. The discussion was also recorded, with the permission of the participants, and it was reviewed later to ensure the notes were accurately representative of the content. After the focus group occurred, the feedback was compiled and applied to our designs to produce our final recommendations.

CHAPTER 4: RESULTS & DISCUSSION

This chapter presents the data we collected and the results we obtained by applying the methods outlined in the previous chapter. We thoroughly describe the survey results, indicating the overall level of knowledge, typical behavior, and common opinions of dog owners on beaches. We also display the information gleaned from expert interviews in relation to both dog owner behavior and effective intervention methods. Additionally, we analyze the survey results and present the categories of dog owners determined by that analysis. Lastly, we present the intervention methods that we developed by applying group brainstorming techniques and design methods that leveraged the results of our analysis of survey, and interview data.

4.1 Understand the behavior of dog owners on beaches, their beliefs about how to manage their dogs, and their knowledge of coastal wildlife

Our first objective was completed by applying observation and survey methods. The information obtained through these methods informed us on dog owner behavior, habits, and knowledge, as well as helped us explore how these aspects might be affected by the type of beach that a dog owner visits. Beach observation and profiles, as described in Chapter 4.1.1, were first made to get a baseline understanding of the project's five beaches. Chapter 4.1.2 highlights the main findings of our survey, and touches on the demographics, behaviors, habits, motivations, and knowledge of dog owners surveyed.

4.1.1 Beach Observations and Profiles

Over the first two weeks of our project, we researched and made observations on our beaches of interest – Lyall Bay, Oriental Bay/Waterfront, Ngati Toa Domain, Whitireia Park, and Paekakariki, as shown in Figure 8. To start, we had to understand the leashing regulations at each site, as well as where the information on those leashing regulations can be found. In general, most information about leashing regulations was available on city or regional council websites and on signage posted at each beach. Additionally, general observations were made, such as the atmosphere of the beach, the wildlife present, and the frequency of dog walking.

Lyall Bay Beach is located in the Lyall Bay suburb of Wellington, and it is directly west of Wellington International Airport. The beach is split into two sections: one that is a dog off-lead area and one where dogs are completely prohibited. There is a playground in the prohibited area, which is about 200 meters from where the off-lead area begins. The off-lead area starts opposite of 30 Lyall Parade and continues until the airport end of the beach. This information was readily available on the Wellington City Council website, both in text and as maps. A map of the beach's dog exercise area can be seen in Appendix F, along with maps of the other beaches. Information on leashing was also available on signage posted on the beach. Signage marked where dogs were allowed, where dogs were prohibited, and where the beach changes from prohibited to off-lead. Examples of posted signage can be seen in Figure 12 below. This beach seemed to be the busiest of the five, with high numbers of dog owners present consistently throughout the day. Examples of the wildlife observed included red-billed gulls, black-billed gulls, and dolphins.

Figure 12 . Signage on Lyall Bay Beach

Oriental Bay Beach and the waterfront area are located in the Oriental Bay suburb of Wellington and in close proximity to the Central Business District on Wellington Harbour. This area includes Oriental Bay Beach, Freyberg Beach, and the public areas near those beaches. As shown in Figure 13, Oriental Bay Beach is an off-lead area between May 1st and October 31st, and it is a prohibited area from November 1st to April 30th. The Freyberg Beach portion of the area is a prohibited area, with no dogs allowed on the beach at any time of the year. As for the public waterfront areas, the Wellington City Council dictates that dogs must be on-lead at all times of the

day and throughout the year when walked through the central city (Wellington City Council, 2016c). These beach areas each had signage pertaining to their leashing regulations. An example of the sign type is shown in Figure 13. Because of the busy nature and restrictions on dogs in this area, this area appeared to have a lower density of dogs compared to other beaches.

Figure 13. Signage on Oriental Bay Beach and Waterfront Area

Ngati Toa Domain is a reserve in the Mana suburb of Porirua City. This reserve has a sports and recreation side, a shore area, and a campervan parking area. The park is off-lead in the foreshore, while the sports fields are on-lead or prohibited when there is a public event at the site. This information is available on the Porirua City Council website. On site, however, the signage available was not as clear about the leashing regulations. The park itself had a sign related to leashing regulations, although the message was not very clear, as shown in Figure 14. For the beach portion of the park, there was no signage posted indicating leashing on the beach. This beach appeared to not be as busy as other beaches, such as Lyall Bay. We observed non-coastal wildlife such as Australian magpies, as well as coastal wildlife, like various species of gull and variable oystercatchers.

Figure 14. Signage at Ngati Toa Domain

Whitireia Park is another reserve in Porirua City. This park is located in the Titahi Bay suburb of Porirua, and it contains tracks near the shore as well as through grasslands and native bush. The park is generally open between 6AM and dusk. This park allows dogs to be walked off-lead in most areas, with Onehunga Bay, located near the carpark, being the exception. At Onehunga Bay, dogs must be walked on-lead. At any other areas of the beach, dogs may be off-lead, provided that they are under control and in sight. A map of the park is shown in Figure 15 can be found in Appendix F. Information regarding leashing regulations were available through the Greater Wellington Regional Council website. Additionally, the park has regulations well-posted, with regulations available on signage placed at car parks and along tracks, shown in Figure 15 and Figure 16, respectively. This park was well-frequented by dog owners and non-dog owners alike.

Figure 15. Signage at Whitireia Park Car Park

Figure 16. Signage Posted along Tracks at Whitieria Park

The last beach explored was Paekakariki Beach, located in Paekakariki, Kapiti Coast District. The beach begins just south of the Ames Street Reserve, and it continues up into Queen Elizabeth Park. The leashing regulations on this beach vary by location and by time of year. During the summer, most of the beach is designated as a dog on-lead area between the hours of 10AM and 7PM. In the winter, however, most of the beach is an off-lead dog area during all times of the day. This information was available through the Kapiti District Council website. Information was also presented on signage posted near beach entrances, as shown in Figure 17. The posted signs were inconsistent, as they were located at some beach entrances but not all. Given that this was such a long stretch of beach, information was difficult to find, and we had to actively search for signage on the beach at different entrances and locations. This beach was also well-used; however, this was only during hours when there were no restrictions on dogs. High densities of dog owners were present before 10AM and after 7PM, with fewer dog walkers present on the beach between those hours. In terms of wildlife, birds such as species of gulls, dotterels, variable oystercatchers, and others were present.

Figure 17. Signage at Paekakariki Beach

4.1.2 Survey Results

Over three weeks of surveying dog owners on the aforementioned beaches, we collected 103 survey responses. This includes twenty from Oriental Bay/Waterfront, nineteen from Whitireia, nineteen from Paekakariki, sixteen from Ngati Toa, and twenty-nine from Lyall Bay. Since all the survey questions were voluntary, not all respondents chose to answer each question. Therefore, the statistics that we report reflect only the responses that we were able to collect.

The survey questions, as shown in Appendix B, are grouped into three categories: demographics of the dog owner, information about the owner's dog, and the dog owner's knowledge. By analyzing survey results of each of these categories, we were able to understand the behavior of dog owners on beaches, their beliefs about how to manage their dogs, and their knowledge of coastal wildlife. Results from key demographics questions are shown in Figure 18 and Figure 19.
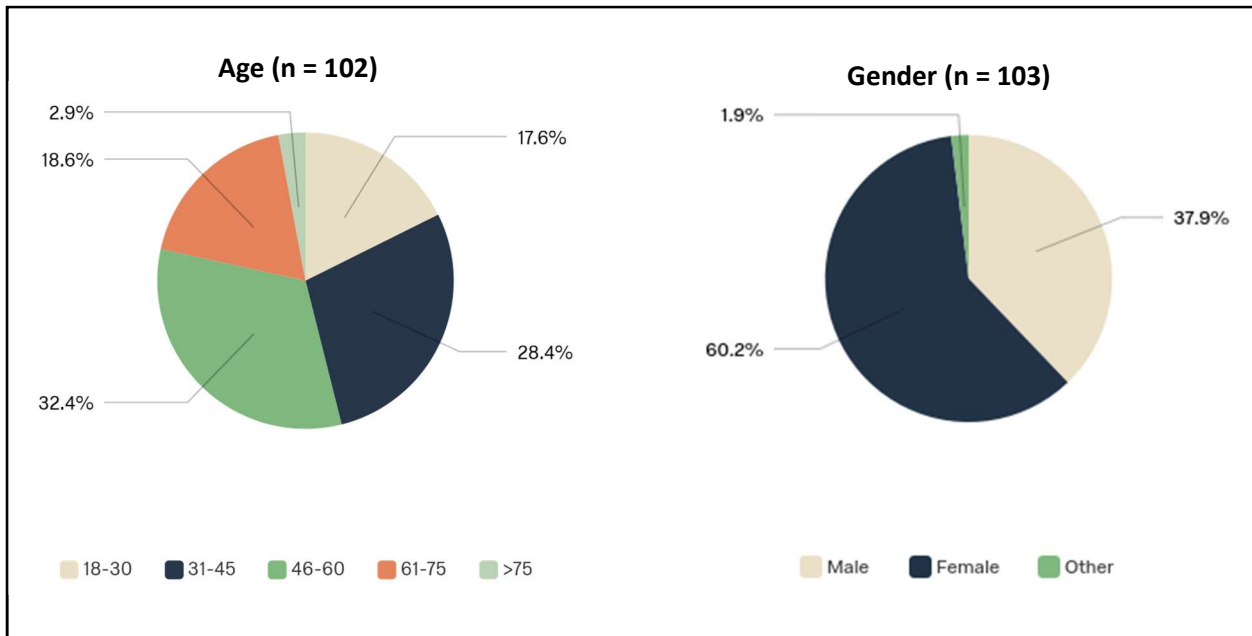
Figure 18. Graphs depicting the age and gender of survey participants
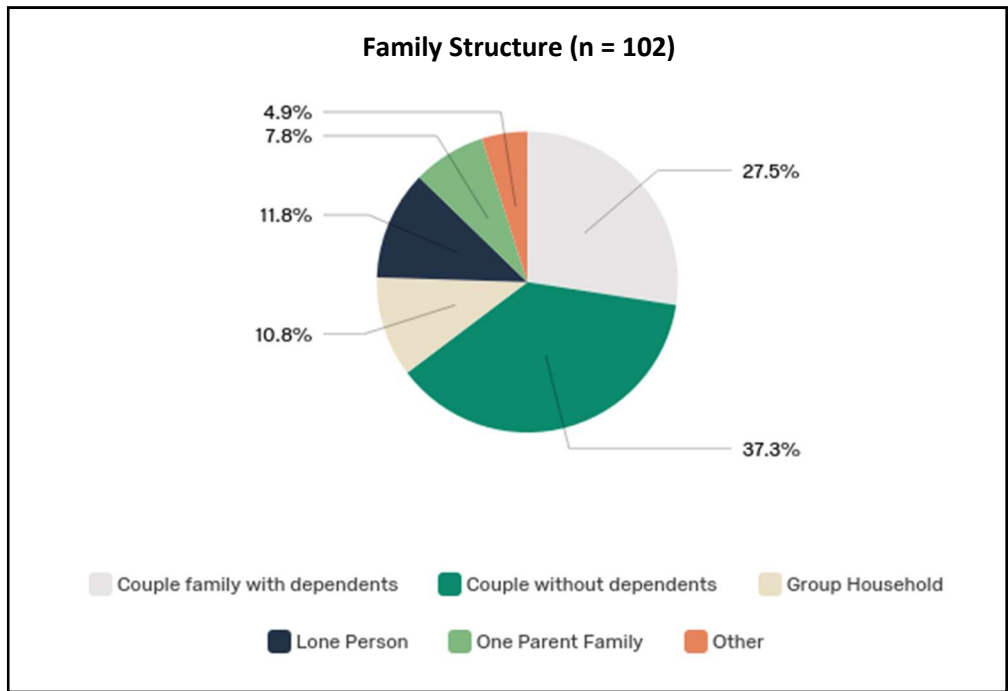
Figure 19. Graph depicting the family structure of survey participants

Additionally, of the 103 participants, 97.1% were from the Greater Wellington Area. These results show that participants of the survey represented a wide range of people in the targeted Greater Wellington Area.

The second category of questions included in the survey asked about the participant's dog, such as their behavior and background. The results of three of these questions are shown in Figure 20 through Figure 22.
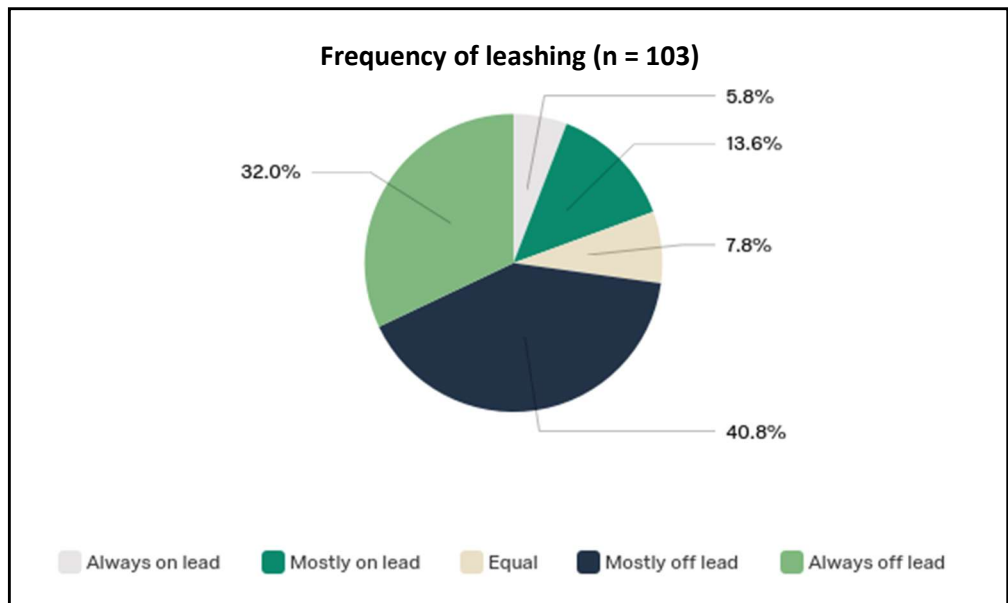
Figure 20. Graph of survey responses regarding frequency of leashing
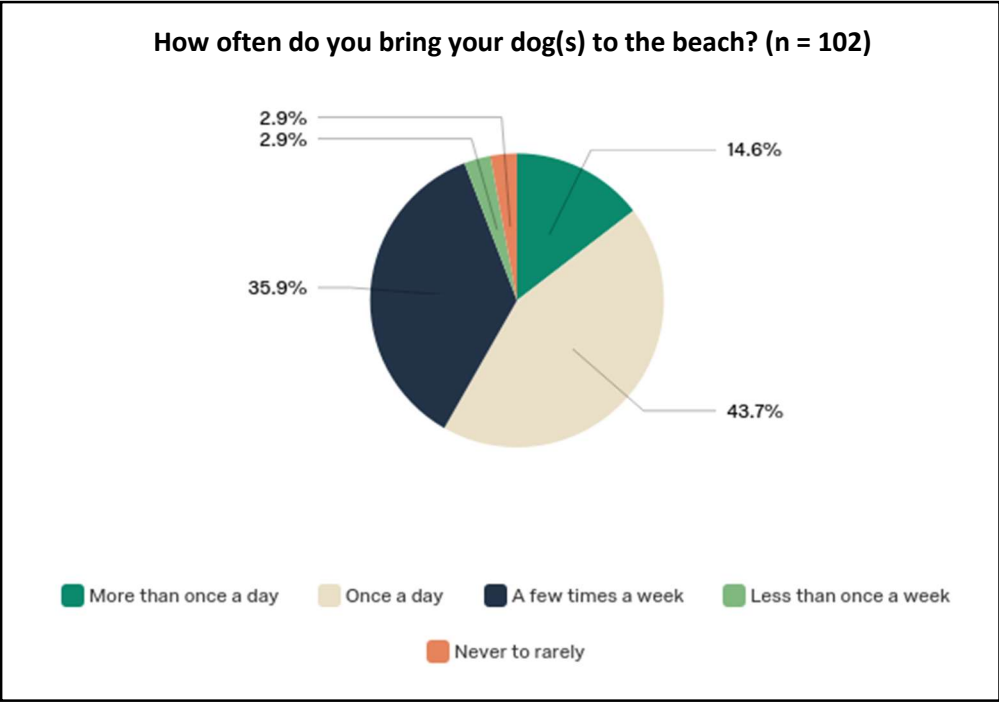
Figure 21. Graph of survey responses regarding frequency of beach visitation
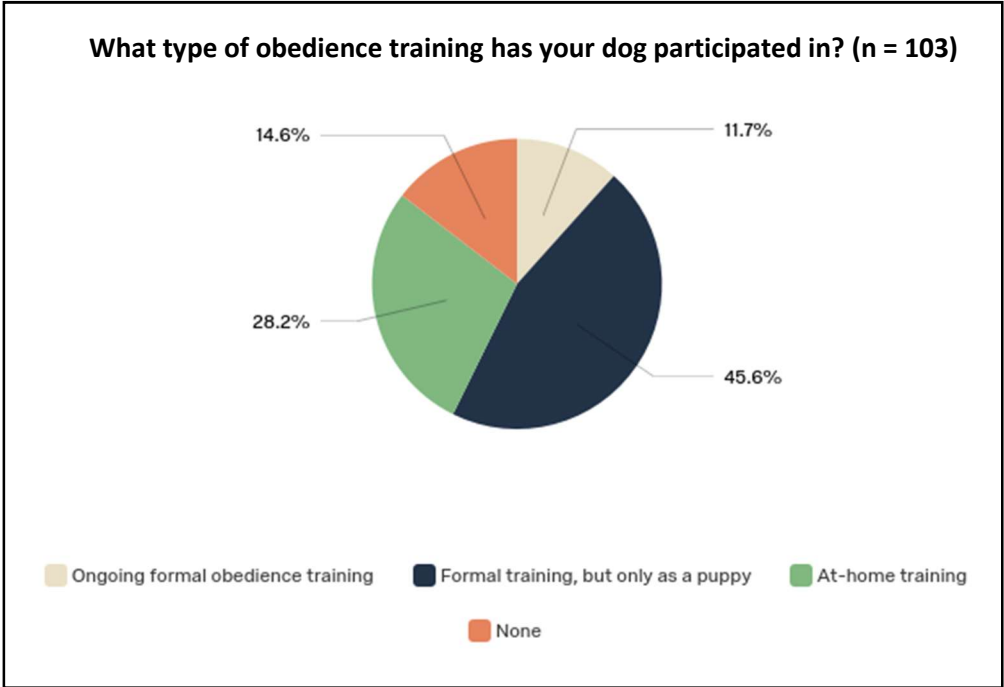
Figure 22. Graph of survey responses regarding level of obedience training

As shown by Figure 20 and Figure 21, we found that most dog owners let their dog off-lead when at the beach and most bring their dog to the beach at least once a day. Dogs who are off-lead at the beach are usually more of a threat to coastal bird species than those on-lead, because they can wander far from their owner and disrupt or injure a bird without the knowledge of the owner. This type of behavior can be avoided if a dog is well-trained; however, many dog owners indicated that their dog has not gone through formal obedience training (Figure 22), which often indicates that the dog is not well-trained. These results show that the behavior and history of most of the dogs belonging to the owners we surveyed have the potential to be a high risk to coastal wildlife species.

The third category of questions that were included in our survey pertain to a dog owner's knowledge and opinions. Questions such as "What wildlife have you seen on this beach?" and "Do you know the leashing regulations of this beach?" gave us an idea of how knowledgeable owners were regarding their surroundings. Other questions such as "What are some of the benefits of walking your dog(s) off lead?" and "How much of a threat to coastal wildlife would you perceive your dog(s) to be?" allowed us to understand what motivates certain dog owner behavior. Answers to some of these questions are shown below in Figure 23 through Figure 25.
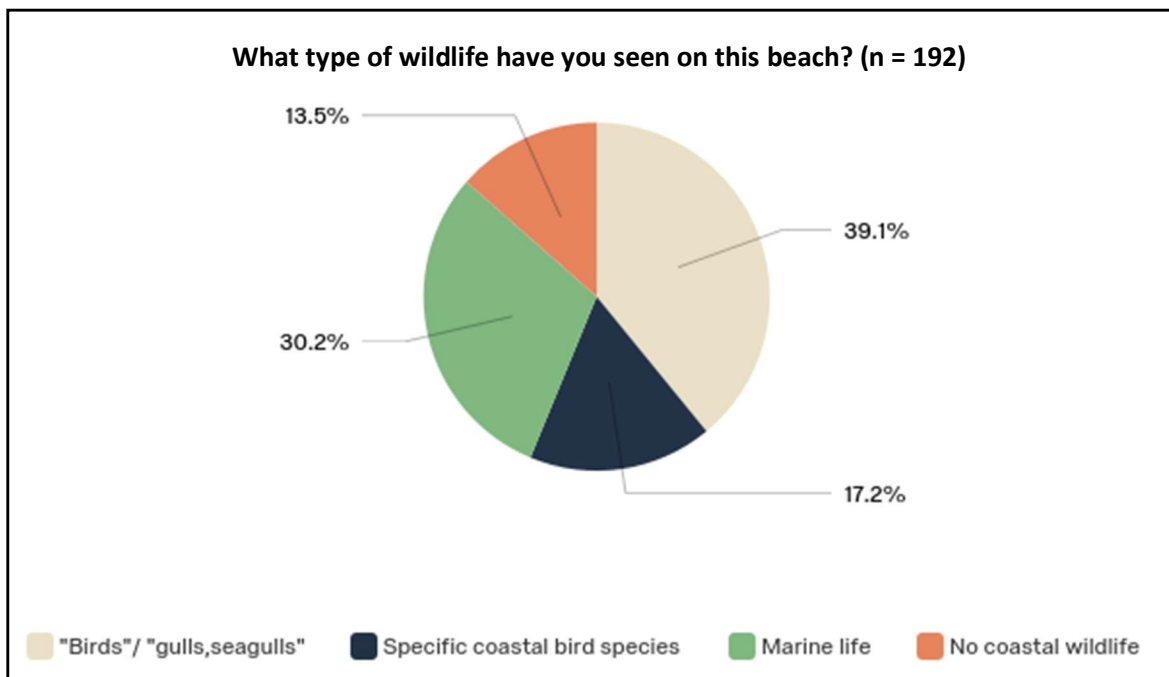
Figure 23. Graph of survey responses regarding wildlife observations

What are some of the benefits of walking your dog(s) off lead? (n = 168)

9.5%
11.3%
26.2%
18.5%
34.5%

Exercise Socialization Dog well being Happiness of owner

Easier off lead/ dog better off lead
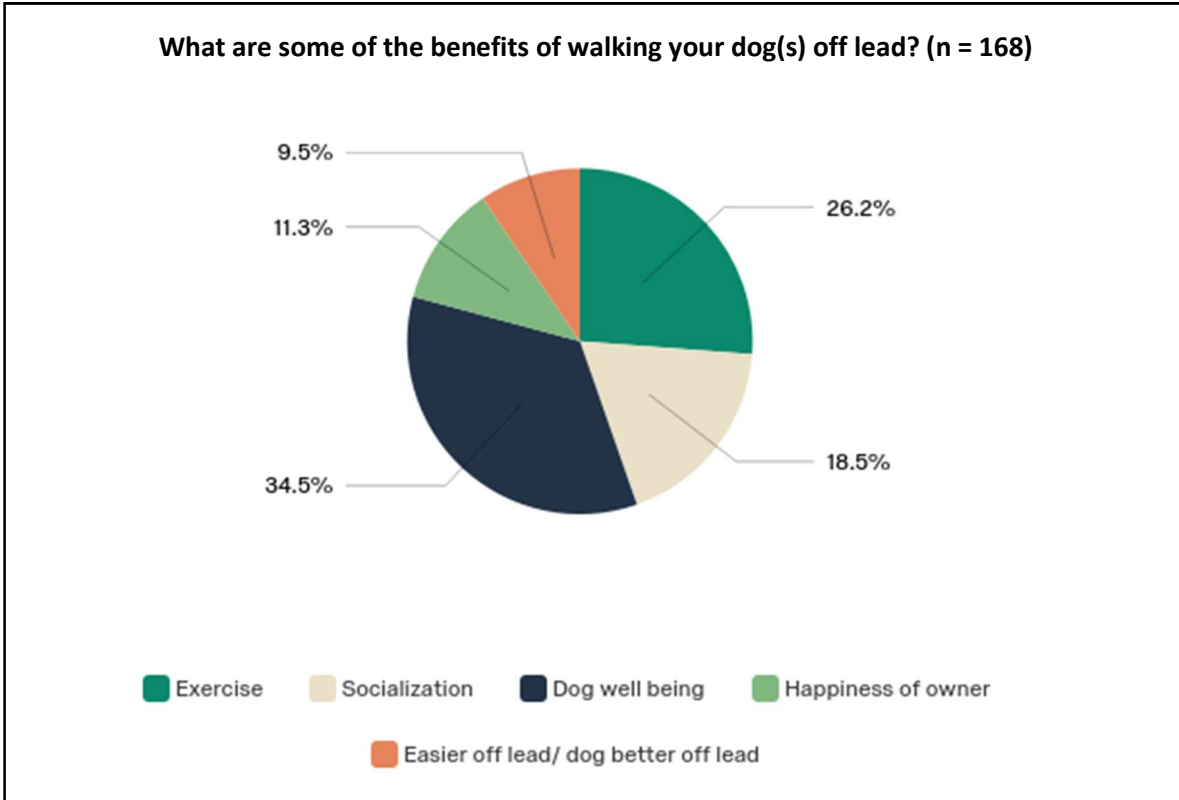
Figure 24. Graph of survey responses regarding off-lead benefits

How much of a threat to coastal wildlife would you perceive your dog(s) to be? (n = 102)

1.0%
1.0%
7.8%

25.5%

64.7%
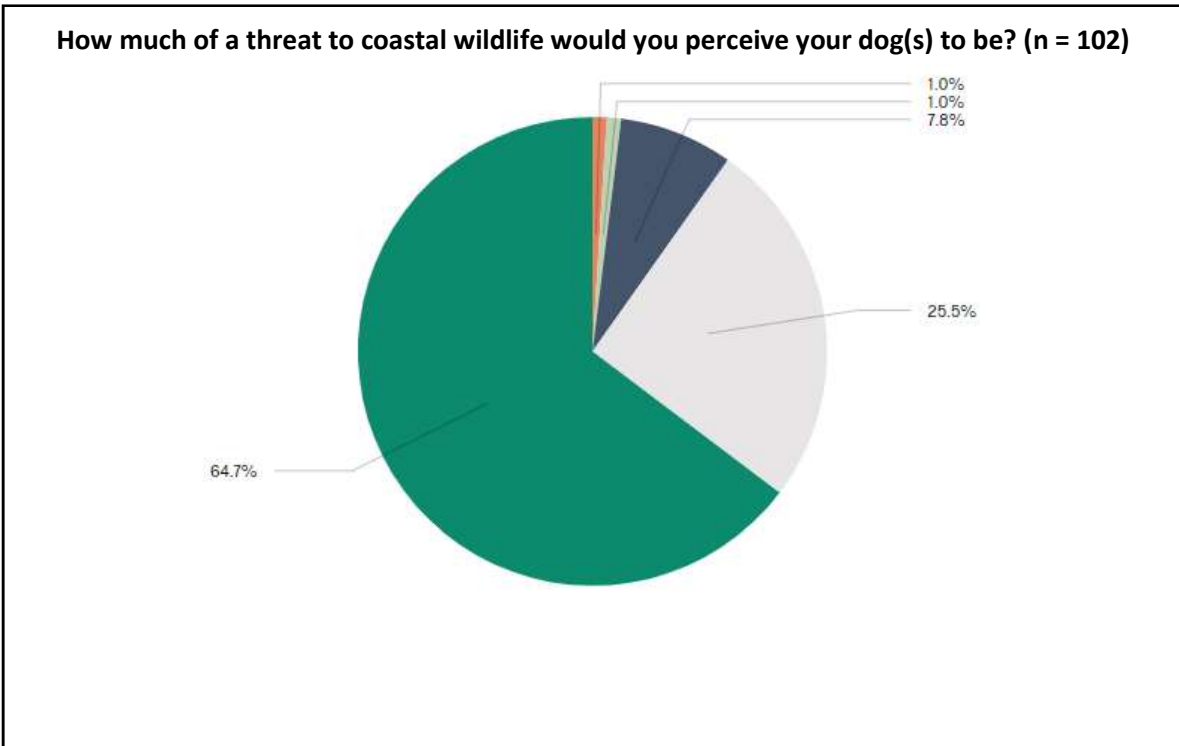
Figure 25. Graph of survey responses regarding perception of dogs' threat to wildlife

Both questions "What wildlife have you observed on this beach?" and "What are some of the benefits of walking your dog(s) off lead?" are open-ended. This allowed participants to choose their answer on their own rather than be led to think a certain way by answer choices. To make these responses quantitative data, each response was coded, as described in Chapter 3.1.2, and entered into Qualtrics. For this reason, the number of responses to these questions was larger than the sample size of 103, because some participants listed multiple codes in their answer. By using the codes outlined in Appendix G. we were able to see that most participants were aware of the coastal bird species and considered them part of wildlife, as shown in Figure 25. We also determined that most people let their dog off-lead for their dog's well-being. In addition, it was found that participants were also reluctant to understand that their dog is a threat to coastal wildlife.

By analyzing our survey results, we were able to find the typical behavior and knowledge of dog owners of different demographics in the Greater Wellington region. In doing so, we could begin to assess what aspects of dog owners needed to be addressed in order to ultimately decrease the risk that their dogs pose to coastal wildlife species.

4.2 Draw from experts in human-wildlife management to determine characteristics that define the ideal dog owner in a beach environment

In order to describe the knowledge and behavior associated with the ideal dog owner with respect to wildlife, we conducted seven expert interviews on this topic with individuals experienced in conservation and human-wildlife management. Based on the information obtained from those interviews, the description of the ideal dog owner is outlined in this section. Chapter 4.2.1 describes the knowledge associated with the ideal dog owner, and Chapter 4.2.2 describes the behavior associated with the ideal dog owner.

4.2.1 Ideal Dog Owner Knowledge about Coastal Wildlife

Experts most often mentioned knowledge of wildlife as an important aspect of ideal dog ownership. Three experts mentioned that knowing specific things about the species that could be present on beaches and the locations they are typically found is important for avoiding them. While the knowledge of wildlife is not necessarily enough to inspire behavior change, people cannot avoid what they do not know is there. Three other experts also stated that it is important for dog

owners to know the true level of danger that their dogs pose to wildlife, since dogs are natural predators, any sized dog is a threat to wildlife. Even the most well-trained dog can behave unpredictably around the smell of penguins.

Apart from the knowledge of wildlife, it is also crucial for dog owners to understand the character and limitations of their own dogs. Two experts highlighted that dog owners must know their dogs' tendencies and level of training. If a dog is not well-trained enough to obey commands when off lead, the owner should be aware of that and therefore keep their dog on lead. They should be able to identify situations where their dog might be uncomfortable or react poorly to avoid them. Additionally, they should know the likely reaction their dog will have in those situations. If placed in a less than ideal situation, the dog owner should know how to minimize the risk their dog poses to wildlife, prevent incidents, and manage their dog in an appropriate manner. They should know how well their dog socializes with other dogs and other humans.

4.2.2 Ideal Dog Owner Behavior

Knowledge combined with the corresponding behavior has the potential to be significantly more impactful than either of the two alone. Dog owners need to act on the information that they have been taught. The most prominent idea that arose from expert interviews was that dogs must be well-trained and respond to commands; this was talked about specifically by four experts. A dog must obey their owner in all circumstances, even in situations with a lot of other stimulation for the dog and contrary to its own desires. In order to accomplish this, Andrew Glaser, a DOC Senior Ranger of biodiversity, stated that repeat training is important, since a dog can neglect training that was done only once or only when the dog was a puppy. He also stressed the importance of dog owners reacting to their dogs' actions with the proper level of positive and negative reinforcement. The dog's training must be paired with an owner who knows how to properly manage their dog, most importantly, since the owner is the one giving commands. A dog that is on-lead should also be well-trained and obey its owner, since a dog on-lead does not mean that it is under control. Ken New from Forest & Bird's Places for Penguins stated that a dog that is on a lead, but not under full control, could detect a penguin off the path and lunge to kill it before its owner had time to react and prevent it. A large dog walking on-lead often still has the capability to pull the owner while walking or break the grip on the lead by the owner if it is strong and determined to sniff out wildlife or explore its surroundings.

Training is only useful if the owner can give commands that protect the dog and the wildlife that may be present in their surroundings. Laura Boren, a DOC Science Advisor, described how a dog owner must be aware of their dog and their surroundings, including possible distractions that could cause the dog to react. This involves having the dog always in sight and the owner being actively engaged in the action of walking their dog. For example, if a bird is present on a beach, the owner should be aware and able to direct their dog away from the bird.

A dog owner should not hesitate to put their dog on lead at the appropriate time. Ken New pointed out that dogs are supposed to be on lead in public areas unless there is signage stating otherwise. In addition, dog owners should leash their dogs when wildlife is present. This means dogs should be on lead if the owner sees wildlife that their dog could be a danger to, or if signage is present indicating that vulnerable wildlife is in the area, such as penguins. Most importantly, a dog owner should follow the dog-related regulations of the area, whether that includes leashing a dog or not bringing a dog at all. If an incident does occur, or if they come across injured or dead wildlife, dog owners should report it immediately to the DOC hotline listed online and many beach signs. Figure 26vsummarizes the aspects of dog owner knowledge and behavior that are ideal.

Knowledge	Behavior
What wildlife is present on beaches	Train the dog well so it responds to commands
Where on beaches to avoid because wildlife is likely present	Repeat train the dog so the training is maintained
The true level of danger dogs pose to wildlife	Stay alert to the dog and surroundings
The personality and limitations of the dog	Avoid wildlife and possible distractions
The dog's level of training	Put the dog on lead when appropriate
How to react if wildlife is encountered	Obey all leashing regulations
	Report incidents to DOC

Figure 26. Summary of the Ideal Dog Owner

4.3 Identify key dimensions that differentiate dog owners and formulate specific categories of dog owners based on those dimensions

This section discusses analyzing cross tabulations of survey responses. These results were used to create a Dog Owner Model with two axes: awareness and behavior. This model was then used to create categories of dog owners.

4.3.1 Cross Tabulation and Clustering

As elicited from our expert interviews, the ideal dog owner can be identified using two dimensions: knowledge and behavior. To understand dog owners other than the ideal, we analyzed responses of the survey questions that targeted these characteristics. For example, questions that asked dog owners about their knowledge of their surroundings and how much of a threat to wildlife they perceive their dog to be gave us some insight into an owner's awareness. When we cross-tabulated responses to these survey questions, we were able to identify some interesting patterns.

As shown in Figure 27, the less a dog owner perceives their dog to be a threat to coastal wildlife, the less aware they are to the different types of coastal wildlife present on the beach. Dog owners who believe that their dog is not at all a threat to coastal wildlife had the highest percentage of owners who could not identify any coastal wildlife on the beach. Meanwhile, all of the dog owners who believe their dog is a moderate to wildlife were able to identify some type of coastal wildlife, and this category had the largest percentage of dog owners who could identify specific coastal bird species. This cross-tabulation result shows that if a dog owner is knowledgeable of different wildlife, they are typically aware of what threat they and their dog pose to wildlife. For the question "How much of a threat to coastal wildlife do you perceive your dog to be?", only one participant answered that they believed their dog to be "a lot" of a threat, and only one participant believed their dog to be "a great deal" of a threat, therefore those answers were omitted from the cross tabulation.
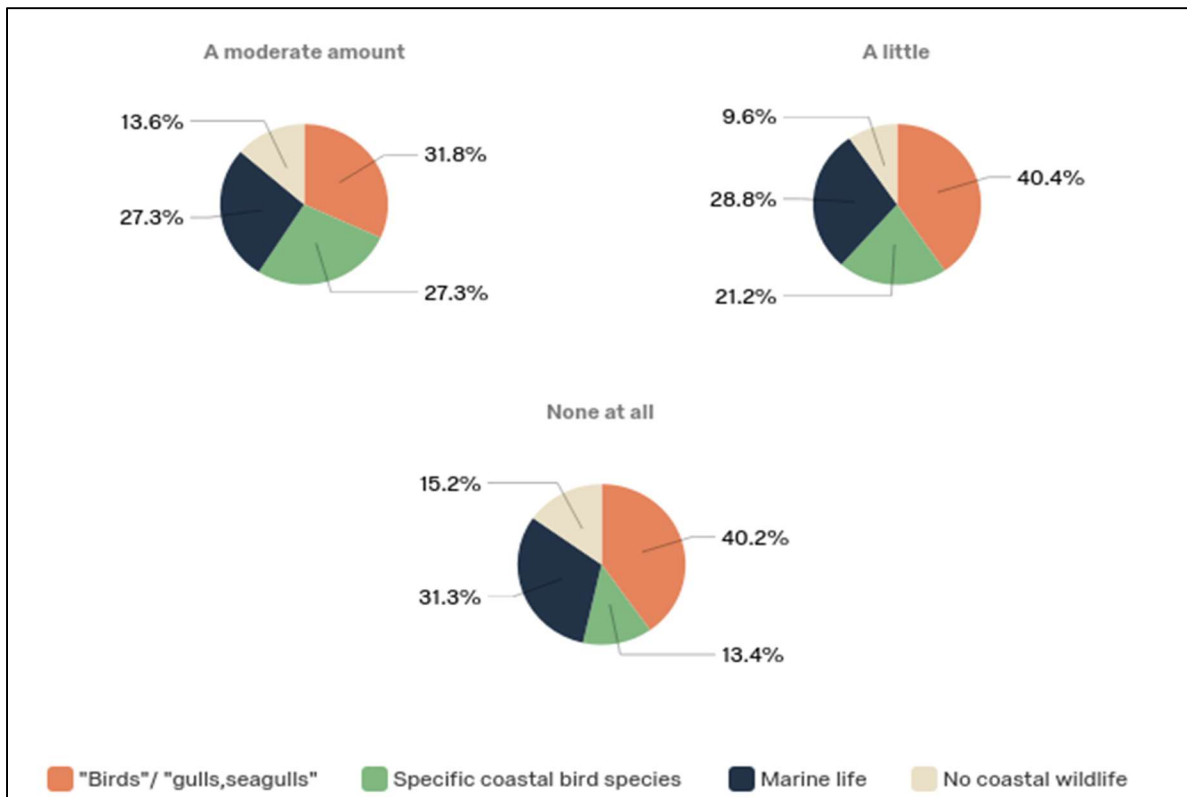
Figure 27. Cross tabulation of "How much of a threat to coastal wildlife do you perceive your dog to be?" and "What wildlife have you seen on this beach?" (n = 103)

Another revealing cross-tabulation was between the questions, "How often do you bring your dog(s) to the beach" and "What type of wildlife have you observed on this beach?", shown in Figure 28. Similar to the cross-tabulation in Figure 27, this was relating to the knowledge that dog owners have of coastal bird species. Dog owners who walk their dogs less than once per week were most likely to be able to identify no specific coastal bird species; dog owners who walked their dogs at least once per day made up the largest percentage of dog owners who could identify specific coastal bird species compared to the other categories. This demonstrates that frequency of beach visitation is related to wildlife knowledge, and that people who visit the beach more frequently are more likely to be able to name specific bird species.
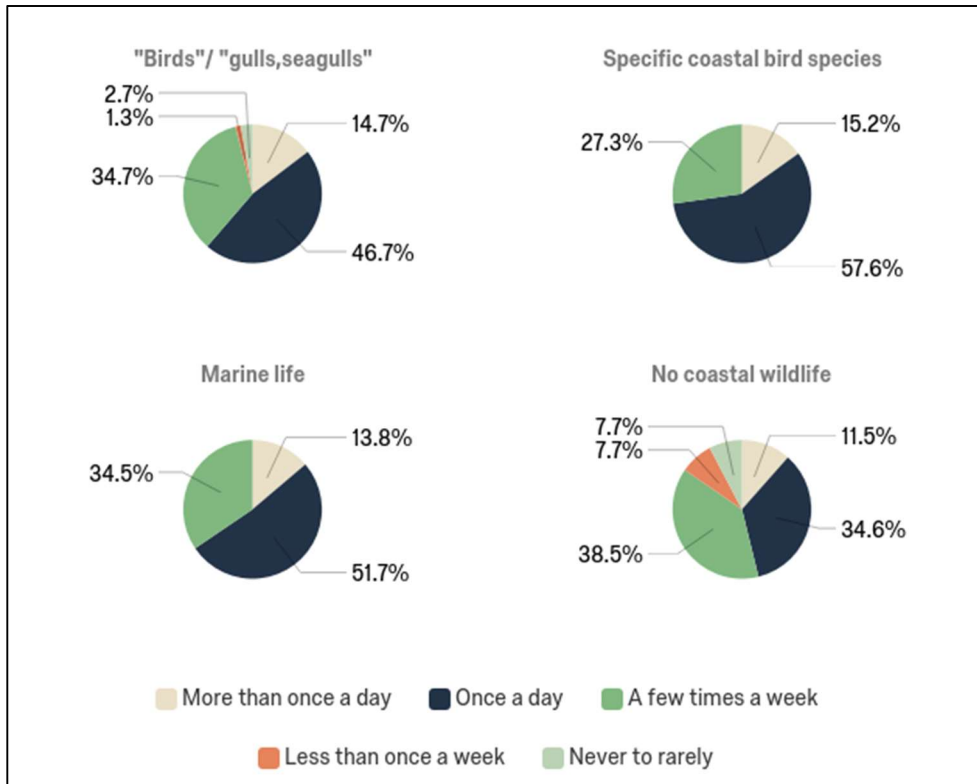
**Figure 28. Cross-tabulation of "How often do you bring your dog to the beach?" and
"What type of Wildlife have you observed on this beach?" (n=103)**

In addition to associations relating to wildlife knowledge, cross-tabulations illustrated relationships between size of dog, level of training, and preference for on-lead or off-lead. Figure 29 shows the comparison between the size of the dog and its owner's answer to the question, "How often do you walk your dog on-lead versus off-lead at the beach?" 91% of large dogs are off-lead at least most of the time, compared to 74% of small dogs. Every large dog was off-lead at least sometimes, but 15% of small dogs were always on-lead. This demonstrates that large dogs are more likely to be let off-lead than small dogs. This is likely because large dogs need more exercise to stay healthy, and large dogs that are not trained are more difficult to handle on-lead because of their size.
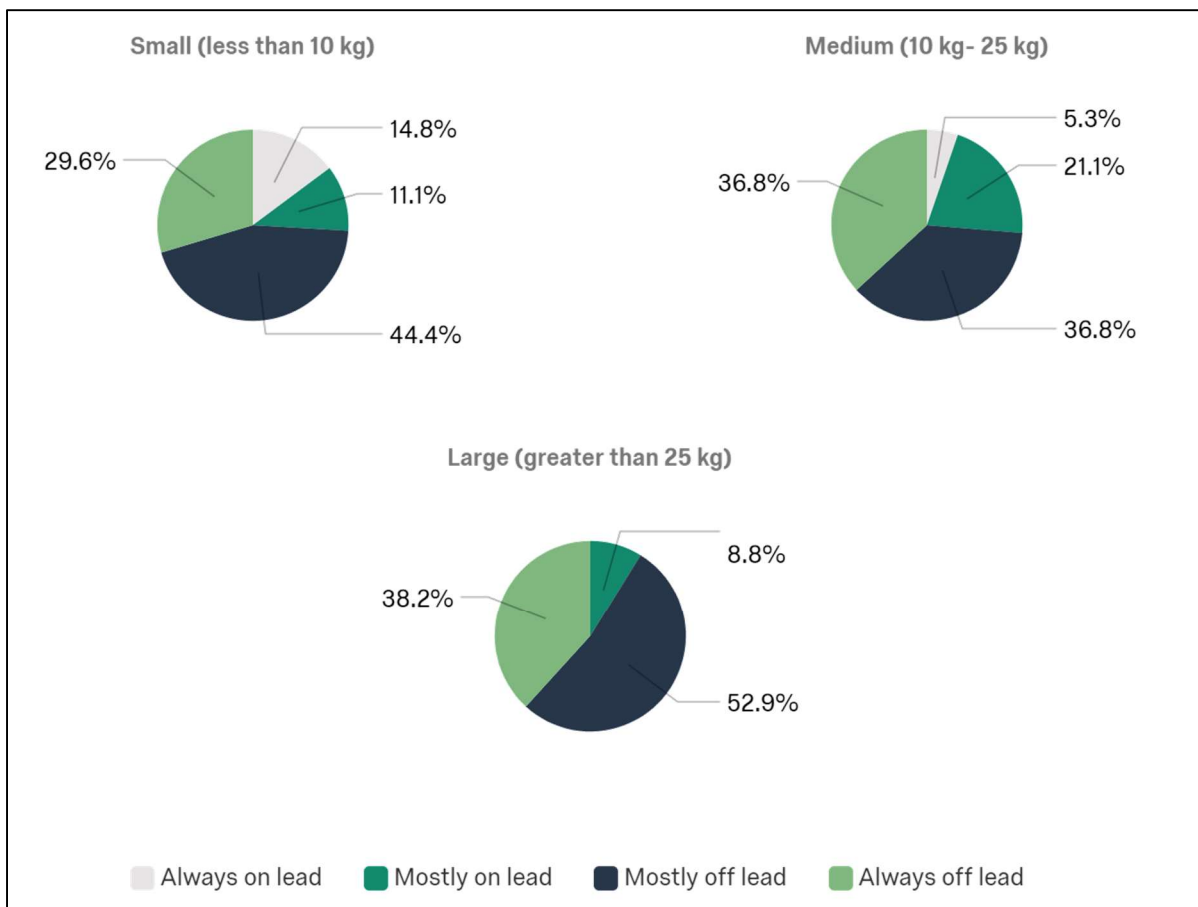
Figure 29. Cross-tabulation of "How often is your dog off lead compared to on lead?" and "What size is your dog?" (n=103)

We found that the size of a dog also correlates with the level of obedience training it has likely received. Large dogs are much more likely to have received no training than medium or small dogs. However, they are also more likely to receive ongoing formal obedience training than smaller dogs. Small dogs receive the largest amount of at-home training. From this, we can conclude that as the size of dog increases, the likelihood of the dog receiving some degree of training decreases. However, small dog owners who do train their dogs are more likely to settle for at-home training than large dog owners. The cross-tabulation for these factors is shown in Figure 30.
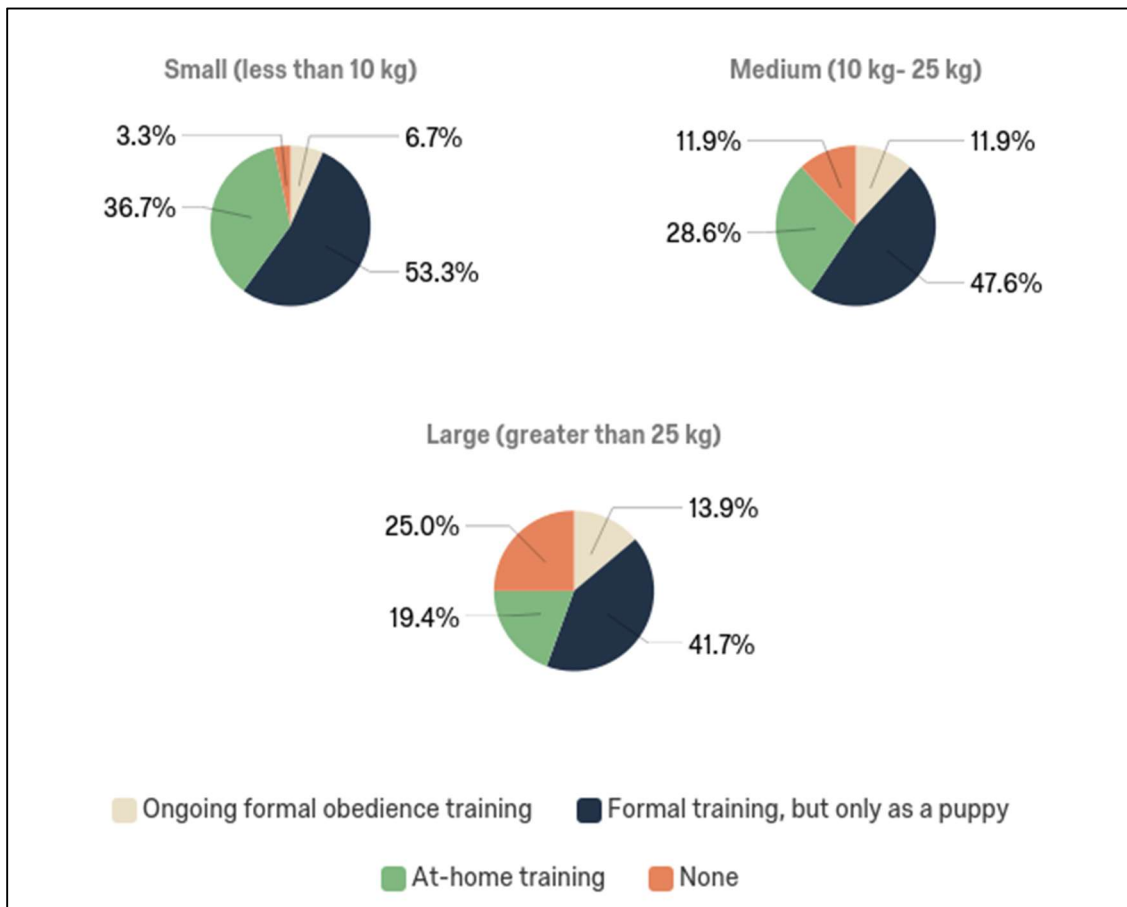
Figure 30. Cross-tabulation of "What size is your dog?" and "What type of obedience training has your dog received?" (n=103)

Combining the associations found between size of dog and level of obedience training, as well as size of dog and frequency of being walked on-lead and off-lead, we found that level of obedience training was also linked to frequency of being walked on-lead and off-lead, shown in Figure 31. We found that the less training a dog has had, the more likely it is that the owner has the dog off-lead. Over 50% of dogs without any degree of training are always off-lead, compared to only 25% of dogs that have had ongoing formal obedience training, and 23.4% that have had training as a puppy. This cross-tabulation result shows how dogs of a certain background have owners who behave in a certain way. However, it is also important to note that dog owners who only received formal training as a puppy, only at-home training, or no training at all were more likely to have their dogs always on-lead.
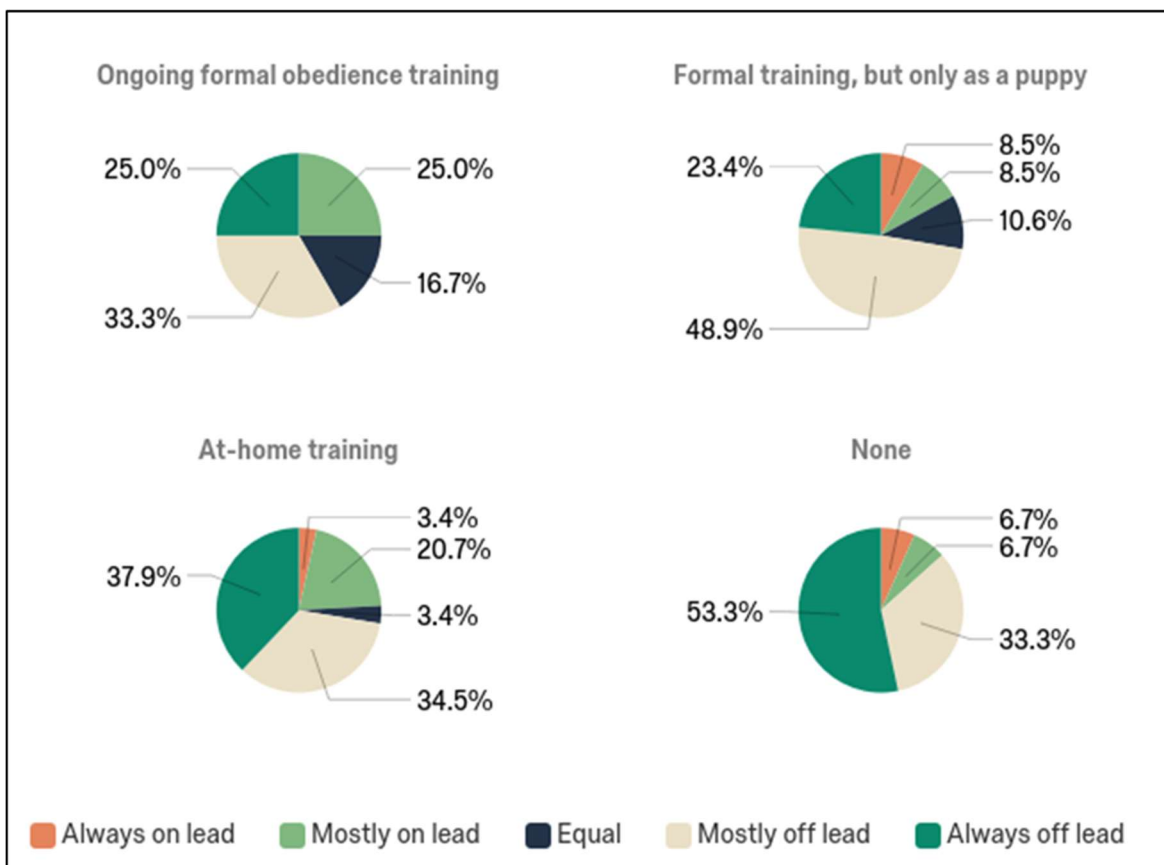
Figure 31. Cross-tabulation of "What type pf obedience training has your dog(s) participated in?" and "How often is your dog(s) on lead versus off lead at the beach?" (n = 103)

As the graphs demonstrate, cross-tabulations yielded a number of interesting correlations that could be used to inform our categories of dog owners. The following is a summary list of the correlations that we discovered:

- Dog owners with more knowledge of wildlife are more likely to know the threat their dog poses to wildlife
- Dog owners who visit the beach more frequently are more likely to have a knowledge of coastal wildlife
- Large dogs are more likely to be off-lead than small dogs
- Large dogs are more likely to have no level of training than small dogs
- Dogs with no degree of training are the most likely to always be walked off-lead

From the results of these cross tabulations, we could begin to form categories based on owners' behavior when managing their dog and the knowledge they have of their surroundings. To confirm these preliminary categories, we used the program Weka to identify any other patterns in the data we may had overlooked. We first organized our data into discrete variables and removed responses to questions that were irrelevant. Most associations Weka found in the data support the patterns we found with cross tabulation. One example association revolves around dog owners who go to the beach every day, consider their dog to be mostly obedient, and allow their dogs to interact with coastal birds. 100% of the dog owners with these characteristics prefer to let their dog off-lead at the beach. This association suggests that there are people who believe that their dog is well-trained and so they let them off-lead, which results in dogs chasing coastal bird species. These owners have little knowledge of their surroundings and are irresponsible with how they manage their dog on the beach. Using the association feature of Weka did not lead us to find any new associations regarding behavior and knowledge of dog owners that we had not considered before, but served as confirmatory analysis. The associations found also confirmed that there were not significant associations between demographics and knowledge and behavior.

We also used Weka's clustering feature, which uses K-means testing. In order to determine the most appropriate K value to use for our data set, we ran several tests using K values two through five with ten different random seeds for each K value. This means that for each test, as explained in Chapter 3.3.3 different centroids were selected and therefore a different sum of squared error was calculated. We then took the median sum of squared error for each of the test and plotted the points on a graph (Figure 32).
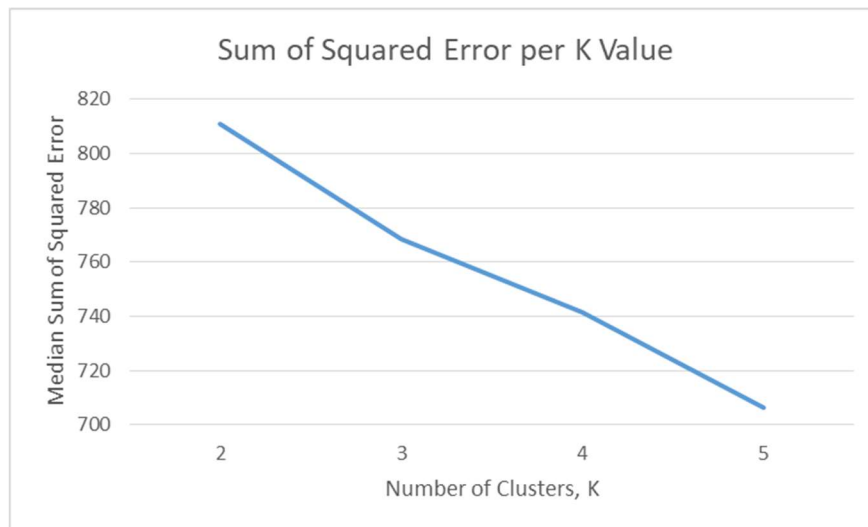
Figure 32. Graph of the sum of squared error for k values 2-5 used to determine the optimal K value.

Naturally, as the number of clusters, K, increases, the sum of square error will decrease. This is because with more centroids, the likelihood that a data point is close to a centroid increase. Therefore, it is important to find a K value where adding another cluster does not significantly improve the sum of squared errors. When K is equal to three, there is an "elbow" shape that appears in the graph. This point indicates when the sum of squared error stops declining sharply, thus making it the most appropriate K value to use. For the tests that used a K-value of three, the lowest sum of squared errors was 758. Due to the fact that an elbow was not well defined, and the fact that the clusters found were not distinctively different, the clusters were disregarded as significant evidence to prove the existence of certain categories of dog owners.

4.3.2 Multi-Axis Model and Categories of Dog Owners

To establish the categories of dog owners, we formed a Dog Owner Model as shown in Figure 33. The cross-tabulations that we performed fell primarily into the two dimensions of knowledge and behavior. The expert interviews also described characteristics of the ideal dog owner that fell almost entirely within these two dimensions. For this reason, we chose knowledge, or awareness, and behavior as the two axes of the Dog Owner Model.

Figure 33. Dog Owner Model

Dog owners can be placed into one of the categories represented by the Dog Owner Model, depending on their level of knowledge and their common behaviors. Responsible behavior and high awareness equate to the qualities of the ideal dog owne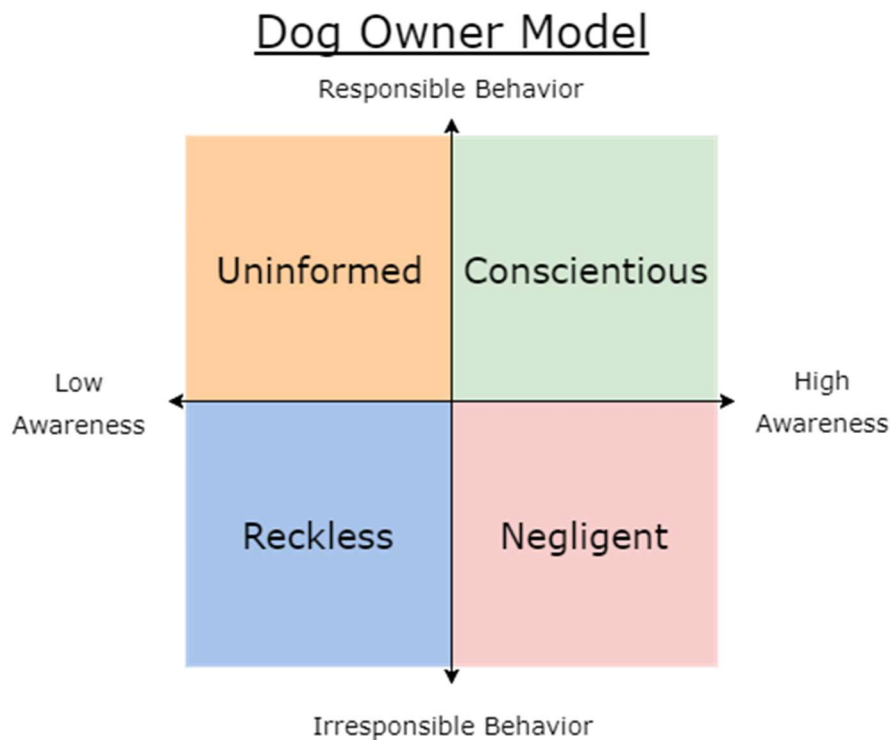r, as described in Chapter 4.2; irresponsible behavior and low awareness are therefore the failure to perform the same actions as the ideal dog owner and possessing a lack of knowledge that the ideal dog owner possesses. Beyond knowledge and behavior, the associations that were found in the last section helped us to create a clearer picture of what each category of dog owner is most likely to look like. For example, the finding that large dogs are more likely than small dogs to have no level of formal training and always be walked off-lead, tell us that that owners of large dogs are more likely to have the irresponsible behavior of both not training their dogs and not leashing their dogs when necessary. Using this information, we can describe the most common attributes of each category. In this example the Negligent and Reckless categories are more likely to contain the owners of large dogs. It is important to note that there are many dog owners who fall outside of these descriptions, and that the descriptions are only meant to represent the most likely attributes of each category. We sorted our survey participants into the categories, percentages of which are shown in Appendix R.

The first category is the Conscientious Dog Owner. This dog owner typically displays more responsible dog owner behavior, such as leashing their dog when appropriate and having higher frequencies of obedience training. The Conscientious Dog Owner also displays high levels of knowledge and awareness of the wildlife on beaches. This dog owner can typically identify many different species of coastal bird species and is aware that their dog poses a threat to animals on beaches. By analyzing the characteristics associated with this category's level of knowledge and behavior, we found that this type of dog owner might use voice commands to keep their dog near them and leash their dogs when they are in an area with high amounts of threatened wildlife. This dog owner also typically visits beaches with their dogs at higher frequencies and is more likely to own a smaller dog. This category of dog owner is the closest to the ideal dog owner.

The second category of dog owner is the Uninformed Dog Owner. This type of dog owner typically displays responsible behavior, such as leashing and giving their dogs some sort of obedience training. The Uninformed Dog Owner differs from the Conscientious Dog Owner in that the Uninformed Dog Owner has lower awareness and knowledge of wildlife on beaches. The Uninformed Dog Owner typically visits beaches less frequently and cannot identify as many species of coastal birds, as found from our survey cross-tabulations. Additionally, this type of dog

owner does not typically perceive their dog as a threat to coastal wildlife. They may keep their dogs on-lead or under voice command, but for reasons other than wildlife safety. For example, this dog owner may show responsible behaviors such as leashing in order to keep their dogs safe from other dogs or from hurting children present on beaches. Uninformed Dog Owners are also more likely to own smaller dogs.

The third category is the Reckless Dog Owner. This type of dog owner usually shows less responsible behavior, such as keeping their dog off-lead, or letting their dog wander out of sight or earshot. Even if the dog is on-lead, a Reckless Dog Owner may not have vocal or physical control. This dog owner is also less likely to have put their dog through obedience training. Poor obedience training results in dogs not responding to commands, and poor leash training may lead to the owner not having physical control over an on-lead dog. Reckless Dog Owners are likely to have larger dogs, which increases the risk if the dog is not under control. Paired with irresponsible dog owner behavior is low knowledge and awareness of wildlife on beaches. Because this dog owner typically walks their dog on the beach less frequently, they are unaware of different species of beach or the threat of dogs to coastal species. An example of a Reckless Dog Owner is one who lets their dog chase birds on the beach and ignores the interaction. Similar to an Uninformed Dog Owner, they may attempt to control the dog for other reasons, such as the protection of children or in order to leave the beach, but ultimately have trouble getting their dog to follow commands.

The final category of dog owner is the Negligent Dog Owner. This dog owner typically displays less responsible behavior but is aware of wildlife presence and the threats posed by dogs to said wildlife. This dog owner may let their dog off-lead around wildlife and their dog typically has a lower level of training. This type of dog owner frequently visits the beach and may recognize many species of coastal wildlife. They may witness their dog chase seagulls and understand that it can be harmful to the birds, but they ignore the interaction and do not care about the harm to wildlife. The Negligent Dog Owner may even encourage their dogs to chase the birds for exercise. They may also let their dogs do whatever they want on the beach, while not keeping them within proximity or exercising any voice commands. This can result in major wildlife destruction caused by the dog.

4.4 Design and develop effective messaging and intervention tools tailored to specific categories of dog owners

Through the categories that we defined, we were able to develop targeted intervention methods for dog owners. The categories informed the knowledge and behavior that the intervention methods would focus on conveying. First, we assessed the risk associated with actions common to each category. We then prioritized which actions were most in need of changing, and we brainstormed methods to alter those actions. These methods were ranked with a design matrix.

4.4.1 Risk Assessment and Necessary Behavior Changes

We created a risk assessment breakout, as described in Chapter 3.4.2, for each of the categories of dog owners to determine which of their common behaviors is most critical to address. Blue indicates negligible risk; green indicates low risk; yellow indicates medium risk; orange indicates high risk; and red indicates extreme risk. These risk levels were determined by comparing the likelihood and level of danger of a behavior with the table located in Chapter 3.4.2. The risk assessment breakouts for each of the dog owner categories are displayed below in Figure 34 through Figure 37. These outline some possible behaviors of dog owners in each category, since it is impossible to account for every possible interaction.

Conscientious Dog Owner

Behavior	Possible Consequence of Behavior	Likelihood	Level of Danger	Desired Replacement Behavior
Dog is on lead and barks at birds	The birds change location	Possible	Insignificant	Dog is trained not to bark
Dog responds to calls from owner	Owner's call may disrupt birds	Possible	Insignificant	None
Owner recognizes wildlife	Owner may be tempted to watch approach wildlife	Possible	Insignificant	Owner does not approach wildlife too closely
Owner brings their dog to the beach frequently	Dog and owner will have a larger frequency of minor disturbances	Likely	Minor	Overall practice responsible dog management to minimize these

Figure 34. Conscientious Dog Owner Risk Assessment

Uninformed Dog Owner

Behavior	Possible Consequence of Behavior	Likelihood	Level of Danger	Desired Replacement Behavior
Dog is on lead and barks at birds	The birds change location	Possible	Insignificant	Dog is trained not to bark
Owner is not aware of wildlife present	Owner unknowingly allows the dog to get close to wildlife and the dog kills a bird	Likely	Major	Owner is informed of the presence of wildlife and how to identify it
Owner keeps dog off-lead in high risk areas	The dog finds a nest and destroys it	Possible	Moderate	Owner puts dog on lead in high risk areas and keeps them in sight
Owner does not perceive birds to be wildlife	Owner allows the dog to harass birds	Possible	Minor	Owner is informed of species at risk and how any disturbance is harmful

Figure 35. Uninformed Dog Owner Risk Assessment

Reckless Dog Owner

Behavior	Possible Consequence of Behavior	Likelihood	Level of Danger	Desired Replacement Behavior
Owner is not aware of wildlife present	Owner unknowingly allows the dog to get close to wildlife and the dog kills a bird	Likely	Major	Owner is informed of the presence of wildlife and how to identify it
Owner keeps dog off lead in high risk areas	The dog finds a nest and destroys it	Possible	Moderate	Owner puts dog on lead in high risk areas and keeps them in sight
Owner does not perceive birds to be wildlife	Owner allows the dog to harass birds	Possible	Minor	Owner is informed of species at risk
Owner does not train the dog so it does not have good recall	The dog sees a bird and kills it without the control of the owner	Possible	Major	Owner repeat trains the dog
Owner does not follow leashing regulations	The dog sees a bird and kills it without the control of the owner	Possible	Major	Owner is informed of and follows the leashing regulations

Figure 36. Reckless Dog Owner Risk Assessment

Negligent Dog Owner

Behavior	Possible Consequence of Behavior	Likelihood	Level of Danger	Desired Replacement Behavior
Owner does not care about wildlife present	The dog gets close to wildlife and kills a bird	Likely	Major	Owner does not allow the dog near wildlife
Owner keeps dog off lead in high risk areas	The dog finds a nest and destroys it	Possible	Moderate	Owner puts dog on lead in high risk areas and keeps them in sight
Owner does not perceive birds to be wildlife	Owner allows the dog to harass birds	Possible	Minor	Owner calls their dog when it is interacting with wildlife
Owner does not keep their dog in sight	The dog sees a bird and kills it without knowledge the owner's knowledge	Possible	Major	The owner keeps the dog in sight and will call if it approaches wildlife
Owner does not call their dog when it approaches wildlife	The dog sees a bird and kills it	Possible	Major	Owner does call their dog when it approaches wildlife
Owner does not follow leashing regulations	The dog sees a bird and kills it without the control of the owner	Possible	Major	Owner is informed of and follows the leashing regulations

Figure 37. Negligent Dog Owner

These risk assessments were useful in prioritizing which behaviors caused wildlife to be most at risk, and therefore were the most necessary to address. There were various high-level risks that overlapped between categories, which are useful to recognize because the same intervention methods could be effective for multiple categories. For example, the Uninformed and Reckless Dog Owners need to be informed of the presence of wildlife and how to protect it. Those two categories also need to put their dogs on-lead around wildlife. Other high-risk behaviors that need to be corrected with intervention methods include informing dog owners of the leashing regulations and encouraging them to have their dog repeat trained.

We decided to design intervention methods that mostly focused on reaching the Reckless and Uninformed categories of dog owners. We did this because we felt that the Conscientious category did not have any large gaps in knowledge or behavior from the ideal dog owner. Last year's project also largely targeted the Conscientious Dog Owner, with the children's book, bumper sticker, and items with catchy slogans that encourage dog owners to be proactive in engaging other dog owners in the community. Additionally, we did not target the Negligent category for a couple of different reasons. Our team felt that the two effective ways of targeting

this category of dog owner would be through enforcement and through increasing social pressures for the desired behavior. This is because they already have a knowledge of wildlife and know the threat their dog poses to that wildlife, but still choose to have irresponsible behavior, so they clearly do not have the empathy for wildlife that would incentivize behavior change. However, enforcement has unrealistic time and resource requirements because it requires manpower that Department of Conservation and city councils do not have. Changing social norms can only be achieved by changing the behaviors of other types of dog owners, namely the Reckless and Uninformed categories.

Based on the decision to focus our intervention methods on the Reckless and Uninformed categories, combined with our risk assessment breakouts for these categories, we could develop a detailed list of what intervention methods towards these two categories should contain. This list is displayed below in Figure 38.

	Uninformed Dog Owner	Reckless Dog Owner
Most likely characteristics of the category	+ Keeps their dog mostly on-lead + Gives their dog some degree of obedience training + Has a low awareness of wildlife + Has a low knowledge of specific wildlife species + Visits the beach less frequently + Does not perceive their dog to be a threat to wildlife + Owns a smaller dog	+ Keeps their dog mostly off-lead + Does not give their dog any obedience training + Has a low awareness of wildlife + Has a low knowledge of specific wildlife species + Visits the beach less frequently + Does not perceive their dog to be a threat to wildlife + Owns a large dog
How to specifically target the category	+ Inform them that their dog poses a threat to wildlife, and that even small dogs can cause harm to wildlife + Encourage them to stay alert to wildlife around them + Educate them about wildlife species present and how to identify them	+ Inform them that their dog poses a threat to wildlife, and that large dogs can be detrimental to small, vulnerable wildlife + Encourage them to stay alert to wildlife around them + Educate them about wildlife species present and how to identify them + Inform them of the importance of leashing their dog around wildlife + Encourage them to train their dog and offer suggestions for how to do so + Offer clearer ways to find leashing regulations and incentive to follow them

Figure 38. Targeting Categories of Dog Owners

4.4.2 Designing and Qualifying Intervention Methods

To develop solutions for addressing dog owners and the threatening behaviors they can have with regards to wildlife, we asked for recommendations from expert interviewees. They helped to inform us of what intervention methods have been used in the past to protect wildlife from dogs, and they gave us suggestions for what in their experience would work. The interviewees and corresponding notes can be found in Appendix E.

In the past, DOC has attempted long-term campaigns that were not sustainable. They and other organizations, such as the Kapiti Biodiversity Project, have spent extra money pursuing one-time solutions; for example, The Kapiti Biodiversity Project gave away free dog muzzles to try to change dog owner behavior. Projects and solutions need to be an efficient use of resources and cannot stretch departments too thin in their responsibilities. One way to encourage the lengthening of a project is by engaging the community to do some advocacy for the project. Experts such as Karin Wiley and Andrew Glaser expressed the opinion that if you can encourage the sense of ownership to all beach goers, the project will be more successful than with a less personal approach.

DOC, in the past has used "authoritarian type wording" and has over explained things in developing signage and rules, as described by Andrew Glaser and Graeme Taylor. People would rather be asked than told what to do. He added that "good images with small narratives speak volumes." Daniela Biaggio also expressed the idea that "dog owners challenging others who aren't following regulations could be more effective than signage, these interactions if framed positively could allow for the key behavior to become part of an ongoing conversation, and for peer pressure to play a role." with an additional note that the interactions should be positive and avoid conflict. Others encouraged the use of social media to engage with the communities of dog walkers. Friendly explanations could prove to be a more successful intervention strategy.

We had many survey participants explain how confusing signage is. "People are confused," said Karin Wiley, "Rules need to be clearer and easy to understand." Daniela Biaggio pointed out that "the WCC is updating signage in some areas, they now include maps to help bring clarity to where an area starts and where an area ends". It appears signage and other intervention methods in the past have also been less informative and do not necessarily provide reasonable explanations as to why regulations are in place. Individuals need a reason to follow the regulations.

Lastly, interventions need to be informative. A lot of people think that penguins are cute, but in reality, they are also "feisty" and "have a vicious bite," as described by both Karin Wiley and volunteers with the Kapiti Biodiversity Project. The idea of creating alerts as to where threatened species are nesting or have been spotted was suggested by many experts including Andrew Glaser and Lee Barry. Lee also warns, however, that "delivering information does not change people's behavior." Solutions must capture people's interest in conservation and create a narrative.

From these experts, many specific suggestions were made for interventions. Group fun days with education events would work to engage the community. Websites to find alternative leashing locations and alternative locations for dog walking would aid with clarifying the regulations. Giving out brochures when people re-register their dogs or at veterinary clinics, with good narratives and images, would spread a knowledge of coastal wildlife by being informative and visual. Most importantly, creating more effective signage that give people an awareness of wildlife and a reason to practice responsible behavior was stressed as crucial.

Taking into consideration the suggestions from the expert interviews, and based on the risk assessment breakouts, we brainstormed intervention methods that would meet these criteria. These intervention methods were then evaluated by a design matrix. From the design matrix, described in Chapter 3.4.5, we ranked the following characteristics of intervention methods in order of importance:

1. Realistic (can be implemented)
2. Affordable (has a low cost of implementation and maintenance)
3. Ease of upkeep (can be easily maintained)
4. Scalable (can be applied in multiple contexts and locations)
5. Independent (is not dependent on a specific organization to implement it)
6. Supplemental (can be added to an existing intervention method)

The design matrix we used to rank these characteristics and a summary of the brainstormed methods with their corresponding scores are located in Appendix J. These rankings, supplemented by feedback from the focus group, led us to develop the recommendations presented in Chapter 5.

4.4.3 Gathering Feedback on Intervention Method Ideas Via Focus Group

To better understand how effective our intervention methods ideas would be if instated, we held a focus group of dog owners. Four dog owners from the Wellington and Porirua area attended the focus group at the Titahi Obedience Club and discussed their opinions and experiences with leashing regulations and coastal wildlife. An agenda of the focus group can be found in Appendix I.

A common response when asked about the current leashing regulations in the Greater Wellington Area was that the city council is very strict when it comes to dog regulations and have not provided an adequate amount of off lead areas. All four participants felt discriminated by the city council because they own dogs. This topic was not completely relevant to our project since the Department of Conservation is not related to the city councils and has no control over the leashing regulations. Nevertheless, the impact of the city council on dog owners' behavior was not a factor we had considered before. Since these dog owners felt a lot of resentment towards the city council they did not see the council as an authority figure and were therefore not motivated to follow the leashing regulations put in place by them. Several noted that they would be more likely to listen to signs put in place by DOC since they trusted them. This discussion brought new factors to consider when creating intervention methods.

When the participants were asked about what wildlife they had seen in the beach, the overwhelming response was seagulls. While many participants were aware that there were other wildlife species, such as penguins, on the beaches and under houses, no one had seen one. Participants, however, were interested to learn about the wildlife that is present on the beaches and felt they would respond better to signage if they knew what wildlife was being protected by the leashing regulations. We found this common theme through our survey as well. Many people who suggested signage also suggested putting an explanation for the leashing regulations on the sign. For this reason, education and increasing wildlife awareness amongst dog owners was one of the focuses of our intervention method recommendations.

One participant explained an instance where signage with an explanation on it worked at the obedience club. At one point, several dog owners would walk their dogs off-lead on the track near the obedience club. At that time the obedience club was replacing the grass on their lawn, so they needed to prevent wandering dogs from walking on it. To do this, the club put up signs on either end of the adjacent track that explained to owners why their dog must be on lead and thanked

them for doing so. The participant noted that the number of dogs off-lead in the area decreased from thirty to two and credited the explanation of the signs and polite tone of the message. While this method as effective on beach signs, it is an important example to consider.

The final part of our focus group involved having participants fill out a design rank order matrix. For this activity, we drew the matrix on a large whiteboard and asked participants to discuss how they would rank each characteristic before writing it on the board. The big takeaways from this activity were that participants felt the most important attributes an intervention method can have is being informative and visual. Rather than reading a long paper or a sign with lots of text, participants felt that being able to easily identify and understand the information presented on an intervention method. They considered the least important attribute to be portable, or something that they could carry around with them, because they felt they would lose pamphlets or flyers they are given, and it would be a waste of resources. Participants also noted that talking to someone in person about the wildlife on the beach or how to control a dog around wildlife is more valuable than reading it online or on a sign. However, a majority of them felt that having the information virtually, in addition to an in-person encounter, is also valuable. The resulting design rank order matrix is shown in Figure 39, which ranks informative most important, followed by visual, then personal, then interactive and virtual, and portable as least important. The method by which we scored the design matrix is described in Chapter 3.4.5.

Figure 39. Design rank order matrix created by focus group members

While these rankings are valuable in determining which attributes would be effective in our intervention methods, it should be noted that the dog owners who created this data were all of similar demographics. All participants were of between the ages of forty and sixty and were avid dog owners. There was one man and three women. The participants of the survey by no means represented all of the dog owners of the Greater Wellington Area, but they gave valuable insight that would otherwise be unknown to us when creating our intervention methods.

4.5 Discussion of Findings

The research conducted for this project gave us valuable insight into the wants, needs, opinions, and knowledge of dog owners in the Greater Wellington region. There were a few common themes present in our survey responses. First, people seemed to agree that "under control" meant that a dog can respond to voice commands or have good recall. Even though a common issue in signage and leashing regulations on beaches seems to be that there is no definition of "under control," it appears that most dog owners have similar definitions. Additionally, while many respondents said that signage was clear and straightforward, many also expressed that regulations that changed with season or time of day were confusing. In terms of off-lead exercise, many respondents cited their dog's health and well-being as a primary motivation. This led us to believe that it is unreasonable to expect most dog owners to start leashing their dogs because off-lead exercise is important to the dog's health and happiness, which owners care greatly about. Therefore, we shifted the focus of our intervention methods from encouraging people to leash their dogs to encouraging them to adopt responsible dog owner behavior, such as training their dogs well.

Our study also gave us insight into how dog owners perceived the threat of their dogs to coastal wildlife. In general, people perceive their dogs to be little or no threat to wildlife. This shows that people may not necessarily understand what exactly poses a threat to wildlife. For example, many respondents said that, while their dogs chased gulls, they would not pose a threat because they would not be able to catch the birds anyway. However, from our background research, we know that a dog can still negatively impact bird species even without making physical contact. Additionally, many dog owners said that their dog is not a threat if the owner is present on the beach, but that the dog might be if the owner is not present. This shows that people think that they can control their dog around wildlife, but this is not necessarily true. If a dog owner is

not paying close attention to their dog, they may not even know if their dog interacts with wildlife. It can also be noted that, even if a dog owner is paying attention to their dog, they may not know how to respond to a situation or may not even recognize a potentially harmful situation. For example, many dog owners did not identify chasing birds as a potentially harmful situation. A general theme from our survey was that dog owners thought that dog friendly areas were free from wildlife. From their perspectives, areas with threatened wildlife would not be designated as dog friendly areas if dogs truly posed a threat. However, we know from our expert interviews that wildlife can land at any beach at any time of day or year, even if the area is a designated off-lead area. Many dog owners do not realize that off-lead areas and wildlife areas are not mutually exclusive. These are all areas of knowledge that will have to be improved for dog owners and the general public alike.

While we made efforts to reduce the error and limitations in our study, some limiting factors were present. To start, the short timeframe of our project affected the possible sample size that we were able to collect. With more time, we may have been able to collect a larger, more diverse sample of responses. Associations could have been clearer and more telling in that case. Additionally, we may have been able to collect data on more beaches in order to more properly represent the Greater Wellington region. Our small target audience may have also affected our ability to collect more survey responses. Because we had to specifically target dog owners on beaches, it was sometimes challenging to collect large numbers of responses. Lastly, we believe that our affiliation with the Department of Conservation may have added bias to our survey responses. The survey respondents may have been influenced to respond in a pro-conservation manner, or they may have been more hesitant in sharing their thoughts and information with a government body. Apart from our association with DOC, survey responses can be inherently biased because people are inclined to tell you what you want to heat.

CHAPTER 5: RECOMMENDATIONS & CONCLUSION

After collecting information from dog owners on beaches, experts in wildlife conservation groups and the Department of Conservation, and conducting a focus group, we were able to create a number of intervention tools we recommend DOC use to minimize the threat dogs pose to coastal wildlife species. This list of methods includes guidelines for signs regarding leashing regulations, suggested types of signage, online outreach programs, and community events. Information regarding these intervention method recommendations are outlined in this chapter.

5.1 Recommendations

Our fourth and final objective was to design and develop effective messaging and intervention tools tailored to specific categories of dog owners. We created numerous recommendations for DOC to use to target Uninformed and Reckless Dog Owners. These recommendations include, but are not limited to, guidelines for future signage, examples of dynamic signage, social media campaigns and a community outreach program.

5.1.1 Guidelines for Effective Intervention Methods

Through the expert interviews we conducted, and supplemented by feedback from our focus group, we had a clear picture of what aspects were required to develop effective intervention methods to dog owners. In order to concisely present this information, we compiled it into a checklist, as shown in Figure 40. We used this list to develop our own intervention methods, and we recommend that the checklist be used as a guide for future designs and campaigns by DOC. The checklist highlights important characteristics of effective intervention methods, such as always including the reasoning behind a command, which was a common emphasis made by focus group and survey participants alike. This list is a good place to start when developing intervention methods, and it may be applicable to campaigns beyond this one.

<div style="border:1px solid #000; padding:10px;">

<u>Checklist for Effective Intervention Methods</u>

- O Keep messaging friendly, positive, and polite.
- O Highlight the behavior that is desired rather than the wrong behavior. For example, to get people to put their dogs on leash, use an image of a dog on leash rather than an image with a dog off leash and a red line across it.
- O Make messaging clear and easy to understand.
- O Focus on visual messaging, providing maps and images to catch attention.
- O Include information about species that will make people want to do further research on their own.
- O Include specific information on what people can do to help, which will create a sense of ownership and duty to protect the species.
- O Do not place the same wildlife warning at every beach, or else people will not believe that it is genuine, since every beach does not have exactly the same risks.
- O Always include a clear reason why an action is being asked of beach-goers to provide incentive that is more powerful than "the sign says so."
- O Appeal to a person's emotions or reasoning rather than stating something in an authoritative way.
- O Place signage in places where beach-goers are most likely to see it, such as directly at the entrance to a beach and along the beach.
- O Use information on the internet to supplement beach signage and inter-personal interaction. Do not waste resources on handouts that people are likely to throw away.
- O Target all beach-goers alike, rather than focusing only on dog owners. This will prevent dog owners from feeling singled-out as the problem, as well as work to educate the public as a whole.

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Figure 40. Checklist for Effective Intervention Methods

5.1.2 Signage

Our survey results, focus group feedback, and expert interviews all primarily stressed the importance of good signage, a theme that was reflected in last year's project, as well. For that reason, signage was our first priority when developing intervention methods. Signage is most important because it presents information on site. Information presented elsewhere is likely to be forgotten by the time it is relevant. It is also a guaranteed method of having information accessible and visible to the entire target audience, since it is difficult to reach all dog owners who go to the beach with any other single intervention method.

The main problem with the existing signage is that it provides no reason as to why a regulation is in place or why a dog owner should follow what it says. This is one reason Reckless Dog Owners may demonstrate irresponsible behaviors, such as keeping their dogs always off-lead despite being in an on-lead area or around wildlife. As a focus group member pointed out, dog owners are animal lovers. A sign indicating that a dog owner should keep their dog on-lead or keep their dog under control is much more likely to elicit the correct reaction from a Reckless Dog Owner if it also brings attention to threatened wildlife. Most dog owners do not want their dogs to endanger wildlife; they are simply not aware that the regulations are in place to protect that wildlife, and that not following the regulations puts wildlife at risk. A common misconception amongst dog owners is that all restrictive regulations are in place because an area is highly populated by other people. This can cause a dog owner to assume that there is no reason to obey those regulations if no one else is around. Correcting that belief with appropriate signage is vitally important, and for that reason, we recommend this be a priority when deciding the information that a sign conveys. This would be an effective way to target Reckless Dog Owners, and it would also help fill the same knowledge gap that Uninformed Dog Owners have, including the level of threat their dog poses to wildlife and information about wildlife to stay alert for.

Another common problem with existing signage is that the same wildlife warnings are present year-round and at many different beaches. Consistent signage is important to catch attention and quicken comprehension, yet a generic and common wildlife warning is much less likely to be believed. People are more likely to take a wildlife warning seriously if it is periodically changed to reflect the different levels of risk depending on the season, the location, or other wildlife patterns. This proves that the warning is genuine, in contrast to a sign that indicates high risk being displayed all year at many beaches, even when the risk is not as high. To that end, signage is recommended that has a place to post notices and seasonal risk levels that can be switched out by a DOC employee when relevant. The orange panel on the signage shown in Figure 41 represents this feature. Uninformed and Reckless Dog Owners have a lack of knowledge for wildlife, so this would be most certain to catch their attention and alert them to the threat their dogs are to wildlife.

Reckless Dog Owners do not follow the leashing regulations in place. Straightforward and visual signage is also critical to have. For these reasons, maps of leashing regulations should be displayed at all beaches. Some beaches have regulations that change depending on the season, and for those beaches, we recommend that the map be changeable in a similar manner as the wildlife

risk panel. This would prevent multiple maps from being displayed representing different times of year, which can be confusing. We designed signage that would take all of these factors into consideration, and it is shown below in Figure 41. A larger version of this sign can be found in Appendix K.

Figure 41. Dynamic Beach Signage

In order to be noticed by the greatest number of people, the signage should be placed at beach entrances that are most used and be clearly visible to all those who are about to enter the beach area. Above poo bag stations that are present at some beaches is another good place to position signage. There was not a significant enough difference in survey results between the different beaches to warrant different styles of signage.

Because Reckless Dog Owners are more likely to own large dogs, we incorporated a size comparison into the above signage. We recommend that small wooden signs be placed on the ground next to the main signage. They would have a picture of a bird printed on them, and they would be to the correct scale of that bird, as shown in the bottom corners of Figure 41. For example,

a wooden little blue penguin, dotterel, and variable oystercatcher, each the size of their real counterparts, could be placed below a sign of interest. These would draw the attention of dog owners. The sign would bring the reader's attention to the threatened nature of the birds presented, as well as urge the reader to compare their dog size to that of the life-sized depictions. In the case of Reckless Dog Owners, their dogs are likely to be substantially larger than these bird species, providing a powerful visual representation of the threat their dogs pose to wildlife and incentive to act responsibly. A poster with birds-to-scale is a version of this idea, placed at the floor level of veterinary offices that allows dog owners to compare their dogs to the size of wildlife. An example of this poster is shown in Figure 42 and Appendix L.

Figure 42. Birds-to-scale Poster

It is also recommended that smaller signage be placed sporadically on the beach itself to provide additional information about bird species. These would be targeted towards both Reckless Dog Owners and Uninformed Dog Owners, since both need to learn more about wildlife and be given a reason to care about protecting wildlife from their dogs. For example, each small sign could have a picture of a species that is present on the beach, a small bit of information about that bird, and why dogs endanger the species. These signs will highlight the species of high risk, as well as provide further information to interested beach-goers than the large sign and make the protection of these birds more personal. Another brand of small signage could be developed and placed alongside the wildlife education signage; these signs could remind and encourage owners to practice responsible dog management. These would be intended specifically for Reckless Dog Owners, since Reckless Dog Owners do not typically demonstrate responsible dog management. Pairing these signs together will create the relationship between protecting these species and responsible dog management. An example of the smaller signs with wildlife information can be seen in Figure 43, as well as Appendix M, and an example of the signage reminding owners to practice responsible dog management can be seen in Figure 44 and Appendix N.

Figure 43. Small Beach Signage: Wildlife Education

Figure 44. Small Beach Signage: Dog Management

In our focus group, it was clear that the participants had rather negative and frustrated opinions of the city councils. They were less likely to obey or believe signage put in place by the city councils due to their overall poor experiences working with the councils on dog-related issues. The participants were from a very small subset of the dog owner population, but it is to be noted that they specifically stated they would be more likely to pay attention to signage commissioned by DOC, especially relating to wildlife. If possible, we recommend that DOC place their own signage at coastal areas or work with city councils to prepare the signage, so that the DOC name provides credibility regarding wildlife claims.

5.1.3 Online Intervention Methods

To supplement the information presented with on-site signage and to make that information readily available otherwise, we recommend that a website be developed and maintained by DOC. Currently, each city council has their own website and resources with information regarding dog exercise areas and the leashing regulations in their respective districts. Based on the large percentage of dog owners who got information about leashing regulations online and who visit those websites, we recommend that DOC create their own website with this information. A problem with the online resources currently available is that they are divided by council, so one

must visit each website separately to get a full picture of the dog exercise areas available. The resources can also be difficult to find.

We recommend that DOC create a website with a complete list of dog exercise areas and their regulations, including all those in the Greater Wellington area and perhaps in all of New Zealand. This would be a more concise and easy-to-find means of indicating leashing regulations. These could be located on an interactive map, including a function where a user would also be able to type in their location and be given a list of off lead exercise areas near that location. A search bar could be added for time as well as location, so it would only list the areas off lead at the specified date and time, since many regulations are time-dependent. This could help clarify the confusing regulations that many people expressed frustration about when surveying and that various experts mentioned as a problem.

Reckless Dog Owners need a simpler and more accessible means to get information about leashing regulations, which would be provided by this website. It is unlikely that Reckless Dog Owners would take initiative and look for the leashing regulations on this website without any prompting, so we recommend that the URL to this website, perhaps dog.govt.nz for easy remembering, be put on all signage described above. If through that signage, Reckless Dog Owners become aware of the wildlife on beaches along with the corresponding leashing regulations, they may wish to become better educated, and the URL can serve as a prompt and a source for that education. It should have an attractive mobile format, since most people will likely use their phones if they choose to search the URL. The website will also make it easier to follow regulations, because it offers a quick and simple way to find all the off-lead options near a location. This would prevent Reckless Dog Owners from not following regulations simply because they could not find any alternative options. The website would be useful for Uninformed Dog Owners, as well, since it would facilitate the responsible behavior they already demonstrate through following regulations.

In addition to dog exercise areas being listed on the map, areas could be specified as "high wildlife risk," "moderate wildlife risk," and "low wildlife risk" and icons with what wildlife was present in an area. Users could click on the icons to show an information box stating information about the wildlife and what they can do to protect it. People who look online for dog leashing regulations would likely be curious about the meaning of these icons over their favorite dog exercise areas and click on them. The leashing regulations and wildlife risk being located on one

map would ensure that everyone, even if they chose not to click on the wildlife icons, would be forced to see that specific wildlife was present in an exercise area and the risk level of that area. This feature would be perfect for both Reckless and Uninformed Dog Owners, because each of these categories requires wildlife education, and the map on this website would provide a detailed and visual representation of wildlife presence. The option to click and learn more about these species would further that education.

Another feature of the website could be a section featuring dog training tips and videos, very necessary for Reckless Dog Owners. Many dogs require regular exercise that cannot be performed on lead, yet many of those same dogs are not trained adequately. Dogs receiving repeat training is one of the main goals that should be focused on for Reckless Dog Owners, since that is the main factor in a dog being under control while off-lead. However, training can be expensive, so an easy and clear resource for home training would be valuable to encourage this ideal behavior.

The website would require minimal upkeep, although it would need to be reviewed at least annually to account for any changes to regulations. If the resources were available, the website could also be used as a forum for news about dog attacks or other DOC updates, which would further its purpose of investing people in wildlife. It could have a "bird of the month," where a specific bird and information about it could be highlighted as featured on the website. This could be shared on Facebook to garner attention. In addition to digitally, a "bird of the month" informational postcard could be mailed to Wellington residents. One side could contain information about the bird with photos, and the other side could concisely state what the individual can do to protect the bird. An example "bird of the month" postcard can be found in Figure 45 and Figure 46 (Appendix O).

Figure 45. Bird of the Month Postcard (Front)

Figure 46. Bird of the Month Postcard (Back)

Similar to signage, this website would serve to provide meaning behind the regulations that are in place, a seemingly small factor that has a very significant impact on whether dog owners will follow the regulations. Paired with this reasoning, it educates dog owners on wildlife and incites a pride in New Zealand wildlife, along with a desire to protect it.

Social media is another means to convey information, and it is also an effective way to reach a large number of people due to the pyramid effect of individuals sharing a post. With this in mind, a social media pledge campaign would be cheap to implement and reach a large number of people, of both Reckless and Uninformed categories. Individuals would be challenged to sign a pledge stating that they would try to protect wildlife by staying alert when walking their dogs and leashing their dogs around wildlife. This would be paired with information about dog-wildlife interactions. This would be beneficial in two ways; it would provide Reckless and Unformed dog owners with the education they require, and it would provide a clear action that dog owners could take to protect that wildlife. A pledge campaign empowers people to take personal responsibility, which is a sentiment echoed in Chapter 2.5.3 as well as expert interviews. The post would also encourage people to share an image like Figure 47 (Appendix P) and challenge their friends to also pledge.

Figure 47. Social Media Pledge Campaign

5.1.4 Community Outreach

Ensuring that intervention methods are genuine and friendly is difficult to achieve using signage and online platforms, though those are the most likely to reach the largest number of people from our target population. Personal and face-to-face interactions are the most likely to

cause Reckless Dog Owners to react and change their actions and cause Uninformed Dog Owners to absorb wildlife information in a meaningful way, since interacting with a person who is passionate about wildlife will be more powerful than reading something about wildlife. While it may not be possible to expect that DOC and city councils employ rangers to inform beach-goers of the regulations and coastal wildlife, it is possible that community-based outreach events can be held. To increase involvement with the community even more, as well as reduce costs, DOC could partner with conservation and dog-focused community groups for these events. Dog clubs and kennel clubs have the organizational structure to hold events and engage with a large community of dog owners; conservation groups are filled with passionate and knowledgeable volunteers who could educate the public about wildlife in a genuine way.

We recommend that DOC hold a community outreach event with the collaboration of these community groups. This could occur annually if the first proved to be a success. The focus of the community event would be to inform people of the wildlife on local beaches, education required by Reckless and Uninformed Dog Owners, which would increase awareness of that wildlife as well as a pride for it. This would be paired with how dogs can be dangerous to that wildlife, and a challenge for dog owners to protect the wildlife from their dogs. DOC rangers or volunteers from other conservation groups could hold these informational presentations.

Another main focus of the community event would be to encourage dog training, since Reckless Dog Owners have not adequately trained their dogs, and online resources will not be enough to inspire the level of change that is required. Kennel clubs could hold short training sessions, intended to train dog owners on how to effectively train their dogs; this would likely garner business for the kennel clubs, as well as encourage at-home training for those who cannot afford formal dog training. We recommend that these training sessions be paired with a very short talk by a DOC employee or conservation group volunteer, politely explaining why dog training is important in protecting coastal species and how even the smallest dog can be a predator to small birds. Obedience competitions could go alongside these training sessions to involve Uninformed Dog Owners who have trained their dogs, the idea being that dog owners of the community can informally show off the obedience of their dogs. If a dog is very obedient, it would serve as an example or goal to other dog owners. If a dog is not obedient, it would be an eye-opener to the owner that their dog needs more training.

In addition to these sessions, other fun aspects of the event could be added, depending on those involved and the number of resources available. An example could include crafts, with children making dog toys. Another example could be giving away DOC T-shirts or inviting local vendors to be present. Advertising these could draw more people to attend the event and gain the attention of a broader audience. An example poster for a community event can be found below in Figure 48 as well as Appendix Q. This example displays logos from community groups who we spoke to during the course of this project, but they should be replaced with logos from the organizations who are actually involved with the event.

Figure 48. Community Event Poster

5.2 Conclusion

The main goal of our project was to assist the New Zealand Department of Conservation in addressing the effects that domestic dogs have on coastal wildlife. Through our study, we determined that there are different dimensions that dictate how a dog owner may manage their dog while walking on a beach. The behavior and knowledge of different categories of dog owners informed the intervention methods we designed to target them, since most do not meet the standards of the ideal dog owner. In order to further promote the mitigation of destructive behavior, it is important to encourage and engage local communities, and educate them for how to train their dogs and how to be conservation-minded with dog management.

Dog owners who walk their dogs on beaches often and without regard for wildlife pose great risks to the species that live there. This project has the potential to change their behavior to match the ideal dog owner. By learning more about the beaches that they go to and the wildlife that lives there, dog owners will be able to walk their dog while being conscious of the wildlife risks in coastal areas. Promoting the well-being of both dogs and coastal wildlife can provide the compromise necessary to mitigate the threat dogs pose to native species of New Zealand. By limiting the threat that dogs pose to penguins, as well as other coastal species, New Zealanders can help promote the re-establishment of thriving communities of birds on their shorelines. If dog owners understand the great danger that their actions pose to this success, they can start to make a difference in the lives of species that call New Zealand home.

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APPENDICES

Appendix A: New Zealand Dog Control Act 1996 Section 5

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5   Obligations of dog owners

(1)   The obligations imposed on dog owners by this Act require every owner of a dog—

    (a)   to ensure that the dog is registered in accordance with this Act, and that all relevant territorial authorities are promptly notified of any change of address or ownership of the dog:

    (b)   to ensure that the dog is kept under control at all times:

    (c)   to ensure that the dog receives proper care and attention and is supplied with proper and sufficient food, water and shelter:

    (d)   to ensure that the dog receives adequate exercise:

    (e)   to take all reasonable steps to ensure that the dog does not cause a nuisance to any other person, whether by persistent and loud barking or howling or by any other means:

    (f)   to take all reasonable steps to ensure that the dog does not injure, endanger, intimidate, or otherwise cause distress to any person:

    (g)   to take all reasonable steps to ensure that the dog does not injure, endanger, or cause distress to any stock, poultry, domestic animal, or protected wildlife:

    (h)   to take all reasonable steps to ensure that the dog does not damage or endanger any property belonging to any other person:

    (i)   to comply with the requirements of this Act and of all regulations and bylaws made under this Act.

(2)   Nothing in this Act limits the obligations of any owner of a dog to comply with the requirements of any other Act or of any regulations or bylaws regulating the control, keeping, and treatment of dogs.

Appendix B: On-Site Survey Questions

ID# (date-initials-number Ex: 115-MA-2)

_____

What beach is this?

☐ Whitireia

☐ Ngati Toa/Plimmerton

☐ Paekakariki

☐ Oriental Bay/Waterfront

☐ Lyall Bay

Hello, we are students from **Worcester Polytechnic Institute**, an engineering university in Massachusetts, USA. We are doing a project required for our university and are helping the NZ Department of Conservation to understand interactions between dogs and coastal wildlife.

This survey will take approximately **10 minutes** and participation is **completely voluntary.** If at any time you do not feel comfortable answering a question, you have no obligation to do so. Can we have your permission to take notes and record this interaction?

We are looking forward to hearing what you have to say regarding the subject matter. Please let us know if you have any questions regarding the survey. **Thank you**

What is your age?

☐ 18-30

☐ 31-45

☐ 45-60

☐ 61-75

☐ >75

What is your gender?

☐ Male

☐ Female

☐ Other

☐ Prefer not to answer

Do you live in the Greater Wellington area?

☐ Yes

☐ No

What is your occupation?

_____

Which of these choices most closely matches your family structure?

☐ Couple family with dependents

☐ Couple without dependents

☐ Group household

☐ Lone person

☐ One parent family

☐ Other

Do you have any children? Select all that apply.

☐ None

☐ Under age 5

☐ Ages 5-12

☐ Ages 13-17

☐ Adult children ages 18+

What size is your dog(s)? Select all that apply.

☐ Small (less than 10 kg)

☐ Medium (10 kg – 25 kg)

☐ Large (greater than 25 kg)

Answer this question if you responded "Small"

What breed is your small dog(s)?

_____

Answer this question if you responded "Medium"

What breed is your medium dog(s)?

_____

Answer this question if you responded "Large"

What breed is your large dog(s)?

_____

How do view your dog(s)?

☐ A part of the family

☐ A loved pet

☐ An animal in the house

☐ A nuisance

☐ Other

Is your dog(s) a working dog?

☐ Yes

☐ No

☐ Used to be

What type of working dog?

_____

What other pets do you own?

☐ None

☐ Cat(s)

☐ Fish

☐ Reptile

☐ Bird(s)

☐ Other

Are you a part of any club or organization associated with owning a dog? (kennel club, dog walking, dog training, etc.)

☐ Yes

☐ No

What organization?

_____

What type of obedience training has your dog(s) participated in?

☐ Ongoing formal obedience training

☐ Formal training, but only as a puppy

☐ At-home training

☐ None

What wildlife have you observed on this beach?

_____

What beach(es) do you primarily walk your dog(s) at?

_____

How often do you bring your dog(s) to a beach?

☐ More than once a day

☐ Once a day

☐ A few times a week

☐ Less than once a week

☐ Never to rarely

How often is your dog(s) on lead versus off lead on the beach?

☐ Always on lead

☐ Mostly on lead

☐ Equal

☐ Mostly off lead

☐ Always off lead

Answer these question if you did not respond "Always on leash" to the previous question

What are some of the benefits of walking your dog off lead?

_____

Do you find it difficult to comply with leashing regulations?

☐ Yes

☐ No

What difficulties have you run into?

_____

How obedient would you say your dog(s) is?

☐ Very obedient

☐ Mostly obedient

☐ Somewhat obedient

☐ Not obedient

In your opinion, how obedient have you observed other dogs to be?

☐ Very obedient

☐ Mostly obedient

☐ Somewhat obedient

☐ Not obedient

Define what you think it means for a dog to be "under control."

_____

Do you know the leashing regulations of this beach?

☐ Dogs are allowed off leash at all times

☐ Dogs are allowed off leash at certain times

☐ Dogs must be leashed at all times

☐ Dogs are not allowed on the beach at certain times

☐ Dogs are not allowed on the beach at all

☐ I don't know

Answer this question if you responded anything but "I don't know" to the previous question

How did you find out about the regulations?

_____

Has your dog(s) ever interacted with coastal wildlife?

☐ Yes

☐ No

Answer this question if you responded "yes" to the previous question

Describe the interaction.

_____

Has your dog(s) ever chased birds on the beach?

☐ Yes

☐ No

Has your dog(s) ever barked at birds on the beach?

☐ Yes

☐ No

- -

How much of a threat to coastal wildlife to you perceive your dog(s) to be?

☐ A great deal

☐ A lot

☐ A moderate amount

☐ A little

☐ None at all

- -

Do you have any suggestions for informing people about the danger of dogs to coastal bird species?

_____

Appendix C: List of Interviewees

Lee Barry
New Zealand Department of Conservation
Ranger, Community Engagement

Daniela Biaggio
Wellington City Council
Urban Ecologist

Sue Blaikie
Kapiti Biodiversity Project
Project Manager

Laura Boren
New Zealand Department of Conservation
Science Advisor

Andrew Glaser
New Zealand Department of Conservation
Senior Biodiversity Ranger
Whio Recovery Group Leader

Michael Harbrow
New Zealand Department of Conservation
Social Science Advisor

Avril Hay
Kapiti Biodiversity Project
Project Leader

Ken New
Forest & Bird's Places for Penguins
Volunteer

Inger Perkins
West Coast Penguin Trust
Founder and Manager

Glenda Robb
Kapiti Biodiversity Project
Project Manager

Graeme Taylor
New Zealand Department of Conservation
Scientist, Seabird specialist

Karin Wiley
Forest & Bird's Places for Penguins
Co-ordinator

Appendix D: Interview Questions

Lee Barry
1/31/2018
Questions:

- Could you give us more detail on what your role in DOC is?
- Do you have any experience working with dog owners?
- What do you deem to be the main issues when trying to communicate with dog owners?
- Have you noticed any behavioral differences amongst dog owners in terms of valuing wildlife?
- What do you think can be done to improve the compliance to the leashing regulations? What would you change about the regulations?
- Has anything been done to try to educate the people on this matter?
- Do you have any suggestions for reaching out to dog owners?

Daniela Biaggio
1/24/2018
Questions

- What is your job within the WCC? Are you involved in any way with dog leashing regulations?
- What is the reasoning behind the different regulations?
- Do you believe improvements can be made to these regulations in such a way that will cause people to be likely to follow them? (Talk about how the regulations can be confusing)
- Are there any characteristics that you find differentiate certain dog owners in Wellington?
- Do the different district councils ever collaborate on things like this?
- Do you have any suggestions for others we could interview on this topic who might have insight?
- How are regulations enacted/decided? Are they enforced?
- What is the process of putting signage up that reflects the regulations?
- Who has the authority to put up signs/Is there any collaboration with DOC or other organizations?
- Are you/WCC informed of incidents when they occur?
- How closely does the WCC work with DOC?
- What to your knowledge is the easiest way for people to find out about regulations?

Laura Boren
2/9/2018
Questions
- If in the past it has worked to create categories to tailor intervention methods to community members, can you give us an example or describe how this has worked?
- How would you define "the ideal dog owner" in terms of behavior on beaches and knowledge of coastal wildlife?
- What is typical dog owner behavior you have observed on beaches?
- What is problematic behavior?
- Do you have information regarding Kiwi/Penguin aversion training?

Michael Harbrow
2/13/2018
Questions:
- What is your primary role in DOC?
- What are some of the projects that you and your team have worked on in DOC?
- What means of analysis have you used to identify which questions are meaningful and trendy?
- Laura had mentioned that the social science team at DOC had used categories in the past to determine how to tailor outreach programs. Could you give us an example of one of these categories?
- How do people react to DOC research results?
- Do you suggest different solutions knowing that the public will have different interactions with the messages?

Sue Blaikie, Gay Hay, and Glenda Robb
1/23/2018
Questions:
- What are your roles in the Kapiti Biodiversity Project? Could you elaborate more on the goals and methods of the project?
- What have your experiences been with communicating with dog owners about coastal wildlife? Are there any prevailing opinions that you've noticed?
- What do you deem to be the main issues when trying to communicate to dog owners about leashing regulations for beaches?
- Are there any characteristics that you find differentiate certain dog owners in Wellington?
- Can you recall any instances you've observed with dogs being destructive to wildlife?
- What do you think could be done to improve the compliance to dog leashing regulations or improve awareness?
- What would you define as a dog "under control"?

- What is the expectation of responsibility of dog owners that see wildlife in an off lead dog area?
- Any public education efforts that worked?

Andrew Glaser
2/12/2018
Questions:
- We understand you have a lot of experience with dogs and changing human behavior, which is central to our project. First, what more specifically is your job within DOC?
- Can you tell us a bit about kiwi aversion training and how that ties into the inherent nature of dogs?
- What is required in the certification of a conservation dog?
- What is your experience with social marketing regarding topics like this? What have you seen that works and doesn't work?
- Have you observed any useful traits of dog owners that differentiate between them? Our project is aimed to create categories of dog owners to target intervention methods towards, so do you have any insight on that front?
- What would you say is the goal for dog owners? What knowledge and behavior should we be working towards encouraging with our intervention methods?
- What is your opinion regarding the leashing regulations in this area?

Ken New
2/7/2018
Questions :
- What is your role at Places for Penguins?
- How long have you been involved with the organization?
- What is your experience working with dog owners relating to penguin protection?
- We were told you are knowledgeable about the instincts of dogs regarding wildlife, that even the most well-trained dog will kill a penguin if given the chance. Can you tell us more about this?
- Have you noticed any behavioral differences amongst dog owners in terms of valuing wildlife?
- What is your opinion regarding the current beach leashing regulations in the Greater Wellington Area?
- Do you have any suggestions for reaching out to dog owners regarding the leashing regulations?

Inger Perkins
1/26/2018
Questions:

- What is your role about West Coast Penguin Trust?
- How long have you been involved in the organization?
- Do you have any experience working with dog owners relating to penguin protection?
- Have you noticed any behavioral differences amongst dog owners in terms of valuing wildlife?
- What is your opinion regarding the current beach leashing regulations in the Greater Wellington Area?
- Do you have any suggestions for reaching out to dog owners regarding the leashing regulations?

Graeme Taylor
1/26/2018
Questions:

- What is your role at DOC?
- Do you have any experience working with dog owners relating to coastal wildlife protection?
- Have you noticed any behavioral differences amongst dog owners in terms of valuing wildlife?
- What is your opinion regarding the current beach leashing regulations in the Greater Wellington area?
- Do you have any suggestions for reaching out to dog owners regarding the leashing regulations?

Karin Wiley
1/23/2018
Questions:

- What is your role at Places for Penguins?
- How long have you been involved with the organization?
- When did your interest in protecting penguins start?
- Do you have any experience working with dog owners relating to penguin protection?
- Have you noticed any behavioral differences amongst dog owners in terms of valuing wildlife?
- What is your opinion regarding the current beach leashing regulations in the Greater Wellington Area?
- Do you have any suggestions for reaching out to dog owners regarding the leashing regulations?

Appendix E: Interview Notes

Lee Barry

- The other day a penguin came ashore in the middle of Lyall Bay dog beach and DOC was called
- Role: Community ranger - communications for district office, social media, community outreach in summer (go to events to talk about assorted topics), show DOC's face and answer questions, wildlife permits (under wildlife act lots of these are necessary) to determine whether they should be approved
- We don't have the capacity to run prolonged outreach projects or campaigns so it's fairly reactive vs long term plans
- Done things reacting to LBP deaths or reports, then follow up with media stories related but otherwise not really with dog owners
- General impression - people don't really see their dogs as a threat to wildlife (leash in pocket)
- Interested in what's effective for outreach since lots of things are ineffective - we need to determine what works so that we can use our resources on what works
- Leash regulations - it's tricky because those are council responsibilities, they are confusing
    - Need to be strengthened or clarified
    - People think that if people are let off lead that it's safe from wildlife, feel like if there are things to harm somewhere that they wouldn't be allowed off-lead
- Make sure it's clear that wildlife and dog areas overlap
- Different uses for dogs in the same park can be confusing (hunting vs recreation)
- I'm never confident I'm giving correct info for where dogs are and aren't allowed
- Been at DOC 1.5 years
- If hunter asks where he can take a dog, put on hold, find out rules, inform and maybe offer alternative suggestion
- The call dispatch system is roundabout so can take same time which is bad, try not to place blame on person who called, but deliver message broadly with social media coverage of story
- There is 24-hour hotline (the annoying dispatch one) and can call local office
- How often people call asking about regulations? Not often - less than once per week
- People in the area probably already know
- Not something we generally enforce or prosecute
- We don't know if we submit for bylaw review (ask brent)
    - Wellington district includes Hutt Valley (look at website)
- Event this Saturday - snorkel event at Island Bay - and lots of others, taking stuff from last year
- Main barrier/outcome - no wildlife is disturbed or dies
    - Responsible dog ownership/behavior - understanding of where wildlife lives and understanding instinctive dog owner behavior and being responsible
    - Even the most well-trained dog can run off and have the instinct to kill
        - Don't want to frighten people but get across that barrier that people think their dog wouldn't do anything
- Prevent people from having dogs off lead around LBP - irresistible to dogs and vulnerable on land
- Enforcement
- Socializing the right kind of behavior, visual reminder

Daniela Biaggio

- She has been on council for 6 months, expertise is in ecology
- Council has animal bylaw that regulates the keeping of animals and includes a dog policy (you can find it online) – updated in 2016 so relatively recent
- Part of the review of this policy was getting feedback from the community
    - There is a bit of transition with signage
- As a result of the policy changes, there was a recognition that signage should include more maps
- As they need replacement they are replaced/updated, or if there are issues
    - They know dog exercise areas as a whole need review
- Talk to community about availability/location/etc. of off leash areas
    - Fencing of dog exercise areas – expensive to put in and maintain
    - From observations, people aren't aware of regulations or they don't care
    - No physical barrier between sides of Lyall Bay so it would be interesting to know more about that space
- Puts a lot of responsibility on dog owner to know seasonal/changing rules throughout beaches
    - Would like to know if people are walking/driving to the beach
- This affects regulations of pathways getting to these areas
    - Changing the rules for a space affects everyone, not just dog owners
- If dogs are running around and you bring your kids there, it will affect your ability to use that space
- We have a lot of groups that have a lot of interest in the space: wildlife groups, management, public health
- There is a process – registration, consultation
    - National mandate - dog act
        - Set guidelines of what local councils/authorities do
        - Dog management and registration
- Any new laws get consulted by interest groups – want as many as possible
- People's needs and points of view will affect what they need to look into
    - It would be interesting to see difference in beaches we are surveying
- There are a lot of assumptions for who uses them
    - Could go to see other areas highlighted to informally survey/observe if we have the time
    - Found at zoo survey that people think dogs can't get exercise on leash and that people don't know how to walk dog on leash (women pushing stroller can't hold on to leash too), some people are resistant to change
    - Knowledge doesn't equal behavior change (what values are high enough to trigger a change? Ex. Children)
    - People have dog on lead but don't do well with dogs not on lead
- Conflict between users
- Conflict of dog personalities
    - Partially interested in if people will confront people who aren't complying to regulations
- Will probably be more effective that signage (more signage there, more people won't listen)
- It's difficult for people to do, hard to tell whose dog is whose
    - Personal view – government should have clear, easy-to-access information for people (not just signs)

- Society needs to normalize actions we want to foster
- Mass marketing information too but it's the people setting expectations for others
  - Demographics sides across sites may be difficult
  - Good to compare sites under different governments (compare communication and regulation)
  - Hard to collaborate between cities
  - Hutt City Council and animal control same contracted with Wellington
  - Wellington doesn't issue fines until 3rd warning or violation
- Not very strong because unlikely for animal control to find same violator 3 times
  - People are more willing to change behavior if it affects neighbor rather than government simply saying so
- Get that people to put themselves in certain situations – see how they would read to see their real values (ex. Kids)
  - See what will emotionally appeal to people = will see how to change their behavior, want to target
- Will make recommendations more realistic
  - On city council land the council has the primary responsibility on land for signage
  - Kapiti has different council and rules about signage
  - In land areas sometimes have temporary signs for nesting/breeding birds duning certain times of the year
- Have session with WCC after presentation to answer some

Laura Boren
- Andrew Glaser
  - He works on the blue duck
  - His role is conservation dogs (dogs that go find species)
  - Neo the whio dog
  - One of DOC's top dog handlers
  - Different types of dogs
    - Sniff out pests
    - Sniff out protected species
  - Ask him about aversion training
- Categories and DOC's history
  - It was something that in talking with the social science team that was suggested
  - Stemming from conversations with social science team
  - Michael Harbrow – interview mharbrow@doc.govt.nz
- Ideal dog owner
  - Someone who pays attention to their dog and is responsible
  - Pays attention to their surroundings9
  - Mainly just aware
  - I don't like when I see people who are walking their dogs off lead and they're not paying attention to their dog (ex. Down the track, in the bushes, etc.)
  - Walking your dog is for the owner-dog bond, not just exercise, so you don't get that just buried in your phone or something

- o Dog doesn't have to be the perfect angel, but care enough for your dog to be well-behaved
- o For your dog's safety and well-being and the well-being of others
- o Knowing your dog's personality and that not all dogs are the same, so being able to assess whether there are distractions coming up that your dog will be uncomfortable with or react to in some way
- o Might just be giving commands, or directing the dog away from the distraction, or maybe just carry on, but being alert and aware of their dog, distractions, wildlife, and knows how to handle that
- o I could have a bias, but just having knowledge that wildlife is out there could theoretically be enough. If you need to go a step further and mention an endangered bird or something to get attention then great, but wildlife in general is important
- o No matter what, there will be seagulls and stuff. Keep in mind disturbance within reason. Where do you draw the line that dogs/people will always make birds change position.
- o Understand the birds and their biology. Where they nest (oyster catchers nest on the ground in precarious places), oyster catchers will try to lead you away from their nest.
- o There is a certain level of disturbance that will happen no matter what, but avoid wildlife within a radius or go to a different side of the beach or whatever.
- o All the seabirds are protected except for black-backed gulls, so point out that other types of gulls are really endangered and that there are different types of gulls
- o Be interested/careful of people who just don't care, so different intervention methods for them than people who do care
- o Everyone has different interests when it comes to wildlife/conservation
- Typical dog owner behavior?
  - o Lots of owners that are relatively good and do pay attention to their dogs
  - o Some of the biggest things that are frustrating are the people who are 5 minutes down the track away from their dog and you don't know who the owner is
  - o Most frustrations come from dog/dog interactions
  - o Basic ability to paying attention to dog and being able to call it back, same principle that are going to protect wildlife
  - o Frustrating is when there's been a rule change and people ignore it or aren't aware of it. Makes it hard when deciding where to take Mack. Not a big issue, but if the beginning of track should be on lead and Mack is on lead but everyone else is off lead, then I'm more likely to let Mack off lead so he can get away from other dogs
  - o Whitireia is well-posted now so no excuses
- Dog under control
  - o A dog that listens to their owner and can be called back and put on lead if necessary
  - o A dog on a lead is not necessarily under control
    - ▪ Has seen dogs pull their leashes out of the owner's hand or over
    - ▪ Retractable leads are not under control
  - o A dog that can heal, walk on lead loose lead is under control
  - o A child was walking a dog on a bike or scooter at the same time, father wasn't paying attention, dog pulled the child off the scooter

- - Kids walking their dogs by themselves, dogs didn't even have collars on, kids chasing after the dogs, how do you expect to keep them under control without a leash OR collar
- Wildlife doesn't have boundaries
- Bird aversion training has been run through DOC, but also run through community groups and stuff
  - It's sort of shock training
  - A dog is shown a kiwi, and if it reacts, it gets a shock
  - The aversion wears off – should be done/checked annually
  - There have been issues with getting them organized, support, interest, continued, etc.

Michael Harbrow
- If we increased knowledge, does that correlate with other desirable outcomes?
  - The barrier isn't usually awareness or knowledge, but behavior
- Have or haven't worked for DOC
  - An example in Wellington is cats
    - Cats go outside at night and kill birds
    - Create culture for keeping cats inside at night
    - Message about keeping your cat safe or having cat sleep on your kids' bed or whatever resonated more with wildlife
- His specific job is social science advisor
  - Understand people's behaviors and attitudes and apply that knowledge to get different behavior outcomes
- Did a survey and used audience segmentation and divided into 4 segments
  - "talkers not doers" - all factors lined up to be conservation minded but without behaviors
  - "Converted" – Do all the right things
  - "Obligated" – other motivations
  - "Active Outdoors" – outdoors things but didn't care much specifically about conservation, motivation about self and own experience
  - Can give us a copy of this report
- Say you wanted to get dog owners on lead, target messaging for what their motivations are likely to be, themselves, their dogs, others, etc. Maybe one group is more prone to social media
- Might design a program to target only one of these segments
- Determine which group to target
  - Extent to which already engaging in behaviors
  - People tend to report things that are right rather than what they actually do
  - Cost of intervention
- If there is a geographic difference, then develop different intervention methods for that beach
  - But if categories are spread evenly between beaches, develop maybe one intervention method for all of them
  - OR beaches with particular risks or aspects of wildlife that others don't
- Issues with apps include cost of developing, short lifespan, and incentive for dog owners to download it
- DOC primarily uses information, such as
  - Marketing towards tourists targeting at needs and motivations

- o Spread of rock snot or marshal rust
- Enforcement is last resort in some ways, because you want the behavior to be agreed upon to begin with
  - o Use enforcement for last 5 or 10% is less resource intensive and people are happier with you
- Changing social norm
  - o Don't highlight social norm working in the wrong direction (Ex. Don't say "Lots of people have their dog off lead…"
  - o Use example where people are using the right thing
  - o Pictures of target group of people doing the right thing
  - o Positive reinforcement is better
  - o New Zealanders reluctant to play the intervener
- Changing behavior
  - o Use traditional marketing techniques
  - o Community based social marketing – really targeting, target intervention and group that will made the most difference
  - o Nudge theory, make it easier for people (or behavioral insights)
    - ▪ If you have a particular place where you want people to have their dogs on lead, have it close to the car park
    - ▪ Don't put barrier up that would be hard to get a leash through
    - ▪ Reducing barriers or producing enablers
    - ▪ Prompt to do behavior at a barrier
- DOC may be willing to change signage according to seasons, since that does happen in other locations
- Combine particular categories to get the numbers up

Sue Blaikie, Gay Hay, and Glenda Robb
- Project manager (yellow shirt)
- Sue - group with birds, penguins, sometimes lizards
- Penguins in pukerua bay!
- 3 year project
- 6 parts of project - mostly about pest control
  - o Birds, lizards, weta
  - o Dune restoration
  - o Wide range of activities looking at areas of biodiversity
  - o Funded by MFE
- Establishing what is there, what is not there, what needs to be done
  - o A lot of discovery
  - o 50% of budget on pest control
  - o Expert consultants
- Not directly talking to dog owners - focus on projects
  - o Sometimes go to beaches where penguins are and talk to owners who are there about if they know that there are penguins
  - o Byproduct not focus

- Confusion about signage of pukerua bay
- Bylaws about dog walking/leashing review
  - Focus on areas vulnerable for penguins
  - Signage in pukerua bay
- Pro - Cuteness appeal of penguins, people have huge commitments to them!!
  - Sometimes penguins go under people's houses and those people embrace it - most see it as a privilege
- Some people aren't aware of penguins on beach -- need education
  - Penguins ARE here
  - Dogs ARE a threat!
- Someone keeps diary of penguin spotting? Lol
  - Colleen
- Sue with penguin sniffing dog - sometimes encountered dog owners
  - Defensive
  - "Oh my dog would never do that"
- Likes survey - written in way focusing about dogs?
  - Dog muzzling initiative?
  - Ordered muzzles and have most of them left
  - Maybe not the right approach/time
- Muzzled dogs perceived as dangerous -- definitely there is an association
- US/Canada - website trying to make muzzles cool to wear for conservation purposes
- Lack of knowledge
  - Why things are done
  - "Fatal attraction of dogs"
- "a dog that smells a penguin cannot resist"
  - Foresting birds/places for penguins - ken? ****send email for his info****
  - 13th feb giving talk
  - Member of public who does a lot of good presentations
- Young men pukerua bay to plimmerton, fit - dog off lead, dont like being approached
- Size of dog
  - Small dog owners - protective, want to protect from other dogs
  - Med to large dogs - let dogs run and expend their energy
- Age of owners
  - May relate to size of dogs?
    - Older may have smaller dog - easier to control
- Dog needs to run around
  - Offer land further in land near queen elizabeth park? Penguins
    - Trade off - protect penguins, give dog/owners areaa
    - Localized, accessible areas, easy to get to
- Found penguin at entrance to burrow, killed by dog (by types of injuries), other penguin alive in burrow but may not be able to provide for penguin
- Plimmerton
- Penguins can sometimes defend their burrow unless the dog digs out burrow, penguin vulnerable between penguin or beach

- o Time of day/year doesn't really apply because you always have the odd penguin
  - o Ask WCC for reasoning about regulations
- On a leash
- Owner can call and dog comes - not necessarily on leash
  - o Depends on type of prey
- Most reliable is on lead
- It can just happen so quickly
  - o Dog owner may not even know
  - o Can happen before owner can call dog back
- At low tide - dog owners look for foot prints (depends on tide)
- Dog be well put on leashes
- A lot of people have never seen penguins/don't know penguins are there
  - o Again goes back to lack of knowledge
- NOT muzzles lol
- Creative ideas from survey
  - o Increasing signage
  - o Doing things with schools - penguin sign paintings!
    - ▪ Year 7 and 8 cut out shapes of penguins and lizards in woodworking, make penguin boxes -- 700 kids?
    - ▪ Awareness goes up until they grow up
  - o Appeal of creative solutions
- Confrontations makes people defensive
- Make things fun to raise awareness!!
- Focus group in Paekakariki hall
  - o 35 people showed up!!!!
  - o People are enthusiastic
  - o People made nesting boxes
  - o Good turnout

Andrew Glaser
- Senior ranger for biodiversity
- Peer recovery group leader- for blue duck
- Conservation dog handler and certifier for DOC
- Kiwi aversion training
  - o Dogs who have gone feral started targeting kiwis
  - o Kiwis are particularly vulnerable
  - o Very attractive scent
  - o Monitoring about 15 kiwis- 9 are positively identified by dog
- When encounter penguins on beach they are smelly and attract dogs- when they move it is foreign them
  - o They chase after them and then take a bite out of them
- Use stimuli in aversion training
  - o Have a den and put in scent
  - o Walk dog past it

- o When dog gets the scent they administer a shock to deter it from pursuing
- o Also use visual props (stuff kiwis)
- o Hunting dogs are more prone to using their nose
- o Also use movement too - pull weka on string in front of dog
  - ▪ More dogs are prone to chase movement
  - ▪ React before they get the opportunity to get a smell
- o Dogs tend to pick it up rather quickly
- Conservation dogs are under command - dog handlers have to demonstrate obedience commands
  - o Stop from coming and going
  - o Put them in heal
  - o Working on lead in close proximity
- Use to give confidence that they can control them in situation
- Lots of these basic behaviors are not drilled into people's dogs
  - o Ability to recall and stop dogs will minimize a lot of the impact to native wildlife
- Conservation dogs MUST wear muzzle when working in close proximity to birds
  - o Ensures that dog won't be able to bite bird
- Train dogs on specific targets
- Train all dogs tacitly
- Put dogs in situations where they have to avoid other targets (in bush, etc)
  - o Even more of a challenge then training to be on one target
  - o More stimuli the dog has to avoid
- Does social marketing through facebook page
  - o You have to be using quite good images - good image with small narrative will speak volumes
  - o Have to be creative - use simple terms and words, make it humorous and entertaining, capture people's attention, use famous quotes
  - o Quirky stuff and funny stuff works well
  - o Comical expressions on dogs, majestic scenery with dogs
  - o Create ownership- its everyone's problem so you must play your part
- Not a big fan
  - o DOC over explains things
  - o Authoritarian type wording
    - ▪ Can work with penalties
- Health was a primary part of people's interest
  - o Health of species
  - o Health of them and their dogs
  - o Enjoyment of themselves
  - o But also create sense of ownership of protecting species
- Repeat training is the best way to get a dog to listen
  - o But people don't always get the opportunity to repeat train in that environment
    - ▪ People try it out and then there actually is wildlife there and it ends poorly
- Create a good awareness of where these places are and where these species are
  - o Best thing is to keep dog on leash and be responsible
- Encourage people to take good command of dog and take pride of it

- Give them simple ways to help take control/train dog
  - Give them tools
- People think their dog is the best dog and their dog would never be the one to be damaging
  - All dog are a danger and they are linked to wolves
  - Need to tell people that their dog is a danger without being condescending
  - Dogs have a killer streak in them, even little dogs
- Pet owners think that its ok to let their dog wander bc they are friendly, but instances can happen
- Encourage everybody to be professional and control their dogs, give them simple tips
- Under control: dog that follows instructions of handle even in a high level of excitement (kids around, etc), bond with dog- form a relationship with them so that the dog wants to please, use positive reinforcement and right amount of negative reinforcement
- Off leash areas need to be assessed annually by council to see if there is any wildlife around there
- Need more consistent signage and posted around the country
- Awarding positive behavior in owners
  - Working dogs that are trained get a discount from the council
  - Incentivise certain behavior from owners
- Signage around critical areas where there are birds
- Infringement ability
  - No long court proceedings that no one has time for
- Normal dogs are allowed to get kiwi training
  - Hunters and residents around kiwi areas
  - Urban areas are starting to see more kiwis and weka
  - Don't penguin aversion in their area but if there were a lot of penguins in danger they would
  - Big issue is having it readily available to owners and making it affordable
  - Gold coin donation given to local bird conservation
  - Requires a lot of interest from the public
  - Be social with other dog owners to get them interested
  - Need aversion trainer to evaluate dogs temperament and when to give shock
- Do a five year census of penguins with conservation dogs, also do it for kiwis
  - Good opportunity for dogs
- Currently going through our requested university to take an assessment of kiwi training
  - Research various stimuli of dog to see what the primary stimuli are for dogs to see which ones trigger dogs to improve the kiwi aversion training
- Also looking into standardizing props to make sure everyone is using best ones and everyone is using same ones
  - Scent, movement, sounds, etc
- Comes down to understanding dogs and making it a point of interest for public
  - Point out that they can be killers, they are part wolf, they have these instinct in them
  - Their sense of smell, detection of movement, and ability to process things make them a threat
  - Make it clear to people to grab their attention
- Put in touch of lady completing the research (just started it now)
  - Student currently, this is new to her

- - Developed a study design that her peers will be able to look into for improvements to the training

Ken New
- Role at Places for Penguins is a bit undefined
  - Floating amidst management (no fixed role)
  - Gives presentations to interested groups
  - Works sort of as a liaison
  - Helped with Take the Lead at the zoo when that was a thing (Take the Lead took baseline surveys for how many dog owners would keep their dogs on lead when supposed to ~50%)
    - Had help from the zoo who organized things like the printing of pamphlets and stuff
    - Goal was to get brochures to vets, to dog owners when they register which they have to do annually (this didn't happen but it would be a good opportunity to tell people)
- Worked as a volunteer with Places for Penguins since 2010.
- 2007-2012 there was a paid coordinator of the project, then she resigned at the end of 2012 and gave Ken her role, so he put together a group of volunteers to run it and passed over the management role
- Karin Wiley is the expert when it comes to all things penguins and birds, so Places for Penguins looks to her for the expertise and knowledge in that regard
- Operates about 300 traps for pests, increased enormously from about 10 in the beginning
- Enforcement!
- Most people don't know they should be on lead in a public area unless there are signs otherwise
- If you draw to their attention that their dog should be on a lead, standard defense reactions, "like piss off" or "my dog can't read" or "my dog has never shown any interest, my dog is far too well-trained"
- Some people are more responsive, just uninformed, and put their dog on lead straight-away
- Some think you are interfering with their dog's god-given right
- Range of people who are sympathetic, just uninformed, to people who doesn't matter whether they are or aren't informed, they aren't sympathetic
- Quite a few dog attacks this year
- No signage in Houghton Bay by Island Bay, dog off lead recently killed 2 penguins, upset owner said "wouldn't have let my dog off lead if I had known" completely genuinely
- Combination of very poor signage and general public education and differing attitudes amongst dog owners
- Lack of enforcement means people who are unwilling are not being made to follow the rule
- A penguin will stand no chance against even a small dog
- "A domestic wolf in your house"
- Even dogs that are highly trained, like penguin detector dogs or kiwi detector dogs, wear muzzles, because you can't be 100% sure that instinct won't overrun training
- With family dogs attacking children or whatever, it's usually a dog that seems completely socialized and then does something unpredictable

- Muzzling dogs won't go well with owners because it has the connotation of being dangerous vs caution, so a lot of education of dog owners and total lack of enforcement of the rules
- I'm a dog lover so I can sort of see this from both sides
- With attack, some people call DOC, some people call Places for Penguins
- DOC will likely get more funding with new government but previously didn't have the resources to do anything, so if people reported a dead penguin they couldn't do anything about it
- Hard sometimes to differentiate dog vs car (the two major threats), but usually bites are pretty distinctive
- "People don't know that there is a requirement under the Wildlife Act to report for them to tell DOC anyway, and DOC hasn't been pushing it because of their own lack of resources."
- Places for penguins maintains a database of penguins but it's naturally incomplete
- Daniella promised to get the only dog trained to find specifically penguins up here to survey the entire coastline (Allister Judkins and his dog Mena), but it's quite a long process
    - He's come up a few times and the council has had him up a few times
    - They prefer rocky areas to sandy ones because sandy beaches are much too exposed
    - Daniella is hoping to include in her budget to pay for him to come up a few more times
- White flippered little penguin is separate species
- Two clades (descendants of a single female) of little blue penguins, Australian and New Zealand (Australian clade is present in Otago)
- They have behavior differences, NZ comes ashore silently in ones and twos but Australian comes ashore as one huge ass group
- Info from detector dog is probably with the WCC, not complete so not available, but IDK
- Places for Penguins records nesting information on a site recommended by "GIS in Conservation" which is a group of professional GIS people who volunteer spare time to conservation groups, not really sure where the information gets recorded
- Info only started for nesting boxes in maybe 2013/2014
- Nest box program started in 2009, and nest boxes were only checked once every 3 months which was largely useless
- At the end of 2019, there will hopefully be 5 years of reasonably reliable data on nesting/breeding etc. but it's still hard to know, only about 110 nest boxes (zoo had maybe 250 but mostly empty and not effectively monitored)
- Breeding figures have been going up but it's so highly variable so difficult to predict or get hopeful that it won't drop again
- Council had review of dog regulations in the last couple years, and Places for Penguins intervened in that process, because the council is saying things like let all dogs off leash in the winter, but that's the breeding season, etc (although there were a lot of strong dog lobbying groups)
- Island Bay is of lead, so dogs are trashing dunes that were previously restored because dogs are going through them, oyster catchers stopped nesting there
- The conservation groups try to work together but only do so occasionally
- Dog under control obeys dog owner's commands over own desires
- Managed to make sure penguin areas were identified
- Goal
    - Follow regulations

- - Enforce regulations - NEED THIS to change behavior ****
    - Dog on leash isn't necessarily under control (can kill penguins close to the path)
- The smell that penguins give off is highly attractive to dogs, they can't resist, so most obvious nesting areas shouldn't allow dogs at all
- Sending out information with re-registration
- Posters in vets offices, most vets are sympathetic and willing to do that
- Signage - the existing signage is very poor
- Enforcement is a big part of it
    - Council is reluctant because they'll lose money and votes from dog owners
    - But if you're gonna have a rule and people won't respect it, it's like saying it's okay to burgle someone's house as long as you don't get caught

Inger Perkins
- Manager of WCPT 11 years
- Smaller → larger
- Lost a bit of funding DOC
- We've had a big part of dog attacks - one or two dogs have killed a large number of penguins
- It tends to be possibly just one or two dogs
- Create pamphlets about warm and fuzzy dogs and bad dogs
- Focus more on dog owners that have beach front property
- There have been issues and challenges with two of the key counties
- 90-99% of people on board with conservation (of those completing surveys)
- One of the county officers lives right next to to the beach ad has two large dogs - let's them out
- Collection with DOC
- Noticed more dogs on lead
- Children have been taught about dog threats and they hope that community education comes from that
- Edy McDonald used to work at Te Papa
    - Cats need to be kept in doors
- If you can provide education in the light that you are protecting your dog, it will be better received
- Get dog owners to pass on information to other dog owners
- Try to find alternative solutions to telling people information
    - Such as showing dangers to dogs off lead than dangers caused by dogs
- Some owners say "this is too strict" but will find if its clear then they will follow
- "Don't let your dogs go wild" as a message on the beach
- Big sign with "penguin zone" and owner has ripped it out
- One guy used DOC logo without approval
- We need to move towards one sign for council, DOC, WCPT
    - Everyone needs to work together
- Revisit dog restrictions but doesn't know if it when people are walking dogs or if it's houses on the beach
- There are a lot of beach front properties with penguin risk areas
- Look to see if there are any deliverables that we will be able to produce

- Lok into the 1% at the end of the phone call
  - Patagonia did a campaign where 1% of profits go to wildlife conservation, they came to NZ to talk to people like WCPT

Graeme Taylor
- Principal science advisor of marine species environmental department (threatened species, seabirds)
- Hasn't worked directly with dog owners - witness dogs on the beach (professional conservation dogs)
  - Locate predators on offshore islands
  - Look for kiwis on island
  - Detect seabirds (through contractors)
    - Must be trained/able to show that they are fully trained/obedient
  - Dogs are very useful for conservation work
- Not professional dogs are the problem
  - Vast majority on beaches are poorly trained (doesn't come when called, wants to interact with other dogs - same w/ if it's w/ a penguin)
- King penguin reported in media that came up on west coast - people came and wanted to come and see it, brought their dogs and they would torture it
  - Had to move bird to isolation and people got mad
- Found that people are overconfident in the obedience of their dogs
- Works at West Coast in Auckland - dogs are prohibited in some areas
  - Most people let their dogs off leash all the time
  - Only lots of leashes when ranger comes out and fines people - only lasts a couple of weeks
- Birds can't nest where they want to because it's a public place
- Dogs are 50-100 meters ahead of owners
- People in houses near tracks on island (with nest) allow friends to come with their dogs - one of them killed a bird therefore owner decided to ban dogs - built fence
- Part of the problem is people don't report injuries
- Surfers come w/ dogs and leave them on shore when in water
  - Dogs wander in dunes and find birds
  - Fox terriers can burrow and get birds easily
- Most wildlife has decreased because popularity of beaches increased
  - 80s was very desolate but now in summer there are hundreds of people and dogs on the beach
- Terns and flight birds get chased by dogs (people find it fun) - constant harrassment
  - Very dangerous in nesting area (chicks can't get away)
- Braided riverbeds are in danger too
  - People drive four-wheel drive around and bring dogs
  - Danger to terns there
  - Beaches in Auckland - dog found colony of penguins and harmed/killed many → dogs banned
- Penguins became rare on north island

- o Go to offshore islands and boulders
- o They should be nesting on mainland but can't because of populations
- South coast there is a penguin viewing site (but they nest along coast)
- Ecotourism - hotels, etc
  - o People there leash dogs because they see that it can benefit community
- Dog issue is mainly around how people are able to control it
- No licensing surrounding dog (except registering) unless attacking people
- Kiwi aversion training seems to be going well
  - o Same idea can be used for penguins
- Thinks leashing regulations can be better enforced
  - o Waikanae had big signs about leashing, pointed it out to rule breaker and her reaction was that she's been here for years and won't change
  - o (think maybe if he had dog on leash she would listen
- Need to give alternative places for dog owners to go
  - o Make webiste for people to see risk free areas and high risk areas
    - ▪ Put links on facebook
- Advocacy of what dogs can do
  - o Need to make it clear that dogs and birds can't mix - sent mixed messages in one DOC tv special (dogs stress out birds)
- More engagement with dog owners and obedience clubs
- Big lack of knowledge or willingness to do anything
- Some dog owners don't pick up poop on beaches
  - o Some parks will put bags to use but beaches are poorer and don't
  - o Never knew poop could have diseases
- Need to better find places where dogs can be and make it clear where dogs/ can't be
- Chicks freeze from predators in sand
  - o They are build to defend against flying predators not dogs with noses
  - o Dogs interested in rats will be most excited about small birds and may eat it right there (owner may not know that dogs cause some damage)
- People's perception is that the bigger the dog the bigger the danger but in reality any dog of any size is a risk (e.g. jack russells)
  - o Smaller dogs may be even more of a threat
  - o Different breeds have different risks

Karin Wiley
- Messages from council is not straight forward
  - o Doesn't emphasize that dogs must be on lead in public areas
- People get defensive of their dog
- Positive reinforcement - people won't listen to disciplining
- Ignorance w/ dog owners
  - o Their kids are misbehaving as well
- Nest box coordinator → putting them up, monitors, finding places, maintaining, gets call when boxes need fixing
  - o Call about injured birds

- - Meets w/ council
  - A bit involved with vegetation on beaches
  - NIWAR area - new nesting boxes, long term project
  - Monitors = volunteers that are trained to keep an eye on nesting boxes
    - 2 weekly during nesting season
    - Database since 2014
- Warm water make fish go deeper - causes penguins to use more energy to feed --> many die from starving (mainly younger ones that just left nest) birds aren't banded, same birds go to same locations
- Young girl, when young adult looked over penguins (very labor intensive), streamlined nesting box design for PFP
- Dogs on leashes program with vets - did surveys --> that died, trying to get people to start up again
  - Structured talks with people
  - Dealing w press (when penguins are killed) - showed that few people know regulations - info was on website not registration forms - links were not consistent with information (better now)
- There are enough places for dogs but owners are very particular
  - There are a lot more dog owners now and council hasn't kept up
  - Conflicts between different dog owners, dog owners and non owners, etc
  - People think their dog is traine but it's really not
    - Nothing like dogs trained in penguin aversion training
  - Electric collar is the only way to really base train dog
  - Penguin aversion training
    - Must evaluate each dog on merits to accept for training
    - Training gives people false sense of security
      - Training must be updated
    - Too many steps must be achived before penguin aversion training is effective
  - People don't realize that penguins are present
    - Dog grabs them when they dash across walkway to rest
- Nigel is helpful
  - Looking after penguins for 15 years
  - Steer clear of zoo
    - Ended partnership with them last year
    - Gave message that kids could monitor
- Penguin costumes and walk around coastal areas and wait to be approached to inform people, hand out leaflets, be non-threatening
  - Dispell misconception that penguins are like happyfeet
    - They can be violent
- KCC in Forest & Bird - deals with education & zealandia to include seabirds in discussion
  - Did talk in wellington high school
    - Not enough structure when deciding with different age groups - need that to be effective
    - Advocacy part has been missing

Appendix F: Maps of Dog Exercise Areas

Lyall Bay

Lyall Bay Beach

LEGEND
- ● Playgrounds
- ═ WCC Tracks
- Off leash
- On leash
- Restrictions
- Prohibited

Oriental Bay/Waterfront

Oriental Bay Beach:
Off leash - 1 May to 31 October
Prohibited - 1 November to 30 April

Freyberg and Oriental Bay Beaches

LEGEND
- Playgrounds
- WCC Tracks
- Original Dog Exercise Area Boundaries
- Dogs On Leash
- Restrictions Apply
- Proposed Addition
- Proposed Removal
- Prohibited

Ngati Toa Domain

Whitireia Park

WHITIREIA PARK

Kaitawa Point

Kaitawa Pou

Onehunga Bay

Maungaroa

Whitireia Rd

Whitireia
105m

Thornley Street

Golf course

Te Onepoto Stream

Titahi Bay

Onepoto Loop Track

Te Onepoto Bay

To Porirua city centre

To Porirua city centre

State Highway

Māori Pā sites
1: *Kaitawa*
2: *Onehunga*
3: *Te Kahikatoa*
4: *Kaiaua*
5: *Te Neke*
6: *Te Onepoto*
7: *Kahotea*

Natural Features

- Duneland
- Coastal scrub
- Burnt in 2010
- Native bush
- Grassland
- Pine trees
- Stream
- ▲ High point

Other Features

- ● Public entrance
- Road
- Walking & biking track
- Locked gate
- ◆ Building
- ✳ Radio transmission mast

Bus stop	No motorbikes off road in the park
Parking	No off road driving in the park
Toilets	
Information	
Walking / Dog walking	
Mountain biking	
Horse riding	
Fishing	
Rock climbing (at own risk)	
Swimming	
Snorkelling	
Kite surfing	

0   500   1,000 Metres

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

N

121

Paekekariki

PAEKAKARIKI
SUMMER
10AM-7PM
DOG ACCESS
AREAS

Walking tracks and marked areas
are off leash within this area.

8

9

Wainui Stream

10

Queen Elizabeth Park

Wellington Rd

Tilley Rd

The Parade

7

SH1

Beach Rd

Southern end of
Ames Street
Reserve

6 3

4

SH1

Paekakariki Hill Road

5

LEGEND

Dogs Off Leash area

Dogs On Leash area

No Dogs Area

NORTH

SUMMER ACCESS AREAS APPLY
TO BEACH AND FORESHORE
AREAS ONLY FROM 1ST DEC.
TO THE END OF DAYLIGHT SAVINGS
10.00AM - 7.00PM.

DISCLAIMER: While the map provides a
specific indication of dog restrictions in
certain parks, reserves, and public areas
within the District, the maps do not cover
every single open space. Please refer to
the Schedules of the Dog Bylaw 2009
which provide a general statement on the
dog restricted status of all public places,
parks and reserves in the District that
are not covered within these maps.

PAEKAKARIKI
WINTER AND
SUMMER
7PM-10AM
DOG ACCESS
AREAS

Walking tracks and marked areas
are off leash within this area.

Queen Elizabeth Park

Wellington Rd

Tilley Rd

The Parade

SH1

Beach Rd

Southern end of
Ames Street
Reserve

6 3

4

SH1

Paekakariki Hill Road

5

LEGEND

Dogs Off Leash area

Dogs On Leash area

No Dogs Area

NORTH

WINTER ACCESS AREAS APPLY
TO BEACH AND FORESHORE
AREAS ONLY FROM THE END OF
DAYLIGHT SAVINGS TO 30TH NOV.

DISCLAIMER: While the map provides a
specific indication of dog restrictions in
certain parks, reserves, and public areas
within the District, the maps do not cover
every single open space. Please refer to
the Schedules of the Dog Bylaw 2009
which provide a general statement on the
dog restricted status of all public places,
parks and reserves in the District that
are not covered within these maps.
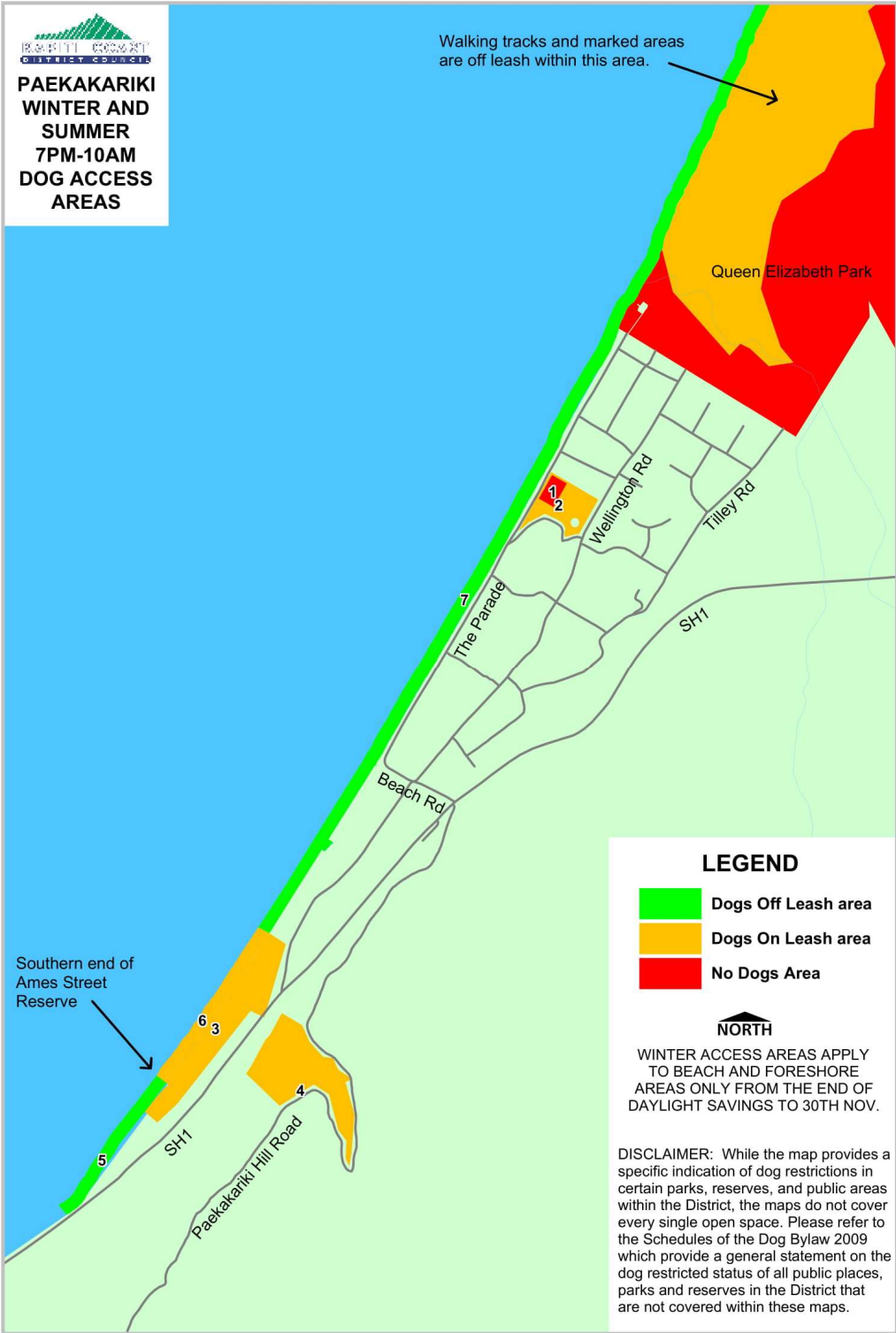
Appendix G: Codes used for open ended questions

Question: What is your occupation?

   a) Retired
   b) Student
   c) Service industry
   d) Skilled professional
   e) Unemployed
   f) Labor
   g) Entertainment

Question: What wildlife have you observed on this beach?

   a) Birds/ Seagulls
   b) Specific coastal species
   c) Marine life
   d) Non-coastal wildlife
   e) No answer

Question: What are some of the benefits to walking your dog off-lead?

   a) Exercise
   b) Socialization with other dogs
   c) Dog well-being
   d) Happiness of owner
   e) Easier off-lead/ dog better off-lead

Question: Define what it means for a dog to be under-control

   a) Voice commands/ Come when called
   b) On lead
   c) Stay close to owner
   d) Not nuisance/ danger

Question: How did you find out about the regulations?

   a) Signage
   b) Facebook page
   c) City council/ Google
   d) Registration
   e) Local knowledge
   f) Don't know

Appendix H: Focus Group Participant Questionnaire

Name: _____

1. What size is your dog?

    ○ Small (< 10kg)

    ○ Medium (10-25kg)

    ○ Large (> 25kg)

2. Where do you most commonly walk your dog(s)? How often?

    _____

3. How often is your dog(s) on lead vs. off lead?

    ○ Always off lead

    ○ Mostly off lead

    ○ Equal

    ○ Mostly on lead

    ○ Always on lead

4. What sort of training has your dog(s) had?

    ○ Ongoing formal obedience training

    ○ Formal obedience training, but only as a puppy

    ○ At-home training

    ○ None

5. How much of a threat to coastal wildlife do you perceive your dog to be?

    ○ None at all

    ○ A little

    ○ A moderate amount

    ○ A lot

Appendix I: Focus Group Agenda

Date: <u>2/17/2018</u>   Location: <u>Titahi Bay Canine Obedience Club</u>   Number of Participants: <u>4</u>

<u>Objectives for this Focus Group:</u>
- Refine our idea of what motivates dog management on beaches
- Determine what needs dog owners have that aren't being met
- Get feedback on what dog owners think about intervention methods in order to help us determine what will actually incite behavior change
- Get feedback of general intervention ideas that we've brainstormed

Focus group participants will fill out a short questionnaire on paper before the start of discussion.

<u>Introduction:</u>

Hello, my name is Kaleigh, and this is Kellen, Ana, and Madeline. We are students from Worcester Polytechnic Institute, an engineering and science school in Massachusetts, USA. We are working with the NZ Department of Conservation to ultimately reduce the impact on coastal wildlife caused by dogs, while also keeping the needs and preferences of dog owners in mind. In order to do this, we need to understand dog owners - their opinions, knowledge, and behavior. We will use this information to communicate with dog owners about the risks their dogs pose to coastal wildlife and what they can do to protect it.

My role is to help get a conversation going and to make sure we cover a number of important topics that we would like your input on. I would like to thank you all for taking time out of your day to come here and discussing your opinions. You have been asked to participate in this focus group because you are all dog lovers and dog owners in the Greater Wellington area.

This focus group will take an hour to an hour and a half and participation is completely voluntary. If at anytime you do not feel comfortable speaking or answering a question, you have no obligation to do so. Notes will be taken during this focus group, and we would also like to audio record the discussion so we don't miss anything important and can revisit the information if necessary. If you are not okay with notes being taken or the discussion being recorded, please let us know. All responses will be kept anonymous.

Here are a few ground rules before we get started.
- I might move you along in conversation. Since we have limited time, I'll ask that questions or comments off the topic be answered after the focus group session
- I'd like to hear everyone speak so I might ask people who have not spoken up to comment
- Please respect each other's opinions. There's no right or wrong answer to the questions I will ask. We want to hear what each of you think and it's okay to have different opinions.

- We'd like to stress that we want to keep the sessions confidential so we ask that you not use names or anything directly identifying when you talk about your personal experiences. We also ask that you not discuss other participants' responses outside of the discussion. However, because this is in a group setting, the other individuals participating will know your responses to the questions, and we can not guarantee that they will not discuss your responses outside of the focus group.

Again, your participation here today is totally voluntary. So if you are okay with moving forward, please sign the sheet that Kellen will pass around. Now to get started! We'll start with short introductions.

Short introductions: Tell us where you're from, what type of dog you have, and what you usually like to do with your dog

Discussion Questions:
1. What are your thoughts about the leashing regulations in this area?
   a. Touch on: how they learn about regulations and how this could be improved; whether they think the regulations are unfair and for what reason
2. What would motivates the way you manage your dog on the beach?
   a. Touch on: would they change their behavior with children, something they deem unsafe for their dog, whether others are following the rules, wildlife
3. How aware are you of the wildlife on beaches that you bring your dogs to?
   a. Touch on: how they learned about the wildlife, whether they know where it's found, do they think it's important for people to know about the wildlife
4. When it comes to you and your dog, how would you prefer important information (about wildlife or regulations) be presented to you?
   a. What do you think is important for signage? (ex. What type of wildlife, where the wildlife is, what the regulations are, etc.)
   b. Would you be interested in a community event for dog training and wildlife information?
   c. What do you think of, for example, text message alerts or information sent out with re-registration?
   d. Do you have any other possible ideas?

Design Rank Analysis

(Draw on whiteboard and complete as group)

	Visual	Interactive	Informative	Virtual	Portable	Personal
Visual	■					
Interactive		■				
Informative			■			
Virtual				■		
Portable					■	
Personal						■
Total						

Definitions of each category -

Visual: A solution filled with images or imagery, maps, videos, and colorful
Interactive: A solution where a user has to actively engage with the system, physical touch
Informative: A solution filled with text and background about species, wording and stories
Virtual: Something accessible on the internet or hypothetical represented in real life
Portable: Something to carry around from location to location or on your person
Personal: Narrative based and person to person

Appendix J: Design Matrix and Weighted Scores

	Cost	Scalability	Ease of upkeep	Independence	Realistic	Supplemental
Cost		0	0	1	1	0
Scale.	1		1/2	0	1	0
Upkeep	1	1/2		0	1	0
Indep.	0	1	1		0	1
Real.	0	0	0	1		0
Suppl.	1	1	1	0	1	
Totals	3	2 ½	2 ½	2	4	1
	75	62.5	62.5	50	100	25

Signage	Cost	Scalability	Ease of Upkeep	Independence	Realistic	Supplemental	
Poo bag station	2	4	3	3	4	5	12.625
Dynamic signage	3	5	4	4	4	5	15.125
Interactive signs	2	5	4	4	3	5	13.375
Bird to scale	4	5	5	5	5	5	18
Uniform between councils	5	2	2	1	2	5	10
Community Event							
Give out leashes/shirts	1	2	5	5	3	5	11.875
Training workshop	2	3	1	5	2	3	9.25
Obedience test/competition	3	2	5	5	4	2	13.625
Seminar on the beach	1	3	2	5	1	1	7.625
Crafts	4	3	3	5	3	1	12.5
Wildlife info session/pamphlets	4	3	4	5	3	3	13.625
Pledge Campaign							
Adopt-a-bird (add to community event?)	5	5	4	4	5	2	16.875
FB challenges	5	5	2	4	5	2	15.625
Delicate bird challenge	3	3	4	4	3	1	11.875
Zombie text game	5	4	3	5	3	1	13.875
Advertisement							
Bus advertisements	1	4	5	2	3	2	10.875
Large ass dog (building mural)	1	2	5	4	4	2	11.625
Wallet cards with DOC numbers (more direct reporting number)	4	5	4	1	5	5	15.375
Birds of the month	4	5	2	2	5	2	13.875
Info at registration	4	5	3	5	4	4	15.5
Bird scale poster (vet offices)	3	4	4	4	5	2	14.75
Technology							
Text/email alerts	5	4	1	3	3	4	12.375
Regulation map database	5	4	1	2	2	5	11.125

Appendix K: Dynamic Signage
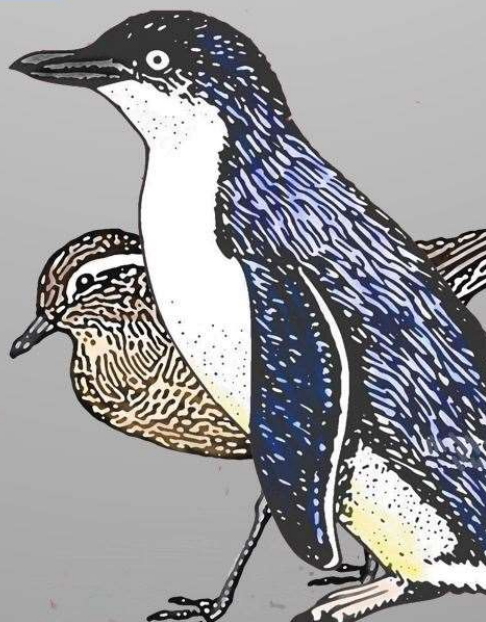
Appendix M: Small Wildlife Signage

Variable oystercatcher/tōrea

Appearance

Adults have black upperparts, their underparts vary from all black, through a range of 'smudgy' intermediate states to white. The proportion of all-black birds increases as you head south.

They have a conspicuous long bright orange bill (longer in females), and stout coral-pink legs; their eyes have a red iris and the eye-ring is orange.

Nesting and breeding

They breed in monogamous pairs and defend territories vigorously against neighbours. Nests are normally simple scrapes in the sand and the 2–3 eggs are laid from October onwards. Incubation is shared and takes about 28 days.

Because oystercatchers nest on the sand, their eggs are often vulnerable. **Breeding success may be low due to human recreation and predation by animals, including dogs.**

New Zealand Status:
Endemic

Conservation Status:
At Risk – Recovering

Breeding Season:
September–March

Emergency hotline
Call **0800 DOC HOT** (0800 362 468) immediately if you see anyone catching, harming or killing native wildlife.

Department of Conservation
Te Papa Atawhai

New Zealand dotterel/tūturiwhatu

Conservation

The endangered New Zealand dotterel was once widespread and common. Now there are only about 1,700 birds left, making dotterels more at risk than some species of kiwi.

Habitat and disturbance

New Zealand dotterel nest in open sites, typically low-lying sand or gravel banks and sandbars close to beaches and lagoons.

On the beach, nests are easily destroyed by careless feet, dogs and off-road vehicles. When adults are disturbed while incubating and leave the nest, the eggs are at risk of overheating. When young chicks are disturbed, they can die from exhaustion as they cannot eat in time, or get to their feeding grounds at the water's edge.

Uncontrolled dogs running through nesting areas can crush eggs, disturb nesting adults, and kill chicks.

New Zealand Status: Endemic

Conservation Status: Threatened – Nationally Vulnerable

Breeding Season: August–February

Emergency hotline Call **0800 DOC HOT** (0800 362 468) immediately if you see anyone catching, harming or killing native wildlife.

Department of Conservation
Te Papa Atawhai

Little penguin/kororā

The world's smallest penguin – little penguin – is just over 25 cm tall & weighs about 1 kg.

Breeding and Moulting

Traditional nests are in underground burrows, under vegetation, in crevices, between rocks or in caves. They may waddle up to 1.5 km from the sea, and climb 300 m to find the perfect nest site.

Adults also come ashore to shed their feathers and grow a new waterproof coat. This moult period lasts about two weeks and can happen any time between November and March. The penguins are especially vulnerable at this time as they cannot swim.

Declining Populations

Where predator control is in place, populations have been stable or increasing. However, their population and range has been declining in areas not protected from predators, such as certain beaches. **Dogs are likely the greatest threat to little penguin.**

New Zealand Status:
Native

Conservation Status:
At Risk – Recovering

Breeding Season:
July–February

Moulting Season:
January–March

Emergency hotline
Call **0800 DOC HOT** (0800 362 468) immediately if you see anyone catching, harming or killing native wildlife.

Department of Conservation
Te Papa Atawhai

STOP

Is your dog
within sight?
Is your dog
under control?

Please help protect our native wildlife by keeping your dog nearby and under control.

Little Blue Penguin

Eudyptula minor, **Kororā**

- **Smallest penguin** in the world
  - Length: 33 cm   Weight: 1 kg
- Only penguin that is not strictly black/grey and white
- Can be found in the **Wellington/Kapiti Region**
- Nests in dunes, under driftwood, under tree roots, rocky crevices, burrows, caves, and nest boxes
  - Occasionally **nests far inland**
- Lays eggs between July and December
  - Chicks weigh approximately 35 g
- Classified as "**at risk**"

Bird of The Month

Department of Conservation
Te Papa Atawbal

Forest & Bird
GIVING NATURE A VOICE

Appendix P: Pledge Campaign Graphic

Appendix R: Dog Owner Category Breakdown