



Nose to Tail, 2020

The knowledge, behaviour and motivations of people walking dogs on Te Henga / Bethells Beach.

A report written for the Waitakere Ranges Local Board, June 2021

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Introduction

Globally, domestic dogs (*Canis familiaris*) are highly abundant within human populations with approximately 30% of households owning a dog (Ioja, Rozyłowicz, Pătroescu, Niță, & Vânaș, 2011). Public outdoor areas have been designated to support dog behaviour by allowing exercise in open spaces (Weston, Fitzsimons, Wescott, Miller, Ekanayake, & Schneider, 2014). As New Zealand has significant coastal areas, beaches are popular open spaces for dogs to be exercised. However, coastal areas are the natural habitat for New Zealand's threatened shorebirds (Bowes, Keller, Rollins, & Gifford, 2018). One of these is the New Zealand dotterel (tūturiwhatu) (*Charadrius obscurus*), which are found nesting in open sites, commonly in low-lying sand or gravel banks and sandbars close to beaches (NZ Birds Online, 2013; NZ dotterel, n.d).

The major threats to New Zealand dotterels are predominantly dogs, which cause disturbance, spread disease, and alter ecologies (Glover, Weston, Maguire, Miller, & Christie, 2011; Lafferty, 2001). Dogs have been reported to chase the adult birds resulting in extended absences from nests leaving eggs or chicks vulnerable (Maguire, Cullen, & Mead, 2013). Weston & Elgar (2007) found the prolonged absences from nests occurred most often when humans approached with an unleashed dog present, which was more than double that of people approaching alone. The repeated exposure of unpredictable speed, proximity, and movement from unrestrained dogs chasing the birds causes sensitization (Glover et al., 2001). This sensitization evokes an increased flight response from beach-nesting birds when walkers are accompanied by a dog rather than alone (Lord, Waas, Innes, & Whittingham, 2001; Taylor, Green, & Perrins, 2007; Sastre, Ponce, Palacín, Martín & Alonso, 2009). Three shorebird species; latham's snipe (*Gallinago hardwickii*), pied oystercatcher (*Haematopus longirostris*), and masked lapwing (*Vanellus miles*), have been shown to have the highest Flight Initiation Distance (the distance at which a bird flees from perceived danger) when advanced by joggers and humans with leashed dogs (Glover et al., 2011). Egg predation and crushing also impact beach-nesting birds, and off-leash dogs have been documented partially or entirely damaging nests, including those where deterrent or temporary fencing has been constructed (Weston, Dodge, Bunce, Nimmo, & Miller, 2012).

With societal norms being a major driver in public behaviour and compliance (Young, 2015), working towards behavioural change of dog-walkers and creation of new social norms may be a significant tool for the implementation of management strategies to increase compliance (Bowes et al., 2017; 2018; Williams, Weston, Henry, & Maguire, 2009). Jaeger & Schultz (2017) found that although social norms are an underestimated driver for behaviour change, they are a valid source of behavioural information for the public. Social norms allow individuals to make quick judgements when making behavioural decisions, and, therefore, serve as a regulatory role in a group or community (Cialdini, Reno, Kallgren, 1990). They set the basis for behaviours that are expected of individuals in a particular situation and establish which behaviours are punishable (Cialdini et al., 1990). Social pressure allows us to learn acceptable behaviours and discourage socially undesirable behaviours thus creating positive outcomes (Poškus, 2021).

Zapata-Rios (2018) stated that domestic dogs not only impact shorebirds but have the potential for a far wider impact on the structure and function of ecosystems, even to the point of identifying dogs as invasive species. The conservation of New Zealand shore-nesting birds, such as the New Zealand dotterel, is contingent on public compliance with the legislation regarding dog walking on New Zealand beaches, such as those created by Auckland Council for the walking of dogs on beaches in the Auckland region (Auckland Council, 2020). However, compliance of dog walkers to these regulations has been raised as an issue both in a previous Auckland Council report (Lukies

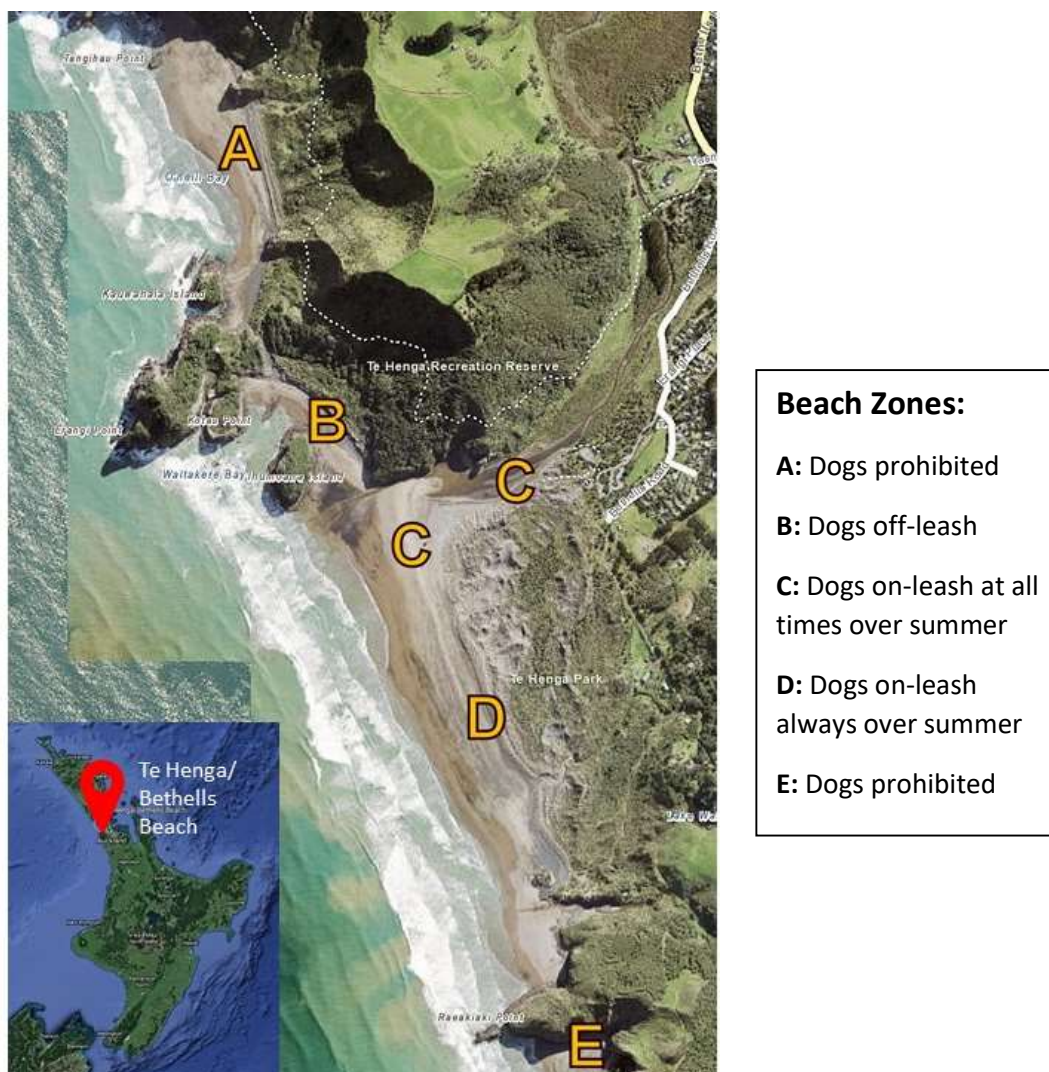
et al., 2018) and specifically by the Waitakere Ranges Local Board. As such, the Waitakere Ranges Local Board is interested in determining the knowledge of by-laws of dog walkers on Te Henga/Bethells Beach and their motivations for compliance and non-compliance. The aim of this pilot study is to obtain the baseline information required to assist with management decisions to increase dog walking compliance on Te Henga/Bethells Beach for the protection of the resident wildlife, and to provide recommendations.

Method

Study site

Data was collected from Te Henga/Bethells Beach, located approximately 36km northwest of Auckland City. The beach was divided into zones according to the Auckland Council bylaws for walking dogs on Te Henga/Bethells Beach as shown in Figure 1.

Figure 1. Map of Te Henga/Bethells Beach, West Auckland, including the designated Zones according to the Auckland Council dog-walking bylaws (Auckland Council, 2020).



Data Collection Schedule

Data collection was carried out over a period of 7 weeks in January and February of 2021 during the times stated in Table 1 below.

Week 1 involved the observation of dogs being walked on the beach in relation to the compliance with the dog-walking bylaws, i.e., if they were on or off the leash in the correct zones. After discussions with members of the Dotterel Minder Society locations for observation were established at the lagoon side of the main beach entrance (Zone C) and the entrance to the off-leash area (Zone B). This provided fully visibility of the beach and allowed us to capture the dogs and dog walkers present on the beach.

The following observations were recorded on a Microsoft Excel spreadsheet: the location of entry, the number of dogs, the number of people in the group, if the dog(s) were on or off-leash in each location they entered, which location the dog(s) were let off-leash, if the dog(s) had access to the dunes, if the dog(s) chased birds, and if the dog(s) off/on-leash status changed throughout their walk.

Weeks 2 and 3 consisted of surveying dog walkers, as per described below. Every dog walker on the beach during our surveying times was approached and asked to participate in the survey. A total of 60 people participated in the survey. The number of refusals was not recorded but is estimated to be around 10 people.

Week 4 involved the repeat of observations of dogs as per week using sa1 to determine if any change to compliance could be observed as a result of the interaction with the survey. A further week of observation was planned for week 7, however, due to the Covid-19 lockdown restrictions and lack of positive change observed in week 4, this was not completed.

Survey of dog walkers

All dog walkers were approached and invited to complete an anonymous survey (Appendix). The survey asked a total of 19 questions regarding knowledge of the dog walking bylaws for Te Henga/Bethells Beach, motivation for walking dogs on beaches both on and off-leash, and their attitudes to the protection of wildlife on the beach. Surveys were completed either via a Zoho Survey using Samsung Galaxy tablets or manually on the printed copies of the survey. Partially completed surveys were not included in the data analysis. While participants were completing the survey, researchers stepped back and did not speak to them in an attempt to reduce any influence or added pressure.

The survey was tested by academic staff and students in the School of Animal and Environmental Sciences at Unitec New Zealand and comments and feedback were integrated into the survey before use on Te Henga/Bethells Beach.

It was estimated that it would take 5-10 minutes for participants to complete the survey.

Data analyses

All data underwent descriptive analysis. The observational data were analysed using a Chi-squared test.

Table 1. Data collection schedule regarding knowledge and compliance to the Auckland Council bylaws for walking dogs on Te Henga/Bethells Beach, Auckland.

Week	Sampling activity	Date	Morning Sampling (6:30-9:30am)	Afternoon Sampling (3:30-6:30pm)
1	Observation of Dogs	19/1/21	√	
		20/1/21		√
		21/1/21	√	
		22/1/21		√
		23/1/21	√	√
2	Survey	26/1/21	√	
		27/1/21		√
		28/1/21	√	
		29/1/21		√
		30/1/21	√	√
3	Survey	2/2/21		√
		3/2/21	√	
		4/2/21		√
		5/2/21	√	
		6/2/21	√	√
4	Observations of Dogs	9/2/21	√	
		10/2/21		√
		11/2/21	√	
		12/2/21		√
		13/2/21	√	√
7	Observations of dogs was not repeated, due to Covid-19 lockdown restrictions and results from week 4 observation			

Results

Participation Rate

Every dog walker on the beach during our surveying times was approached and asked to participate in the survey. A total of 60 people participated in the survey. The number of refusals was not recorded but is estimated to be around 10 people.

Demographics

A total of 60 people answered the survey in 12 collection times across 2 weeks. Of all the participants in the survey, 55% identified as female, and 43% identified as male, while 1 participant preferred not to state their gender (Figure 2). The highest number of participants (23%) were between the ages of 20 and 59 years old (Figure 3). A slightly higher number of participants (58%) regarded themselves as living local to the beach, while 40% were from Auckland and only 1 person from outside of Auckland (Figure 4). The majority of participants walked 1 dog (68%) and were the owner of the dog (93%) (Figures 5 & 6 respectively). The frequency that people walked their dogs on Te Henga/Bethells beach ranged from 15% to 23%

across the responses of daily to rarely, with weekly being the most common response (23%) (Figure 7). Peak dog walking times were identified as 4-7pm with a smaller peak during 7-9am (Figure 8).

Figure 2. Gender of participants

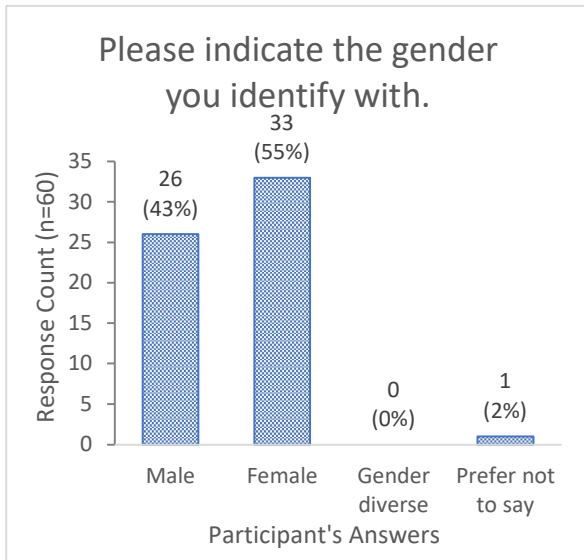


Figure 3. Age category of participants

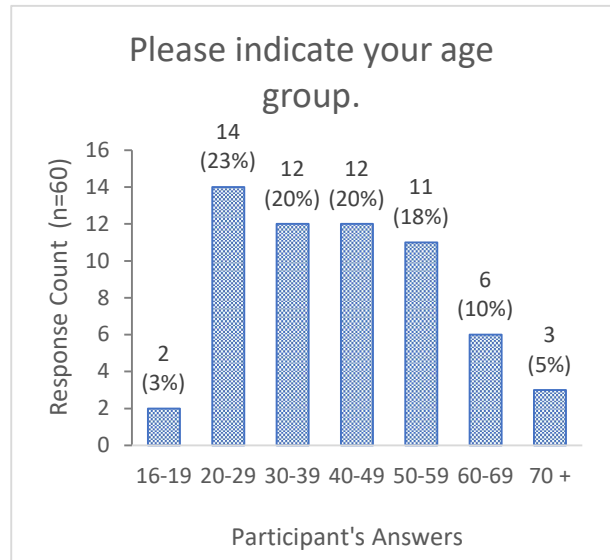


Figure 4. Location of residence of participants

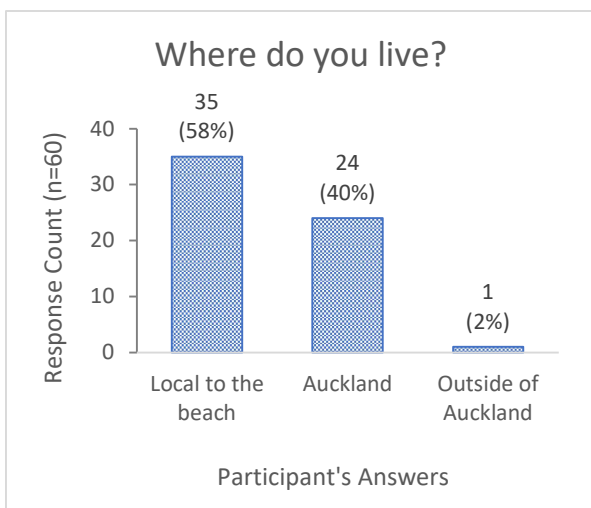


Figure 5. Number of dogs being walked by participants.

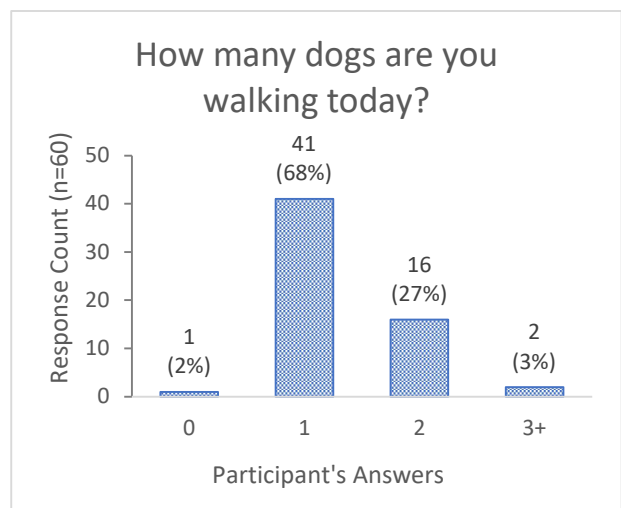


Figure 6. Number of participants walking their own dogs.

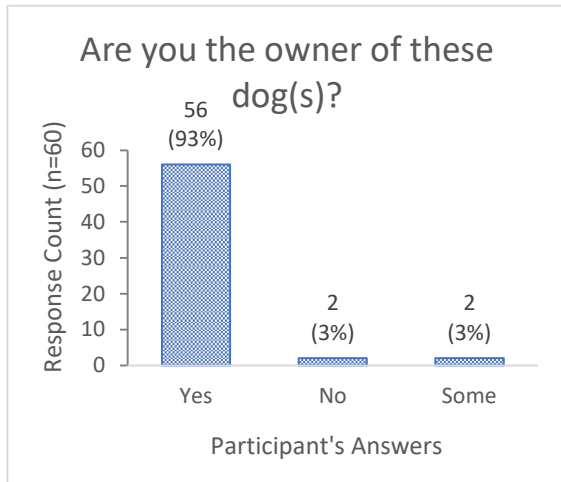


Figure 7. Number of times dogs were walked on Te Henga/Bethells Beach.

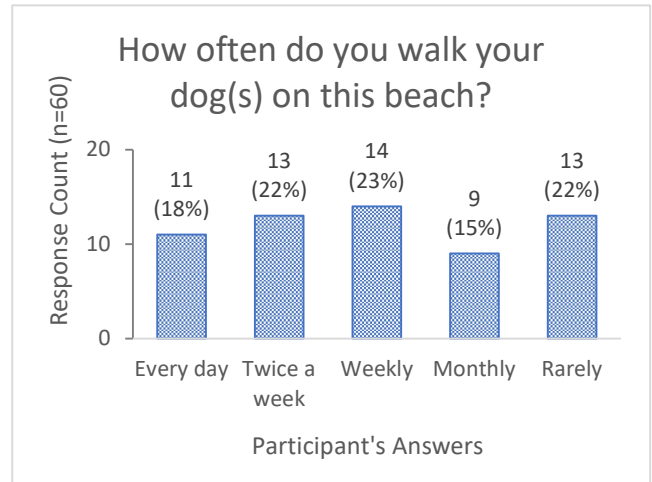


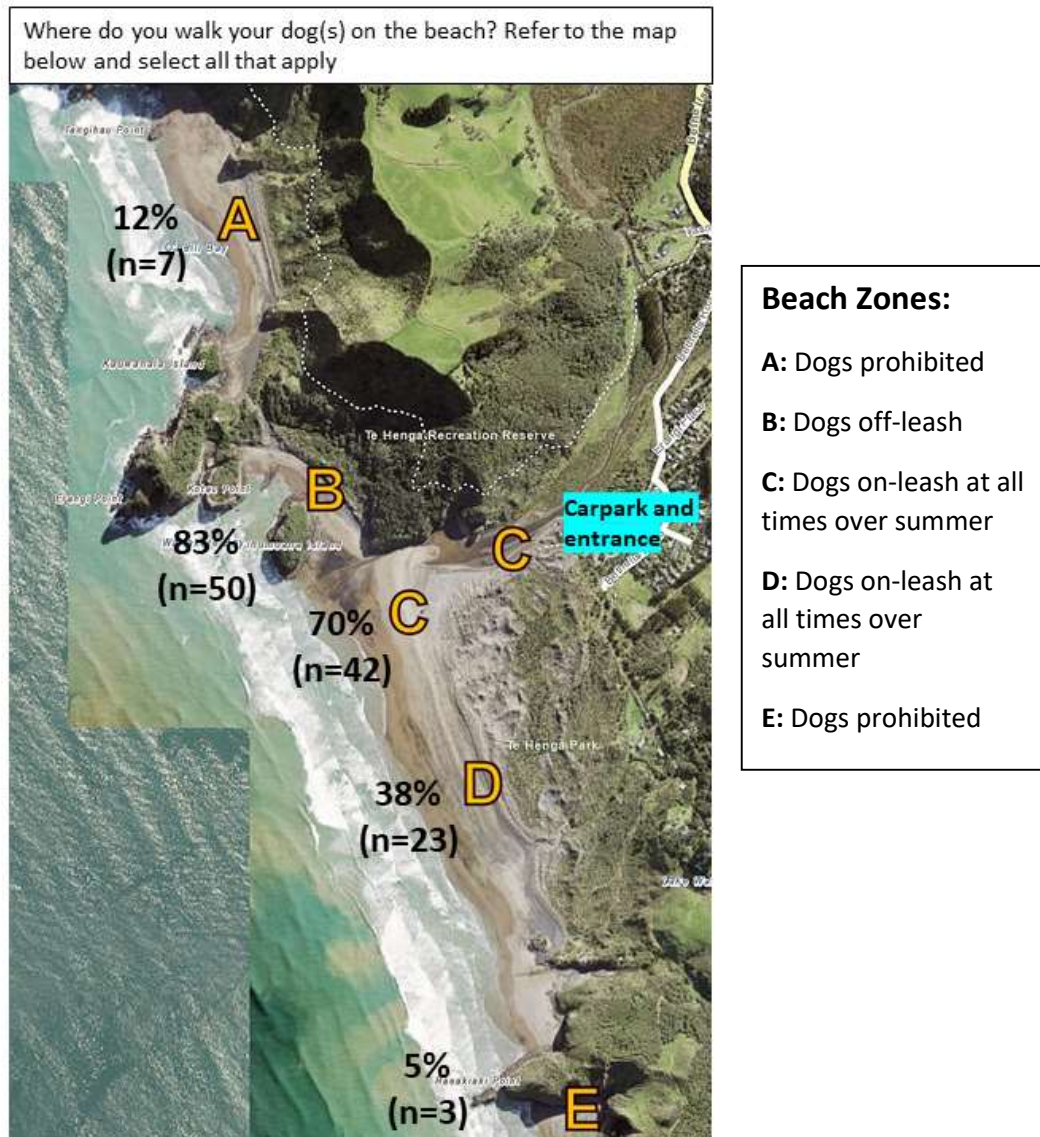
Figure 8. Times in which dogs were walked on Te Henga/Bethells Beach



Location of where dogs were walked

In relation to the locations that dogs were walked, 83% (n=50) responded that they walked their dogs in Zone B, 70% (n=42) in Zone C, and 38% (n=23) in Zone D and 12% (n=7) and 5% (n=3) answered that they walk in Zones A and E respectively (Figure 9).

Figure 9. Locations where dogs are walked on Te Henga/Bethells Beach



Identification of which zone dog walkers have their dog on- or off-leash

The responses to this question were assessed for each zone independently of the others as the response rate varied between zones. Of the people that responded for Zone A (dogs prohibited), 47% walked their dog on-leash, while 29% said they were off-leash and 24% said it depended on other factors (Table 2). In relation to Zone B (off-leash), 21% walked their dog on-leash while 74% were off-leash and 5% said 'Depends'. Zone C (on-leash), 54% of dogs were on-leash while 30% were off-leash and 16% said 'Depends'. Zone D (on-leash) 50% of dogs were on-leash, 32% were off-leash and 18% stated 'Depends'. Zone E (dogs prohibited), 36% were walked on-leash, 45% were off-leash and 18% said 'Depends' (Table 2).

Table 2. Response rate for Q5 Of the areas that you walk your dogs during summer, do you usually have your dog(s) on or off the leash?

Area	By-law requirement	"On-leash" response (%)	"Off-leash" response (%)	"Depend" response (%)	Number of people who answered
Area A	Dogs prohibited	47%	29%	24%	n=38
Area B	Dogs off-leash	21%	74%	5%	n=57
Area C	Dogs on-leash at all times in summer	54%	30%	16%	n=57
Area D	Dogs on-leash at all times in summer	50%	32%	18%	n=44
Area E	Dogs prohibited	36%	45%	18%	n=22

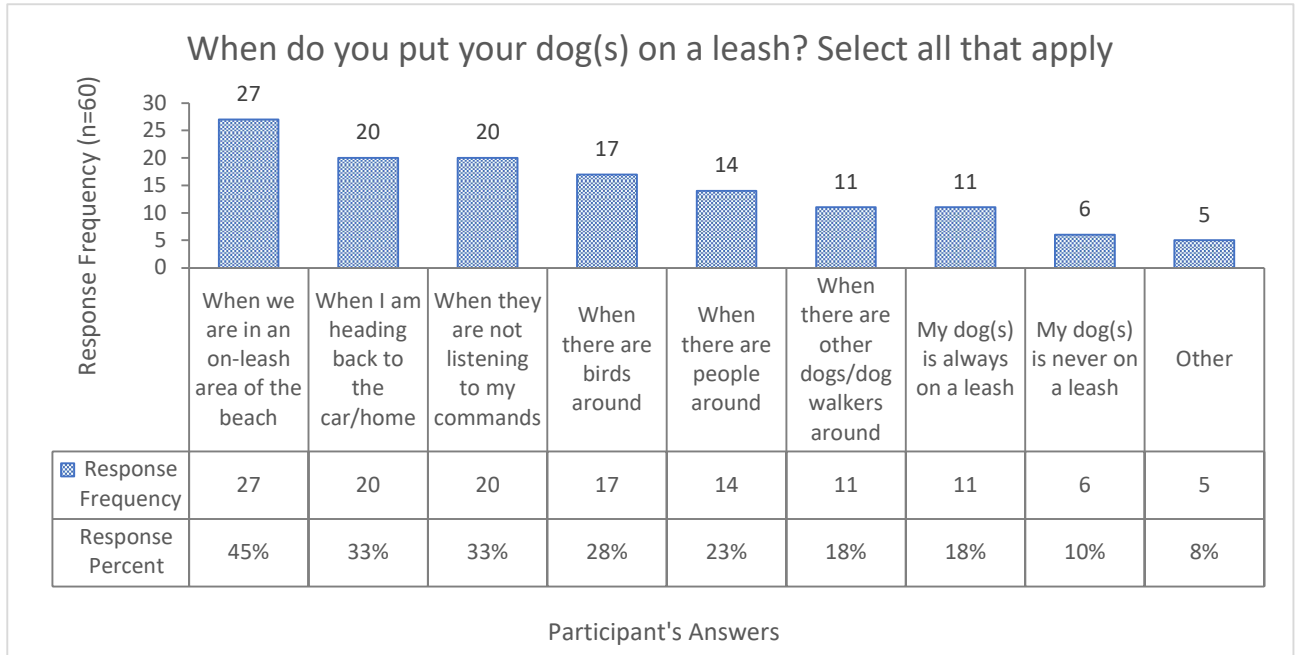
Motivation for walking dogs on-leash

Responses to the question about dog walker's motivations for putting their dog on a leash frequently received multiple responses per participant (131 responses from 60 participants) (Figure 10). Of the options provided, "When we are on an on-leash area of the beach" showed 27 responses, i.e., 45% of the 60 participants chose this option. The options of "When I am heading back to the car/home" and "When they are not listening to my commands" were selected 20 times each (33% of the 60 participants), and "When there are birds around" was selected by 17 participants (28% of the 60 participants). Both "When there are other dogs/dog walkers around" and "My dog(s) is always on a leash" scored 11 responses each (18% of the 60 participants). Of the 60 participants, 6 (10%) stated that their dog was never on a leash and 5 (8%) stated another reason (Figure 10).

Motivations for letting dogs off-leash

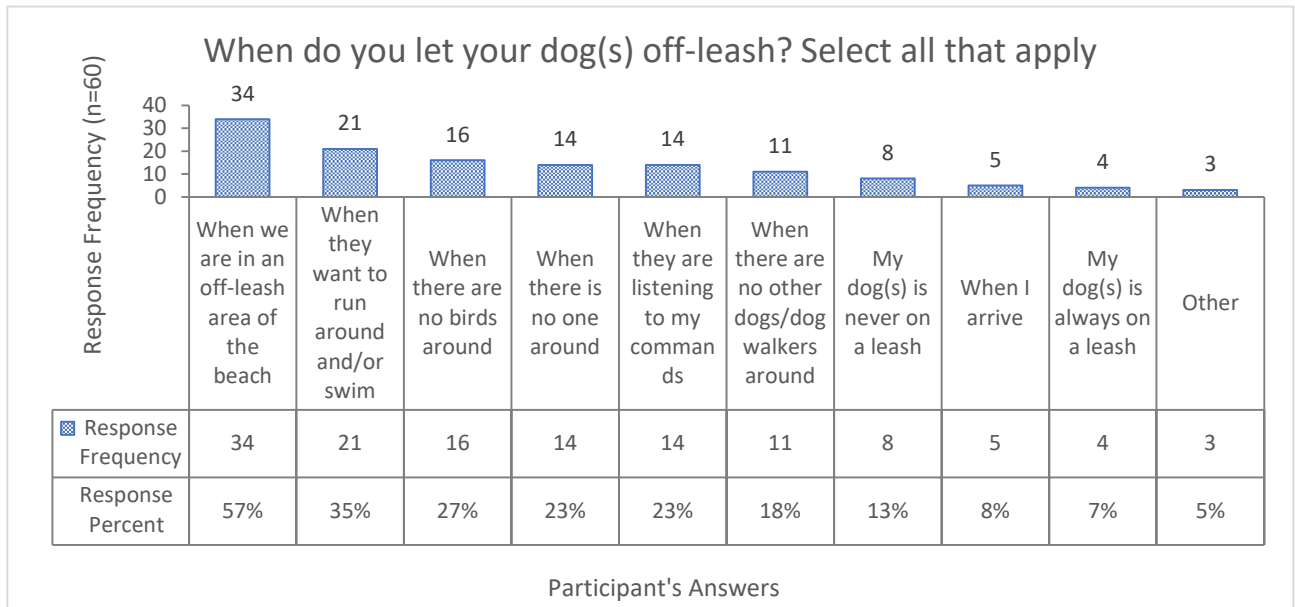
There were also multiple responses in relation to the reasons for letting their dog off-leash (Figure 11). "When we are in an off-leash area of the beach" had the most responses (34, 57% of 60 participants), with "when they want to run around and/or swim" being the second most chosen answer with 21 responses (35% of 60 participants). The options of "When there are birds around", "When there is no one around", "When they are listening to my commands" and "When there are not other dogs/dog owners around" received 16 (27%), 14 (23%), 14 (23%) and 11 (18%) responses from participants respectively. Of the 60 participants, 8 (13%) indicated that their dog was never on a leash (Figure 11).

Figure 10. Motivations for participant to have their dogs on a leash.



Note: Other responses included: "When I'm at the water", "She's still a pup", "Always on-leash now signs are up", "Signs", and "Dodgy looking dogs".

Figure 11. Motivations of participants to let their dogs off-leash.



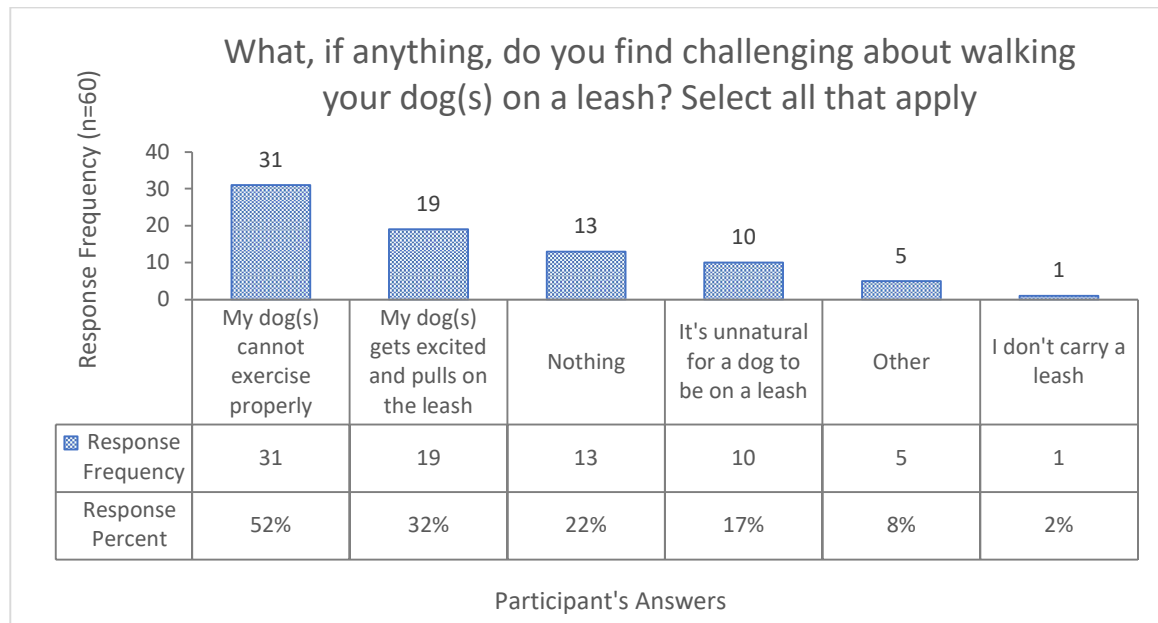
Note: Other responses included: "My dog is actually trained not to chase birds", "Safe", and "Rarely off-leash".

Challenges regarding walking dogs on-leash

The challenge to walking dogs on-leash that was identified most frequently was "My dog(s) cannot exercise properly" (52%, n=60 participants) (Figure 12). "My dog(s) gets excited and pulls

on the leash" was the next most frequent response (32%), while "nothing" and "It's unnatural for a dog to be on a leash" received 22% and 17% of responses, respectively. One participant identified that they did not carry a leash (Figure 12).

Figure 12. Challenges identified by participants regarding walking dogs on-leash.



Note: Other responses included: "When there are horses around", "My dog walks better off-leash", "Dog wants to swim and he can't", "Other dog owners", and "Defensive".

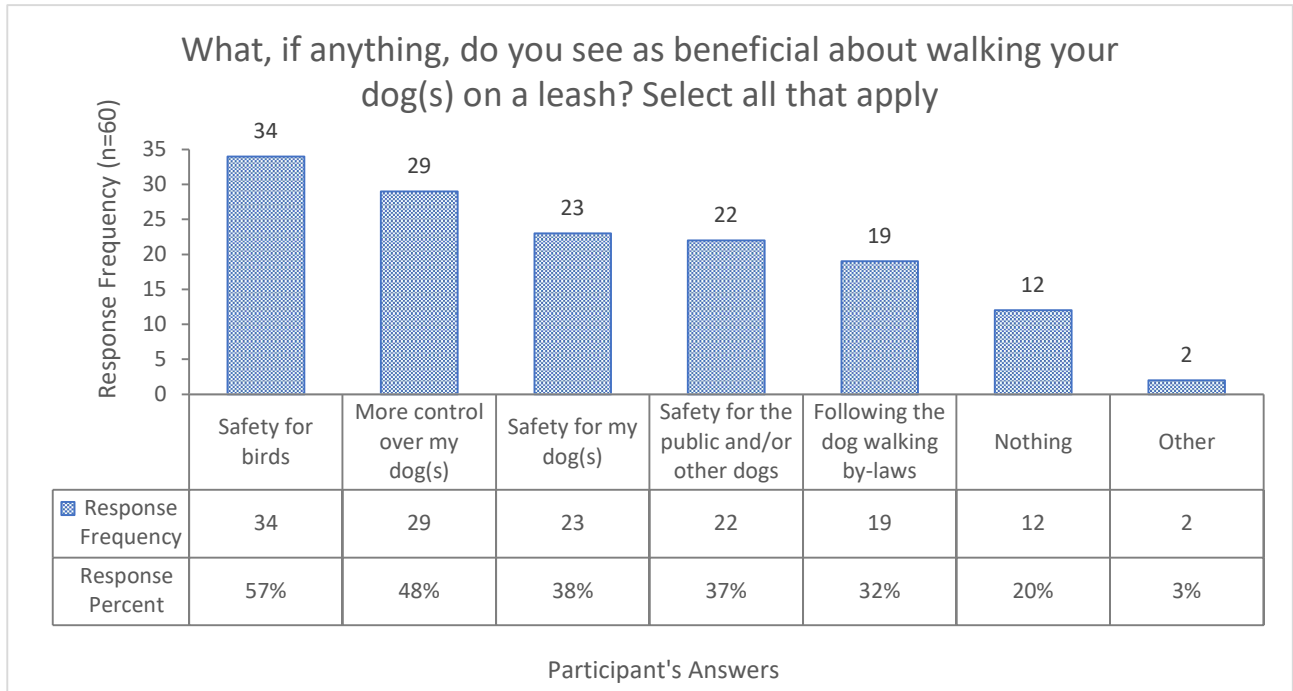
Benefits of walking dogs on-leash

The question regarding the benefits of walking dogs on-leash received 141 responses, of which 20 % of responses saw no benefit of walking their dog on a leash (Figure 13). Of those that did see a benefit, 57% stated "Safety for birds" as the primary benefit, 48% identified "More control over my dog(s)", 38% identified "Safety for my dog", 37% identified "Safety for the public and/or other dogs", 32% identified "Following the dog walking by-laws" and 3% identified "Other" benefits (Figure 13).

Awareness of impact on native birds

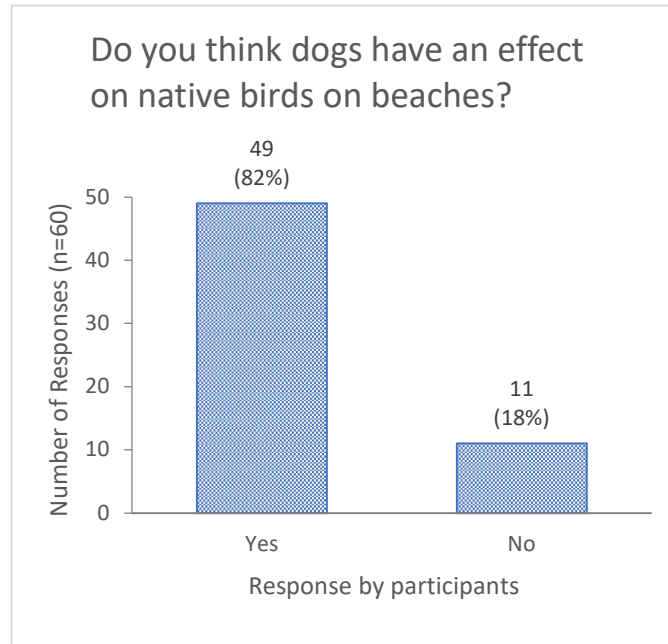
The majority of participants (82%, n=60) responded that dogs do have an effect on the native birds on the beach (Figure 14).

Figure 13. Benefits identified by participants regarding walking dogs on-leash.



Note: Other responses included: "Dogs happy" and "Stop locals harassing you".

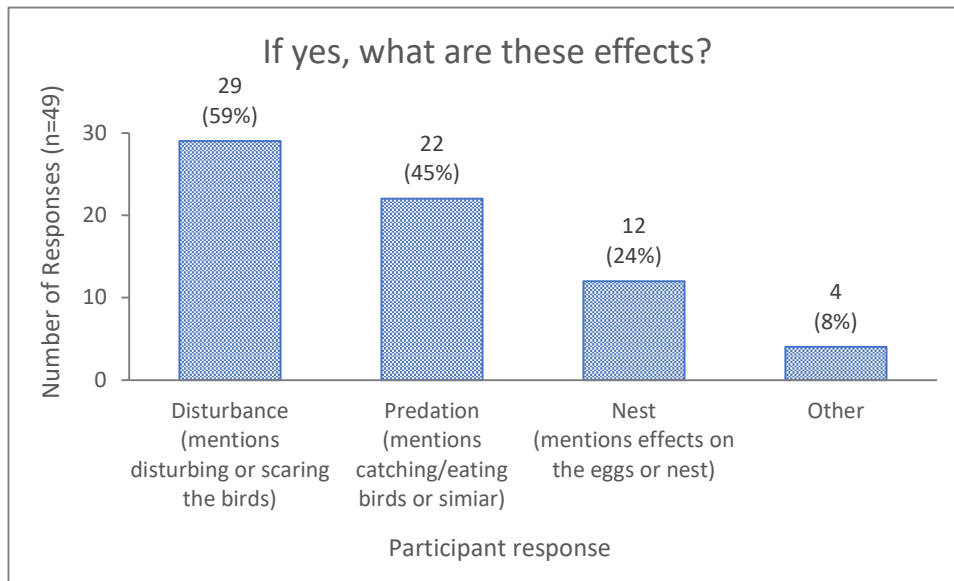
Figure 14. Awareness of participants to the effect of dogs on native shorebirds.



Of the participants who responded yes in Figure 14, 43% (n=29) identified that disturbance by dogs/ scare the birds as being the greatest threat to the bird (Figure 15). Of the remaining responses, predation was the second most common response (33%, n=22 responses), followed by effects on the nest (18%, n=12 responses) and "Other" being 6% (n=4 responses). Of the 11 participants who identified that dogs did not have an effect on native birds in Figure 14, 45%

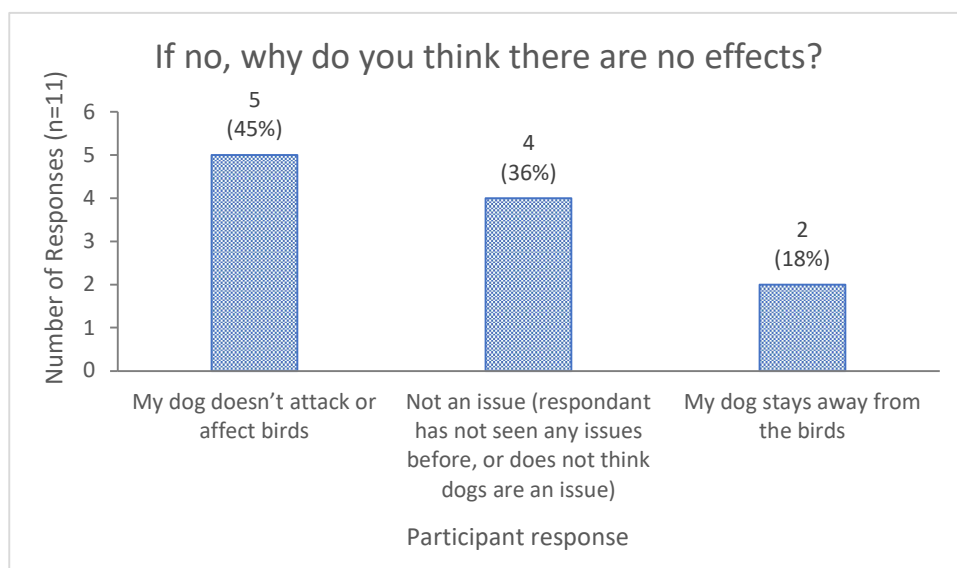
(n=5) stated that their "Dog does not attack or affect birds", 36% (n=4) indicated that their dog was "Not an issue", and 18% (n=2) said that their dog "Stayed away from birds" (Figure 16).

Figure 15. Response of participants to the effects of dogs on native shorebirds.



Note: Respondents may have mentioned more than one effect. Other responses included: "People", "Uncontrolled dogs cause issues", "In general but my Griffin is tiny and walks with me", and "Depends on how the dog has been raised".

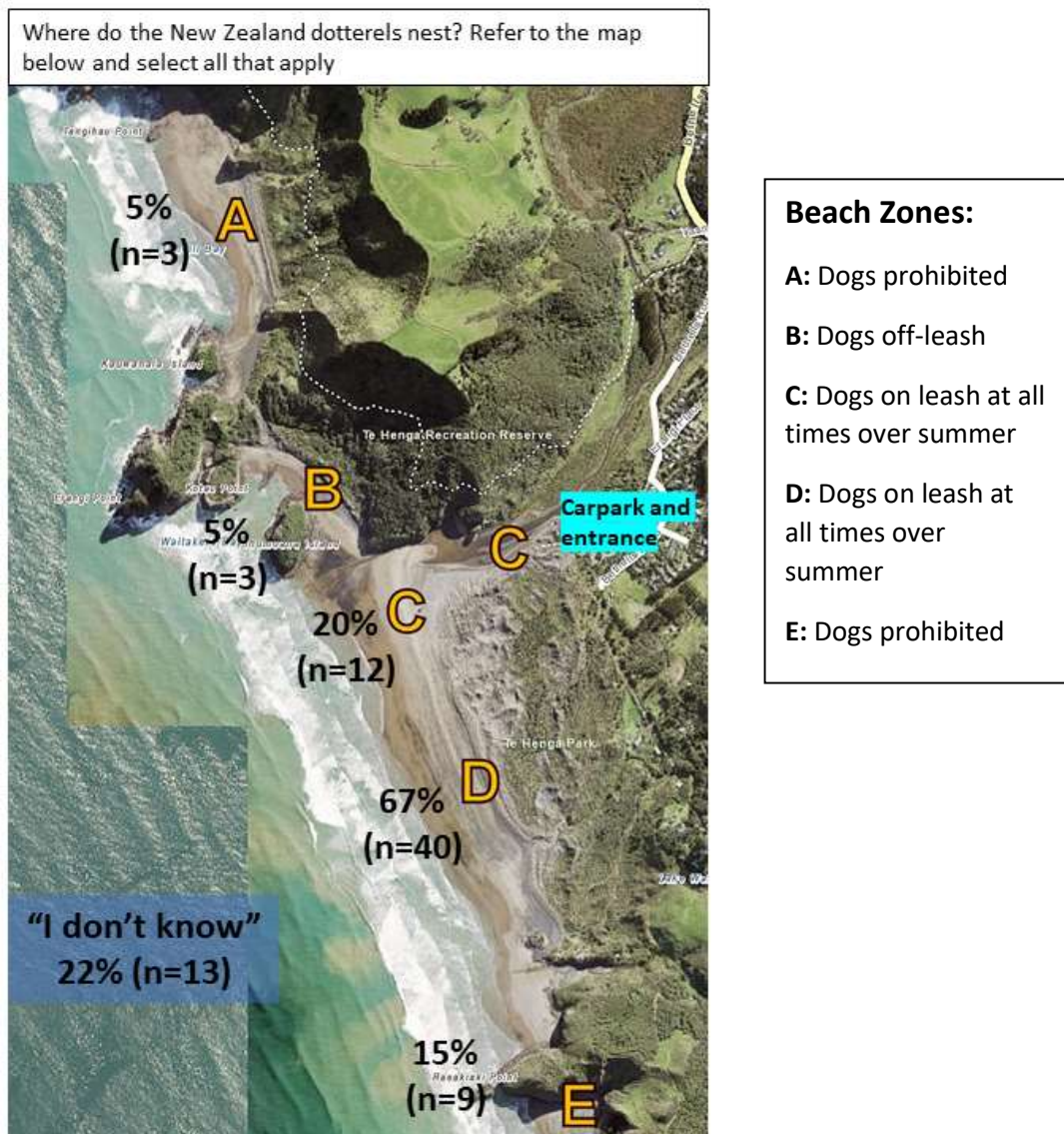
Figure 16. Response of participants who did not think their dogs had any effect on native shorebirds.



Identification of nesting site of New Zealand dotterel on Te Henga/Bethells Beach

This question received 80 responses from the 60 participants, with 67% (n=40) of participants identifying Zone D as the nesting area (Figure 17). Of the remaining zones, 20% of participants identified Zone C, 5%, 5% & 15% of participants identified Zones A, B & E, respectively, while 21% identified that they did not know where dotterels nested.

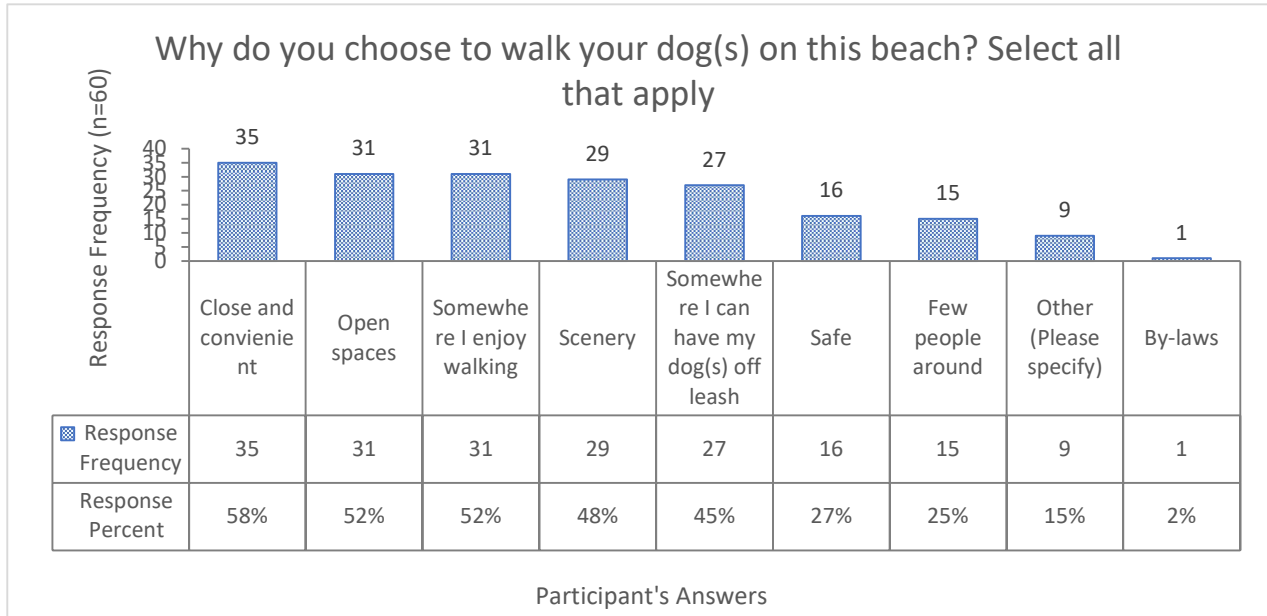
Figure 17. Response of participants as to where the New Zealand dotterels nest at Te Henga/Bethells Beach.



Reasons for walking dogs on Te Henga/Bethells Beach

Multiple responses were given for the reasons for walking their dog(s) at Te Henga/Bethells Beach, with 194 responses from the 60 participants (Figure 18). The most frequent response was "Close and convenient " 58% of participants (n=35). Other responses; "Open spaces", "Somewhere I enjoy walking", "Scenery" and "Somewhere I can have my dog(s) off-leash" had 52%, 52%, 48% & 45% of responses, respectively. The remaining responses, "Safe", "Few people around", "By-laws" & "Others" received 16 or less responses (Figure 18).

Figure 18. Reasons why participants chose to walk their dog(s) on Te Henga/Bethells Beach.

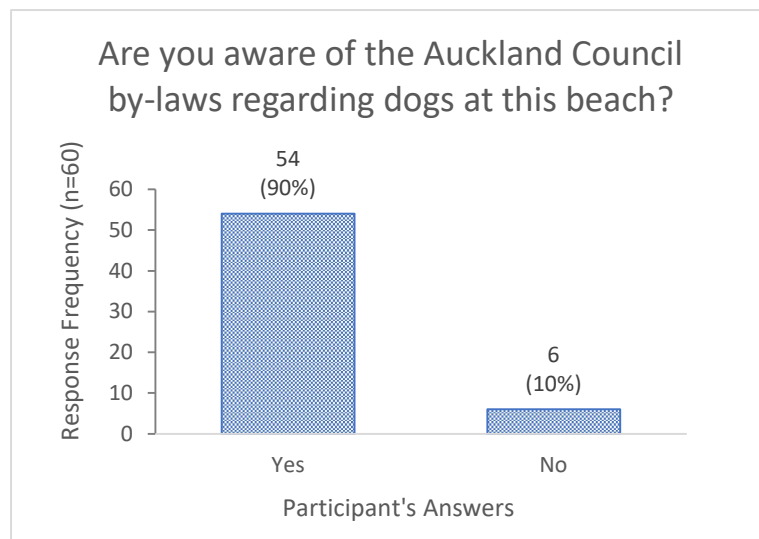


Note: Other responses included: "I rarely do", "Local Beach", "First opportunity we've had in 6 weeks", "Water", "Staying here", "Swim in the sea", "I live close by", and "My local beach". One respondent left the other answer blank.

Awareness of Auckland Council By-laws for dogs on Te Henga/Bethells Beach

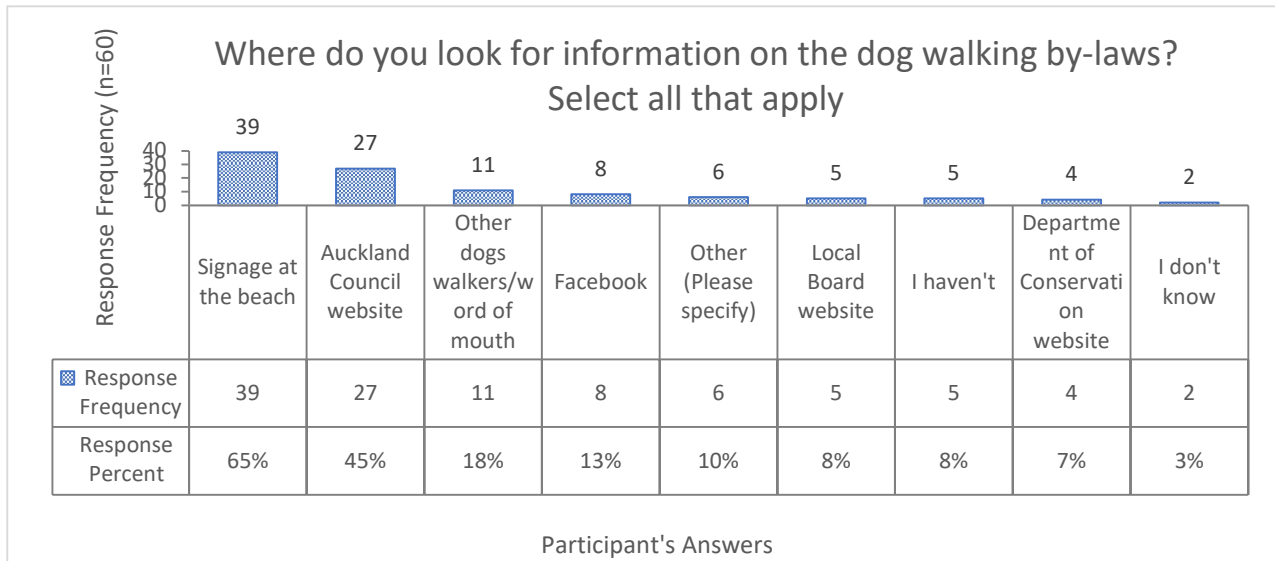
The majority of participants 90% (n=54) were aware of the Auckland Council By-laws regarding walking dogs on Te Henga/Bethells Beach (Figure 19).

Figure 19. Awareness of Auckland Council by-laws



"Signage at the beach" was the most frequently stated means of getting information about the by-laws (65% of the 60 participants) (Figure 20). The Auckland Council website was the next most popular source of information with 45% of the 60 participants. The other sources of information were chosen by 18% or less of the participants (Figure 20). The Paw Planet App, Google, and physical flyers dropped in letterboxes were amongst the "other" answers to this question.

Figure 20. Source of information identified by participants for Auckland Council dog walking bylaws for Te Henga/Bethells Beach.

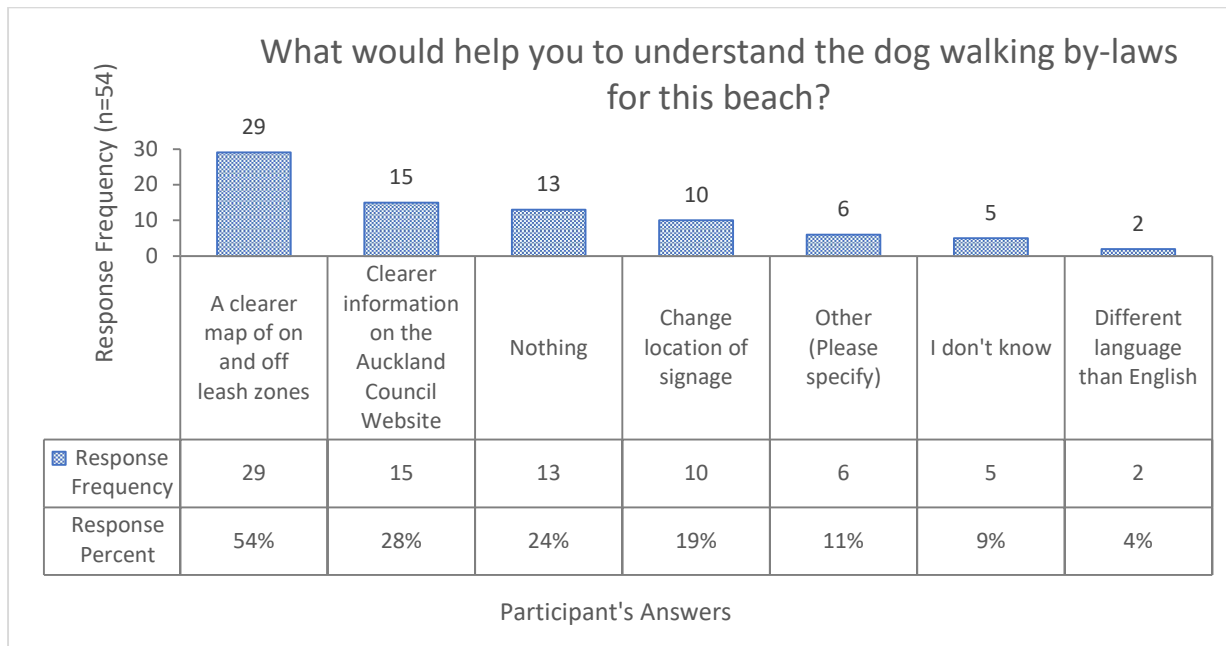


Note: Other responses included: "Paw planet", "googled - dogs on Bethells Beach", "Common sense", "Notice in my letterbox years ago", "Google", and "Signs and website are inconsistent a lot".

What would help people understand the by-laws

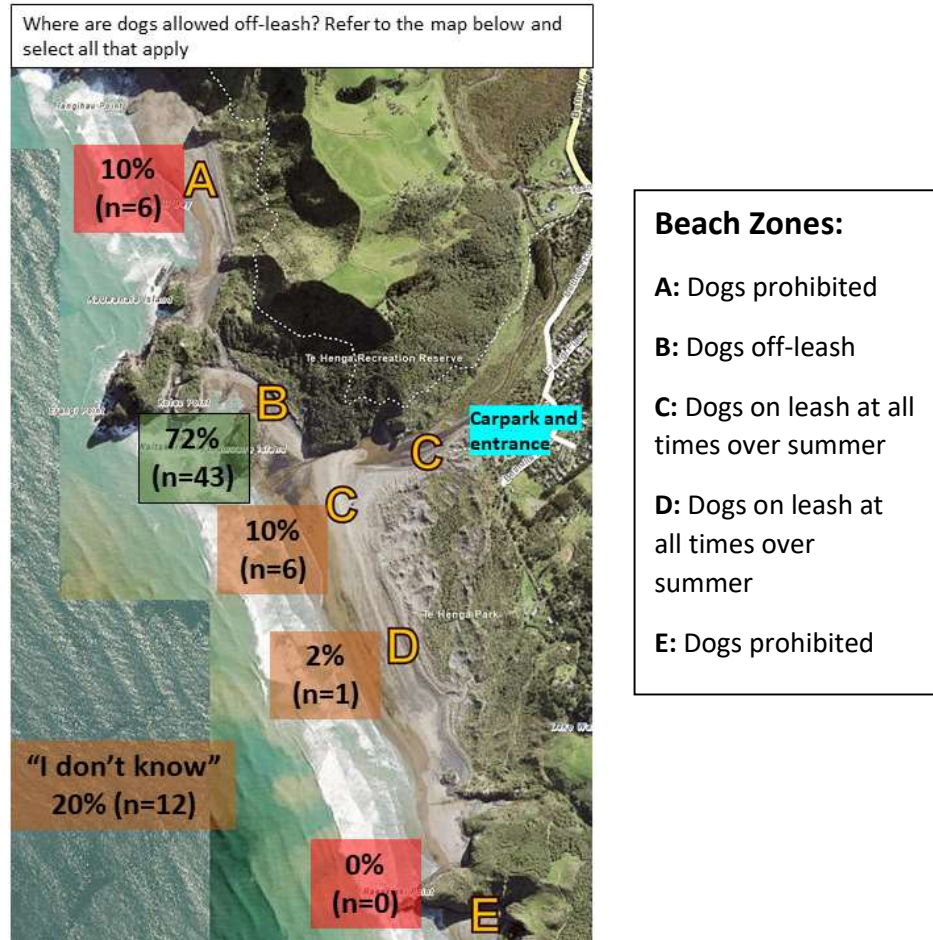
Of the 60 participants, 54 answered this question. The most frequent response to this question (90%, n=54) was "A clearer map of the on and off-leash zones" for Te Henga/Bethells Beach would help them to understand the dog walking by-laws (Figure 21). "Clearer information on the Auckland Council website" was identified by 28% of participants, while 19% identified that a "Change in location of signage" would help. A relatively high proportion of participants, (24%) indicated that "Nothing" would help, while "Other", "I don't know" and "Different language" were 11%, 9% and 4% respectively. The majority of participants, (72%), correctly identified Zone B as being off-leash, as seen in Figure 22. Ten percent of participants incorrectly identified Zones A and C as being off-leash, while 20% did not know where the off-leash area was.

Figure 21. Responses as to what would help the understanding of the dog by-laws for Te Henga/ Bethells Beach.



Note: Other responses included: “Bigger off-leash locations not tidal”, “More info more and larger signage”, “More info signage at the entrance”, “People/ ranger on duty”, “clarification of the signage”, and “I don't care about the rules, I will always walk my dog here because I want to”.

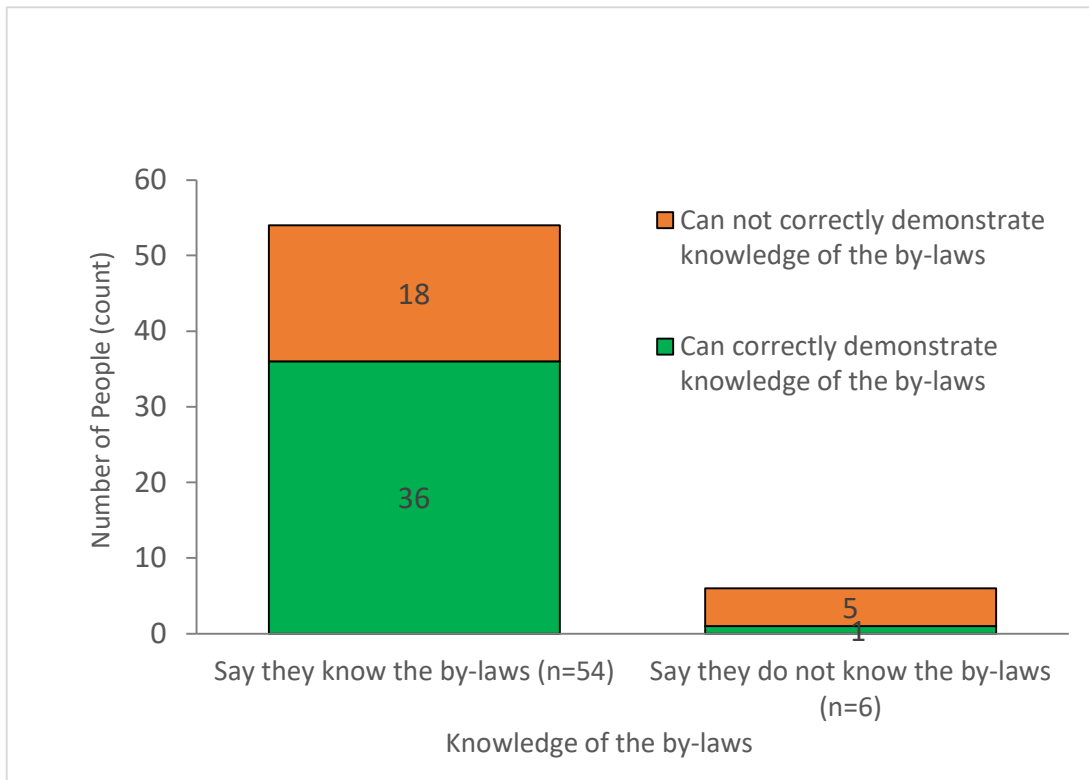
Figure 22. Map of where participants think dogs are allowed off-leash.



Demonstration of knowledge of dog by-laws at Te Henga/Bethells Beach

Of the 90% (n=54) of participants who said they did know the dog by-laws for Te Henga/Bethells Beach, 67% (n=36) of these people actually demonstrated this knowledge in Figure 22 by correctly pointing out the off-leash area on a map, (Figure 23). One person, who did not know the by-laws was actually compliant. A total of 38% (n=23) of all participants could not correctly identify the off-leash area on a map.

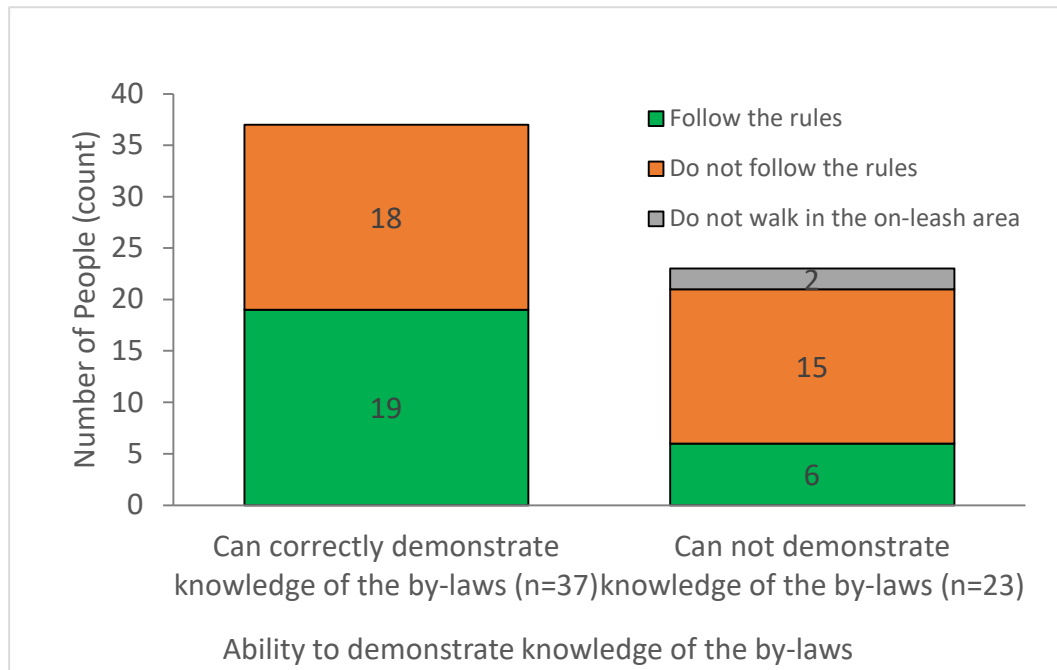
Figure 23. Actual vs perceived knowledge of the Auckland Council by-laws



Of the 37 (those in green in Figure 23) people who correctly identified the off-leash areas in the map in Q15, 49% (n=18) admitted that they knowingly disobeyed the rules by walking their dog(s) off-leash in Zones C & D, i.e., the access to the beach and the immediate foreshore, while 51% (n=19) stated they followed the rules (Figure 24). Of the 23 people who could not correctly identify the off-leash Zones on the map in Figure 22, 26% (n=6) stated they followed the rules, while 65% (n=15) stated they did not follow the rules and 9% (n=2) stated they did not walk in on-leash Zones (Figure 24).

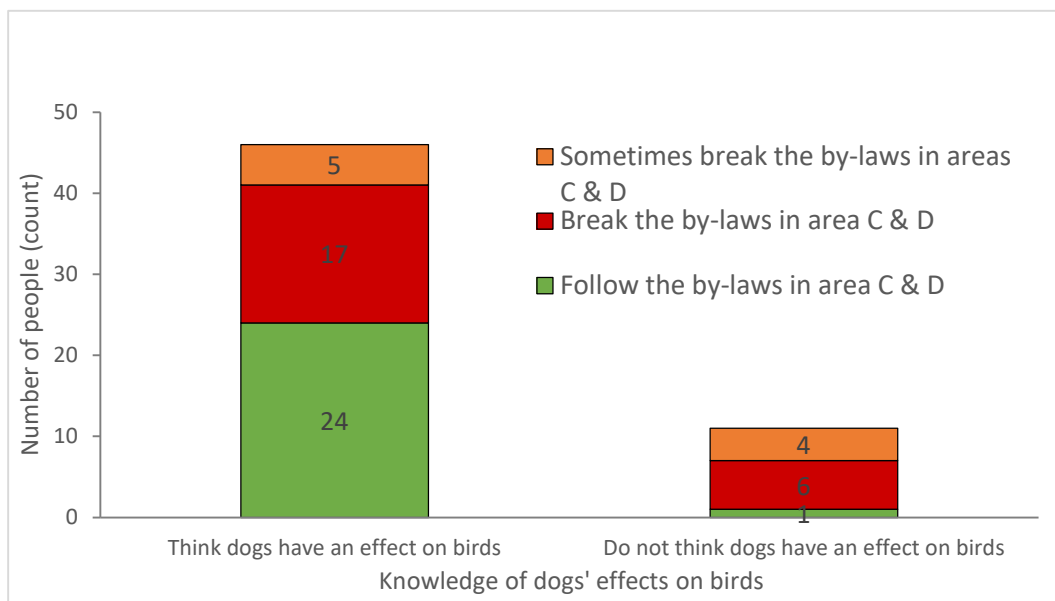
Overall, 42% (n=25) of all participants stated that they followed the rules, while 55% (n=33) stated they did not follow the rules and 2% (n=2) stated they did not walk their dogs in the on-leash Zones (Figure 24).

Figure 24. Compliance with the Auckland Council bylaws by those who know the bylaws and those who do not.



Of the 57 participants who walk their dogs in areas C & D, 81% (n=46) stated that they knew that dogs have an effect on birds, and only 52% (n=24) of these correctly followed the on-leash rule in area C or D, while 48% (n=22) broke the on-leash rule all or some of the time in area C or D (Figure 25). Three people did not answer whether they walk in areas C &/or D, and their answers have been excluded from these results. Of the 11 participants (19% of participants that answered this question) that did not think that dogs had an impact on birds, 9% (n=1) followed the on-leash rules, while 91% (n=10) broke the rules all or some of the time in areas C &/or D (Figure 25).

Figure 25. Comparison of respondents' answers to Q10 and Q5.

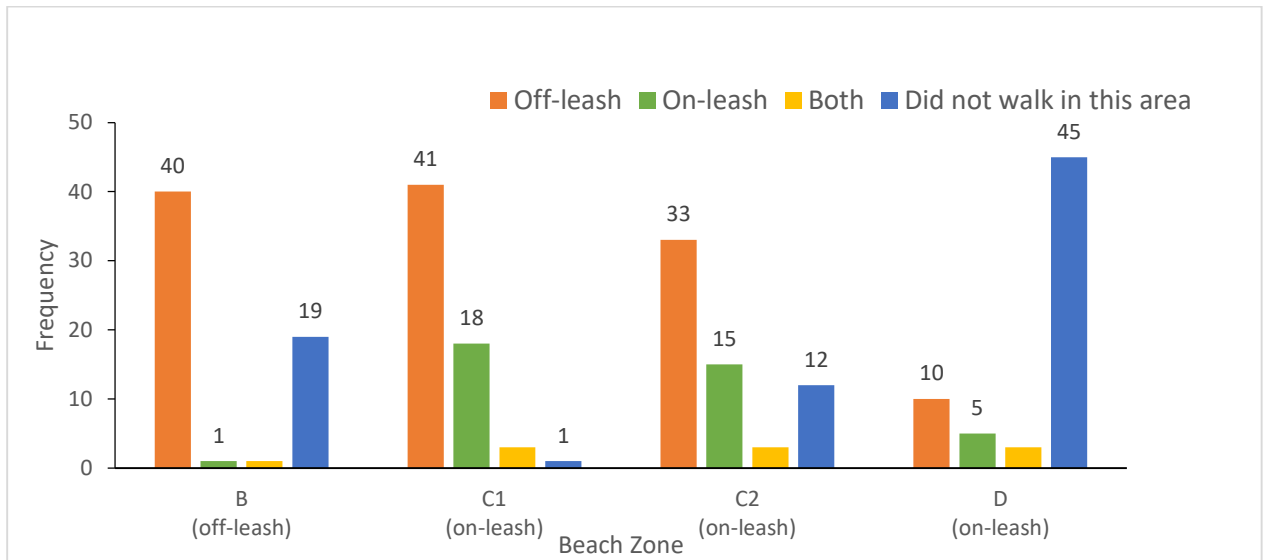


Observations of dogs on or off-leash

Week 1 before the survey

The results of observations in week one (n=82) show that most people walked their dog off-leash in areas C1 and C2, despite the by-laws designating this an on-leash area during summer. Most people did not walk in Zone D, although those who did mostly chose to walk off-leash. (Figure 26).

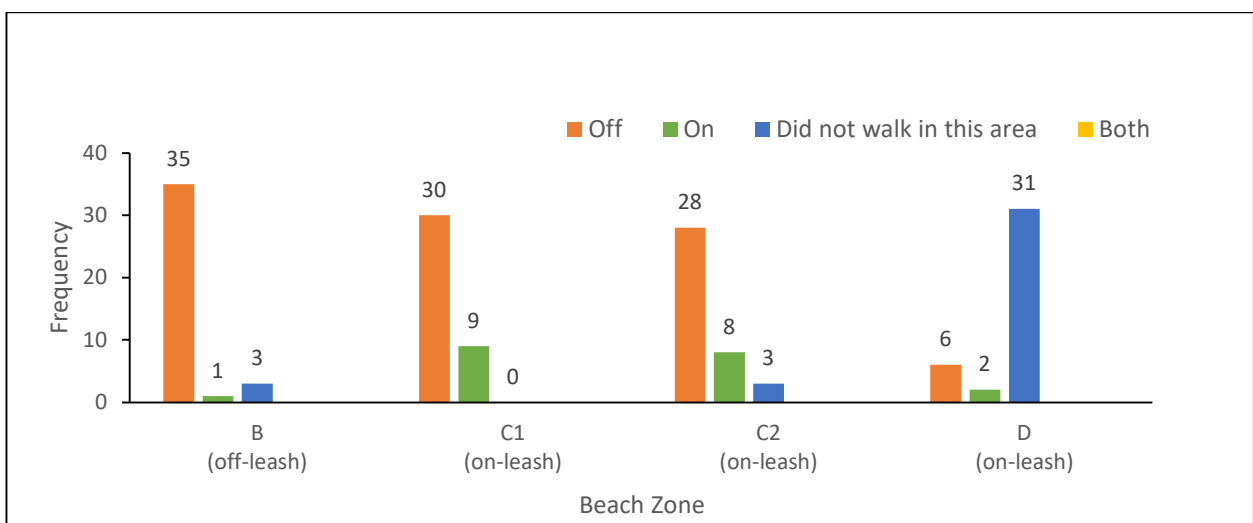
Figure 26. Number of people walking their dog on/off-leash in week 1.



Week 4 after the survey

The results of our observations in week four also show most people chose to walk their dog off-leash in all areas of the beach despite the on-leash by-laws (Figure 27).

Figure 27. Number of people walking on/off-leash in week 4.



Comparison of observations of dogs on Week 1 and 4

The results showed no significant differences in the numbers of people walking dog(s) on or off-leash in the whole of Zone C between weeks 1 and 4 ($X^2= 2.41$, $df= 3$, $p= 0.49$). The results for Zone D also showed no significant differences between weeks 1 and 4 ($X^2= 2.35$, $df= 3$, $p= 0.50$).

Additional information:

In week 1 of observations 3 dogs were seen to access the sand dunes while being walked in Zone D, while 2 dogs were observed in the dunes in Week 4 (Figure 28).

Of the 102 groups of dogs observed in Weeks 1 and 4, the majority, 86% ($n=88$), entered the beach via Zone C1 (Figure 29). However, 9% ($n=9$) entered from Zone D, presumably over the dunes, where dogs are prohibited. We did not see where 5 dogs entered the beach from.

Figure 28. Negative behaviour of dogs observed on the beach, accessing the dunes and chasing birds

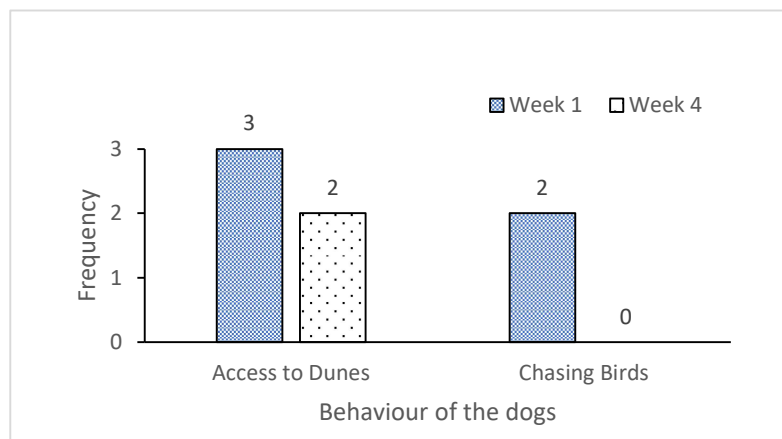
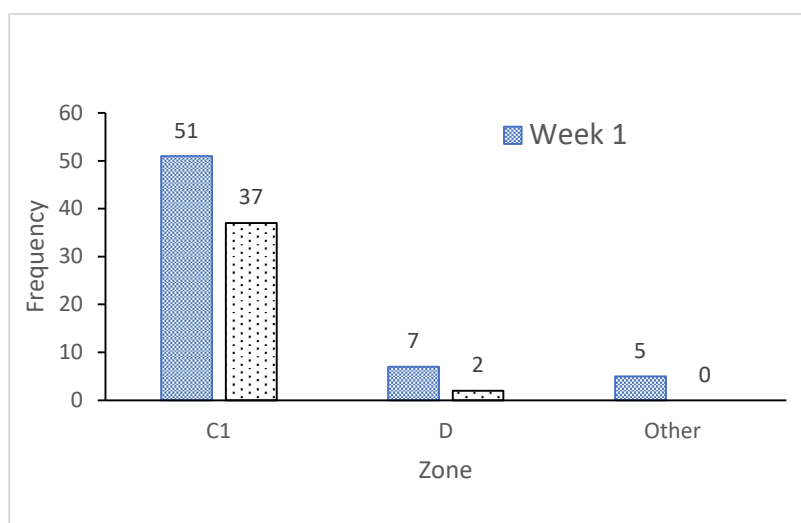


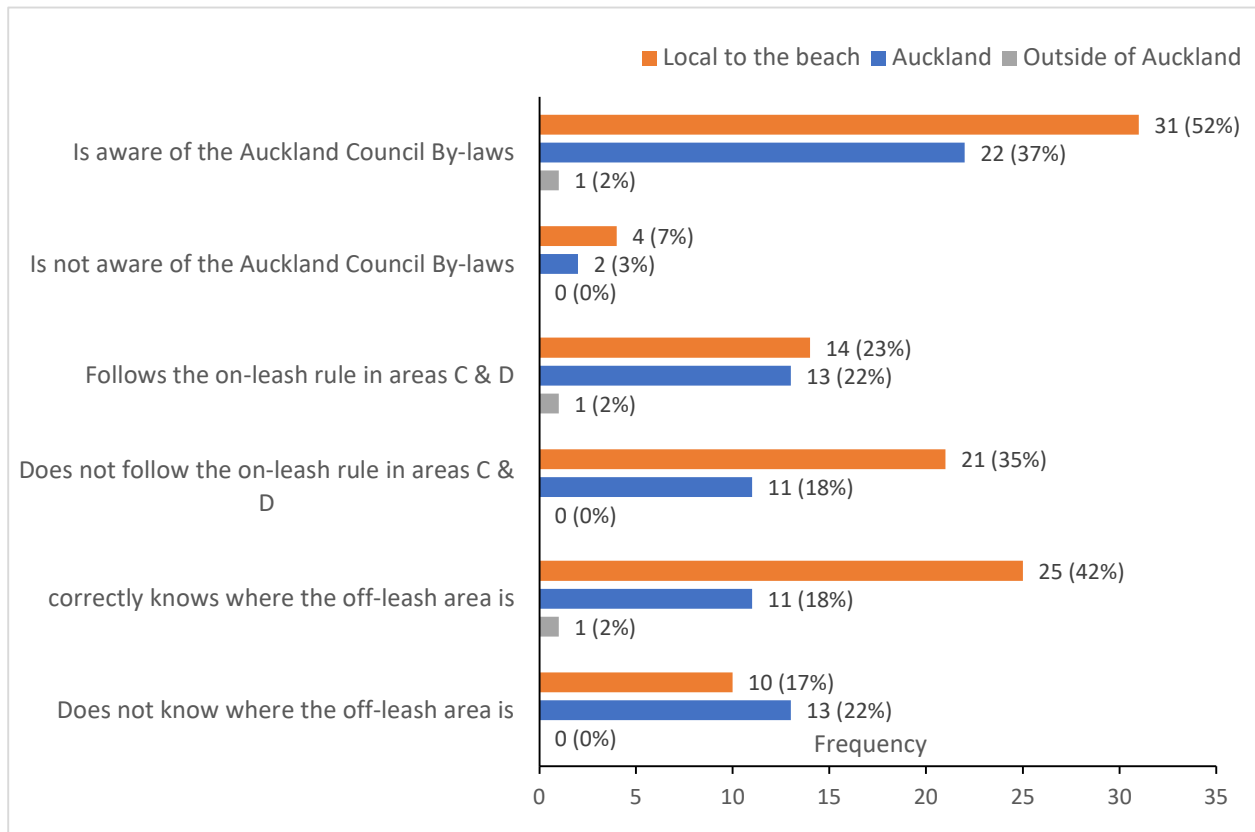
Figure 29. Location of entry of dogs to the beach



Knowledge and action in relation to place of residence

Local residents to Te Henga/Bethells Beach showed higher awareness of the Auckland Council dog walking bylaws (52%, n=31), could identify the correct off-leash areas on the beach (42%, n =25) but also had a higher incidence of not abiding by the regulations (35%, n=21) compared with Auckland residents (37%, 18% and 18% respectively) and those residents outside of Auckland (2%, 2% and 0% respectively) (Figure 30).

Figure 30. Knowledge and action of locals and Aucklanders



Discussion

Walking dogs on beaches

Dog walking is a popular activity in today's society, which has been shown to have human health benefits such as regular physical activity and the reduction of stress (Christian et al., 2016; Westgarth et al., 2021). Westgarth et al. (2021) found that 'recreational' walks provided greatest benefit and were characterised by walks being of longer duration, usually at the weekends in pleasant weather, involved more members of the family and took place in less urban areas. Guinness, et al., (2020) reported that open space for dogs to run free with no cars was the main reasons for choosing to walk dogs on selected beaches in Victoria, Australia. With New Zealand's significant coastline, beach walks would seem an ideal "recreational" walk. Some similarities were revealed in this pilot study where participants identified that "Close & convenient", "Open space", "Scenery" and "Somewhere I can have my dog(s) off-leash" were the main reasons given for walking their dog on Te Henga/ Bethells Beach (Figure 18).

The peak time for walking dogs in this pilot study was found to be primarily between 4-6pm in the evening, followed by a smaller peak at 7-9am (Figure 8). Guinness et al. (2020) identified the peak time for walking dogs on Victorian beaches, Australia was in the morning to accommodate personal schedules. As closeness/convenience was the primary reason for walking dogs on Te Henga/Bethells Beach in this study (Figure 18), it can be suggested that, although the peak times of dog walking were different in the two studies, fitting in with personal schedules was the likely reason for these peaks in this study.

Knowledge and compliance with by-laws

Although 90% of survey participants who indicated that they were aware of the Auckland Council By-laws for walking dogs on Bethells Beach (Figure 19), only two thirds (n = 36) of these could accurately demonstrate this knowledge by correctly identifying on-leash areas on the map provided (Figure 23). This demonstrates a disconnect between peoples' perception of their knowledge compared to their actual knowledge. Williams et al. (2009) suggested that this may be due to participants trying to portray themselves in a 'positive light', thus creating a bias in reporting, which may have occurred in this study.

Further to this, Guinness et al (2020) showed that there is a disconnect between dog walker's desire to abide by regulations and their actual behaviour in relation to compliance with regulations. A similar trend was found in the current pilot study, such that of the 37 participants who could accurately identify all on/off-leash areas on Te Henga/Bethells Beach only 51% stated that they actually followed the rule, i.e., 49% admitted to not following the rules (Figure 24). In addition, of the 23 people who could not accurately identify the on/off-leash areas, 78% of these participants did not follow the rules (Figure 24), giving a total of 55% of all participants that were not complying with the dog walking By-laws for Te Henga/Bethells Beach (Figure 25). In fact, approximately 11.5% of walkers identified that their dog(s) were never on a leash (Figures 10 & 11). This was reflected in only 32% of the participants seeing any benefit of having their dog on-leash in relation to compliance with the by-laws (Figure 13). This was supported by the actual observations of behaviour before and after the survey, where significantly higher numbers of dog walkers were observed to have their dogs off-leash compared with on-leash, particularly in Zone C (Figures 26 & 27).

The results of the survey showed that 12% and 5% of participants said they walked their dog in zone A & E respectively, both of which are "dog prohibited" areas. The level of reporting may be inflated partially due to an apparent lack of map reading skills observed during the survey, however, these figures are concerning. Maguire (2018) reported that there was evidence for higher compliance in 'no dog' areas compared with on-leash areas. This appeared to be the case in this study, where less people accessed zone A and E. However, the use of these "Dog prohibited" zones is disheartening. It is suggested that the higher use of zone A may be due to its relative proximity (approximately 600m) to the entrance to the beach compared with zone E (approximately 1.5km).

However, map literacy appeared to be a problem during the survey. Participants frequently expressed difficulty in reading the maps on the tablets, and we were repeatedly asked for the location of key landmarks and participant location on the map. Issues with reading the maps may have led to incorrect answers in some of the survey questions.

Motivations for dogs on or off-leash

The most common motivation stated for having dogs on (45%) or off-leash (57%) was to follow the dog walking by-laws for on/off-leash areas (Figures 10 & 11). Having considered the previous findings, it can be suggested that this reporting of behaviour in relation to dog walking by-laws is likely to be skewed due to personal positive bias, such that individuals overinflate their apparent knowledge to make themselves "Look good" and is not a true reflection of actual behaviour (Williams et al., 2009). Behavioural aspects of the dogs, such as "When the dog is not listening", "When they want to run around and/or swim" and "Returning to the car" were the next most common factors identified. Approximately 27.5% of participants identified on/off-leash behaviour when birds were present or absent on the beach. Dog behavioural aspects, such as "My dog(s) cannot exercise properly" and "My dog(s) get excited and pulls on the leash" were the most common responses as to the challenges of dogs on-leashes. This was supported by Guinness et al. (2020) who reported that beaches were seen as places for dogs to safely run uninhibited, even when compared with suburban parks. The data in the current study supports this finding, where 38% of participants identified that "Safety for my dog" was an important consideration for walking their dog on the beach while 37% identified that "Safety of the public and other dogs" was a consideration (Figure 13).

Dog walkers and wildlife

It is well documented dogs on beaches pose a significant threat to wildlife and specifically ground nesting shorebirds (Williams et al., 2009; Jorgensen & Brown, 2014; Maguire, 2018; Guinness et al., 2020). The survey conducted by Williams et al. (2009) found that, in general, dog walkers do understand that unleashed dogs can negatively impact ground nesting shorebirds. However, they reported that participants regarded other dogs of more of an issue compared with their own dog. While respondents to the survey valued wildlife protection, the benefits of off-leash exercise were more important to dog-walkers (Williams, et al., 2009). The results from the current study indicate that, although there was a high apparent awareness (82%) of the impact of dogs on birds, such as disturbance, predation and impacts on nests (Figure 14 & 15), only 57% recognise the value of walking dogs on a leash for the protection of birds (Figure 13). In addition, 18% of dog walkers did

not considered their dog as a threat to wildlife (Figure 11) and stated that their dog either did not attack birds, the dogs stay away from the birds, and they have never seen an issue (Figure 16). Weston and Elgar (2007) reported that the level of nest disturbance of Hooded Plover (*Thinornis rubricollis*) on Victorian beaches, Australia, was similar for walkers on their own and walkers with dogs on leashes. However, the disturbance caused by unleashed dogs was significantly higher than leashed dogs. As such, transforming dog walker's knowledge of the impact of unleashed dogs into the appropriate action of leashing dogs, as per the by-laws, is vital for the future protection of ground nesting shorebirds on Bethells Beach.

The study by Guinness et al., (2020) also revealed that beach visitors supported the protection of wildlife and pet owners generally had a 'pro-animal' attitude and attempted/agreed with the need to comply with the regulations, but this was not reflected in behaviour. A similar pattern was shown in the current study, in which dog walkers openly admitted to not complying with bylaws, despite being knowledgeable about the requirements and the impacts of dogs on wildlife.

In this study approximately two thirds of responses (66%) identified Zone D on the map as New Zealand dotterel nest sites, which was correct for the 2021 summer season during this survey. However, the wording of the question (Where do the New Zealand dotterels nest?) may have been misleading, as the participants may have thought this referred to general available nesting areas, not just for 2021 season. Changing the wording of this question to: "Where have the NZ dotterels been nesting this summer?", may have produced a more accurate reflection of knowledge of the participants.

Recommendations

As the human population in New Zealand grows so does the companion dog population, further increasing the demand for shared exercise spaces (Maguire, Miller, & Weston, 2019). Suggestions for improvements may include functional modifications of public spaces to develop dog-friendly areas by the introduction of prohibitions or conditional uses of these public spaces (Iojă, et. al., 2011). These measures endeavour to restrict the occurrence of dogs on coasts spatially to reduce adverse effects on wildlife and people (Maguire et al., 2019). While this method conceptually offers a spatial balance of dog exercise opportunity with reducing impressions of dogs, the extent of compliance with zonation rules has been questioned (Bowes et al. 2018; Lukies, Cowie and Taylor, 2018; Weston and Stankowich 2013). Dog owners' intent to comply, especially putting dogs on a leash in "leash only" areas, vary based on a range of factors including beliefs, social norms, the sense of obligation, and habit (Bowes et al., 2017; 2018; Williams, Weston, Henry, & Maguire, 2009). Hende, Stankey, & Lucas (1990) states inappropriate behaviour regarding control over dogs in public areas is manifested in the following ways: "(1) actions which are deliberate and illegal activities such as violating laws that require dogs to be on-leash; (2) actions which are careless like allowing dogs to bother other people; (3) lack of skill, such as the inability to adequately control poorly trained animals; (4) actions which are uninformed such as letting dogs run free, being unaware of leash laws and why they might exist; and (5) unavoidable impacts on wildlife, for example disturbance of shorebirds on the beach by people and/or their dogs, and high visitation during peak migration." Noncompliance by dog walkers in recreational areas has not been reduced by in-direct management practices (information/education) alone (Park, Manning, Marion, Lawson, & Jacobi, 2008). A combination of both in-direct and direct (fencing, enforcement of regulations

etc.) measures is recommended to increase compliance (Park et al.,2008). Kim & Shelby (1998) found approaching and informing visitors of appropriate behaviour, i.e., direct advocacy, minimized non-compliance in a protected area.

The results from this study can be used to determine the value of a range of methodologies to shape an effective intervention strategy to increase the rate of compliance to dog walking by-laws on Bethells Beach. It is suggested that an increase in the compliance of dog walking by-laws will only be achieved by changes in social norms, modelling of desired behaviours and clear communication of by-laws and expectations of the dog-walking community from a community-based approach (McKenzie-Mohr, 2000; Knopf & Andereck, 2004). Education on its own is unlikely to result in behaviour change (Jorgensen & Brown, 2014), especially for those whom off-leash walking has become a habit (Bowes et al., 2018). Therefore, creation of new social norms in relation to dog walking by-law compliance is more likely to be successful with the implementation of a suite of interventions rather than a simple 'education' strategy.

Surveys

Surveys are a useful tool for gaining information from specific groups in society, however, care must be taken in the interpretation of the results and the potential for self-reporting bias (Williams et al., 2009; Bassett, et al., 2016), which appears to be shown in our results. It is important to ensure that, as in this study, the desired behaviours are recorded before and after the survey to determine any behavioural change.

In this study, approximately 10 people were either reluctant to take the survey due to its length, or struggled to hold their dogs on-leash with one hand while doing the survey with the other. It is recommended that any future survey is short in length, and potentially paper based as sunstroke was an issue in some situations when viewing tablets. Approaching dog walkers as they are leaving the beach may also be a better approach as their dogs had been exercised and were generally in a calmer state, which would have supported participants in the completion of the survey.

Signage

Clear signage at the beach of on /off-leash areas were seen as the primary source of information and the primary factor for improving the knowledge of dog walkers on Te Henga/Bethells Beach (Figure 19 & 20). Lukies et al. (2018), who tested a range of signage to increase compliance of dogs on-leash at Harbourview-Orangihina walkway and Long Bay beach, Auckland, found that, although not significant due to low sample size, signage displaying a silhouette image of people with dogs on-leashes and a large green tick, increased the percentage of people complying with on-leash regulations. Improved signage at Te Henga/Bethells Beach could also help to increase on-leash compliance by providing an image of the correct behaviour. The signage at Te Henga/Bethells Beach is of poor quality and is difficult to follow (Figure 31). It is in fact so bad that the dotterel minders of Te Henga/Bethells Beach have stapled a simpler paper instruction of on/off-leash areas over the Auckland Council notice. New and improved signage with clear maps, as used by the dotterel minders, and careful consideration as to the location of these signs at the entrance and on the beach could help to improve compliance on Te Henga/Bethells Beach. However, it is important that future

signage undergoes rigorous testing to ensure they convey their message effectively. As seen in testing of signage by the Department of Conservation (2019) it is important that signs clearly communicate the reasons why people are asked to behave a certain way, or their efficacy diminishes.

Due to the complexity of on/off-leash areas at Te Henga/Bethells Beach and the differences between summer and winter access, it is suggested that different signage is erected for summer and winter regulations to simplify signage for the dog walking community. This signage would only have to be changed twice a year according to the change in regulations, which should not be overly onerous for park rangers.

Figure 31. Dog by-law signage at Te Henga/Bethells Beach.



Auckland Council website

The next most frequently accessed source of information was the Auckland Council website, and this was highlighted as requiring increased clarity in the communication of the by-law and on/off-leash requirements for Te Henga/Bethells Beach (Figures 19 & 20). This study clearly highlights the need for improvement of the Auckland Council website information. As with signage, it is suggested that summer and winter regulations are posted separately on the website, potentially providing two links, one for each season. It is important to note that different interventions may be better suited for different groups and should be selected accordingly. In this case, changes in signage on site and online would provide consistency and potentially impact compliance rates amongst both visitors and locals.

Pledge boards

Williams et al. (2009) found that social norms can have a large influence on dog-walkers behaviour. In addition, they indicated that community-based approaches involving personal contact be beneficial for encouraging behaviour change. Increasing public commitment through the use of pledge boards could be an effective behaviour change technique for Te Henga/Bethells Beach. This technique would ask dog-walkers to make a pledge to change their behaviour and have this displayed publicly on a pledge board located on the beach. Public commitment to undertake a behaviour has the effect of motivating the person to commit and stick to that behaviour change (Lokhorst et al., 2013; van der Werff, 2019). Public pledges may help dog-walkers with anti-on-leash attitudes by modifying their attitudes to align with on-leash behaviour (Jaeger & Schultz 2017), where the creation of social norms results in perceived peer pressure to do the right thing (Jorgensen & Brown 2014). When used in response to compliance of local forest walkers with boot washing stations for Kauri Dieback, pledge boards increased correct compliance and reduced non-compliance with locals washing their boots (Department of Conservation, 2019). In order for public pledges to work, the commitment to change their behaviour must be made voluntarily and written in public. As a large proportion of people walking dog on Te Henga/Bethells beach indicated that they were local residents (58%, Figure 4), this community-based intervention methodology would appear to be a good option for testing the efficacy of pledge boards in the Te Henga/Bethells Beach situation.

Ambassadors

The current study showed no significant difference in compliance to the dog walking by-laws on Te Henga/Bethells Beach after the survey compared with before (Figures 26 & 27). Although this could suggest that the presence of an 'Ambassador' in this situation had no positive effect on the behaviour of dog walkers, the methodology of this study limited the researchers from having any significant educational interaction with dog walkers and, as such, could not be defined as 'Ambassadors' for change in behaviours. Therefore, it is suggested that the effectiveness of ambassadors for by-law compliance at the entrance to the beach should be fully tested before this is excluded as a Te Henga/Bethells Beach intervention strategy.

Enforcement

Bowes (2018) found that a direct approach of enforcement of the rules to be necessary when attempting to change the behaviour of frequent visitors with a history of breaking the rules, particularly in relation to high offenders who are often locals to the beach and those who knowingly disobey the rules. This could be an option at Te Henga/Bethells Beach due to the high level of non-compliance, the high proportion of local residents and the lack of change in compliance recorded with pre- and post-survey observation in this study (Figures 26 & 27). It is suggested that Animal Control Officers are empowered under the Dog Control Act 1996 to give fines to dog owners breaking the Auckland Council dog control by-laws, and doing so on Te Henga/Bethells beach may increase compliance. However, doing so may erode the goodwill of dog walkers towards the authorities and their efforts to protect wildlife. Future attempts to increase compliance may be best

achieved using a collaborative approach where alternative multi-layer “goodwill” solutions or interventions are designed in a partnership between The Waitakere Ranges Local Board, Iwi, Auckland Council, and local residents before the implementation of enforcement.

Limitations of the Study

- We were able to approach every person who walked past us with a dog on the beach and ask them to take the survey. Some people refused to participate (approximately 10), but exact numbers were not recorded.
- We observed many people expressing issues with using a tablet when completing the survey. People over approximately 65 years old were not comfortable using a tablet, and were offered a paper and pen copy with no personal identification as an alternative. This data was entered into the survey database by the researchers at a later time. Some survey participants also expressed issues with the screen size and brightness, which we agreed with as the text was very small and was hard to read in bright sunlight. We recommend that future surveys consider the use of larger tablets with contrast screens, the use of paper surveys (although this does add data entry time requirements for researchers), provide a shade shelter for participants to read the tablets more easily, or conduct oral interviews of participants.
- The times during which observations and data were collected could be adjusted for future surveys. In the mornings between 6:30-9:30 am there were not many people on the beach, and our personal observations were that these were repeat visits from locals (approximately 80%). In the afternoon there were also not many people on the beach prior to 5pm, and it was very busy at 6:30pm when we were leaving. Future surveys might benefit from adjusting the time they are on the beach to stay later in the evening, or a pre-survey observation period to determine optimum survey times.

Conclusion

The results of this study show that there was a high degree of non-compliance in relation to the Auckland Council by-laws by people walking their dogs on Te Henga/Bethells Beach. Actual knowledge of regulations relating to different zones of the beach were considerably less than the participants perceived knowledge of the by-laws, suggesting a self-reporting bias in responses by participants.

Participants demonstrated a high level of awareness of the impacts of dogs on ground-nesting shorebirds but did not translate this into the mitigating action of keeping their dogs on-leash in the relevant designated areas.

The implementation of the survey had no effect on the observed compliance of people walking dogs on Te Henga/Bethells Beach, however, the impact of the presence of the researchers may have been limited by the research methodology and limited interaction of the researchers with the participants.

The Waitakere Ranges Local Board is encouraged to develop of a community based multi-layered intervention strategy in collaboration with Auckland Council, Iwi, and local residents to mitigate

the impact of dogs on ground nesting shorebirds. However, before this strategy is implemented, it is vital that intervention methods are critically evaluated for their effectiveness within the Te Henga/Bethells Beach situation. As such, the Board is encouraged to invest in the funding of social science research to maximise the behaviour change outcomes for the protection of ground-nesting shorebirds on Te Henga/Bethells Beach.

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References

- Auckland Council. (2020). Kimihia ngā wāhi me ngā wā hei hīkoinga māu me tō kurī
Find where and when you can walk your dog.
<https://www.aucklandcouncil.govt.nz/dogs-animals/where-walk-dog/Pages/default.aspx>
- Bassett, I.E., Cook, J., Buchanan, F., Russell, J.C. (2016). Treasure Islands: biosecurity in the Hauraki Gulf Marine Park. *New Zealand Journal of Ecology* 40(2): 250-266.
- Bowes, M., Keller, P., Rollins, R., & Gifford, R. (2017). The effect of ambivalence on on-Leash dog walking compliance behaviour in parks and protected areas. *Journal of Park & Recreation Administration*, 35(3): 81-93. <https://doi.org/10.18666/JPRA-2017-V35-I3-7440>
- Bowes, M., Keller, P., Rollins, R., Gifford, R. (2018). Habits, Beaches, Dogs and Leashes: Non-Compliance with Park Regulations. *PARKS, The International Journal of Protected areas and Conservation*, 24: 119-130.
- Christian, H., Bauman, A., Epping, J.N., Levine, G.N., McCormack, G., Rhodes, R.E., Richards, E., Rock, M., Westgarth, C. (2016). Encouraging dog walking for health and disease prevention. *American Journal of Lifestyle Medicine* 12(3): 233-243.
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6): 1015- 1026.
- Department of Conservation (2019). Behaviour change research.
<https://ourauckland.aucklandcouncil.govt.nz/media/30131/234-behaviour-change-and-kauri-dieback-jo-aley.pdf>
- Glover, H. K., Weston, M. A., Maguire, G. S., Miller, K. K., & Christie, B. A. (2011). Towards ecologically meaningful and socially acceptable buffers: response distances of shorebirds in Victoria, Australia, to human disturbance. *Landscape and Urban Planning*, 103(3-4), 326-334. <https://doi.org/10.1016/j.landurbplan.2011.08.006>
- Guinness, S.J., Maguire, G.S., Miller, K.K., Weston, M.A. (2020). My dog, my beach! Attitudes towards dog management on Victorian beaches. *Australian Journal of Environmental Management* 27(3): 329-342. doi.org/10.1080/14486563.2020.1760950.
- Hendee, J.C., Stankey, G.H. and Lucas, R.C. (1990) Wilderness Management. (2nd Edition), North American Press, Golden, 537 p.
- Ioja, C. I., Rozyłowicz, L., Pătroescu, M., Niță, M. R., & Vânau, G. O. (2011). Dog walkers' vs. other park visitors' perceptions: The importance of planning sustainable urban parks in Bucharest, Romania. *Landscape and Urban Planning*, 103(1): 74-82.
[doi:10.1016/j.landurbplan.2011.06.002](https://doi.org/10.1016/j.landurbplan.2011.06.002)
- Jaeger, C. M., & Schultz, P. W. (2017). Coupling social norms and commitments: Testing the underdetected nature of social influence. *Journal of Environmental Psychology*, 51: 199-208. [doi: 10.1016/j.jenvp.2017.03.015](https://doi.org/10.1016/j.jenvp.2017.03.015)

- Jorgensen, J.G., Brown, M.B. (2014). Piping plovers *Charadrius melodus* and dogs: compliance and attitudes towards a leash law on public beaches at Lake McConaughey, Nebraska, USA. *Wader Study Group Bulletin* 121(2): 7-12.
- Kim, S.-O., & Shelby, B. (1998). Norms for Behavior and Conditions in Two National Park Campgrounds in Korea. *Environmental Management*, 22(2): 277–285. doi:10.1007/s002679900103
- Knopf, R.C. & Andereck, K.L. (2004). Managing depreciative behaviour in natural settings. In M.J. Manfredo, J.J. Vaske, B.L. Bruyere, D.R. Field, & P. Brown (Eds), *Society and natural resources: A summary of knowledge* (pp.305-314). Jefferson, MO: Modern Litho.
- Lafferty, K. D. (2001). Disturbance to wintering western snowy plovers. *Biological Conservation*, 101(3): 315-325. [https://doi.org/10.1016/S0006-3207\(01\)00075-1](https://doi.org/10.1016/S0006-3207(01)00075-1)
- Lokhorst, A.M., Werner, C., Staats, H., van Dijk, E., Gale, J.L. (2013). Commitment and behaviour change: a meta-analysis and critical review of commitment-making strategies in environmental research. *Environmental Behaviour*, 45: 3-34.
- Lord, A., Waas, J. R., Innes, J., & Whittingham, M. J. (2001). Effects of human approaches to nests of northern New Zealand dotterels. *Biological conservation*, 98(2): 233-240. [https://doi.org/10.1016/S0006-3207\(00\)00158-0](https://doi.org/10.1016/S0006-3207(00)00158-0)
- Lukies, K., Cowie, S., Taylor, A. (2018). Can community-based social marketing techniques encourage compliance with dog leash bylaws near urban marine reserves in Auckland? https://infocouncil.aucklandcouncil.govt.nz/Open/2018/12/WTK_20181213_AGN_7951_AT_files/WTK_20181213_AGN_7951_AT_Attachment_63070_1.PDF
- Maguire, G. (2018). A review of dog impacts to beach-nesting birds and management solutions. Birdlife Australia. https://birdlife.org.au/documents/Dogs_and_Beach-nesting_Birds_Management_Solutions_Nov2018.pdf
- Maguire, G. S., Cullen, M., & Mead, R. (2013). Managing the Hooded Plover in Victoria: a site by site assessment of threats and prioritisation of management investment on Parks Victoria managed land. *Parks Victoria*. https://www.birdlife.org.au/documents/BNB-Parks_Victoria_Managing_the_Hooded_Plover_Report_2014.pdf
- Maguire, G. S., Miller, K. K., & Weston, M. A. (2019). Only the Strictest Rules Apply: Investigating Regulation Compliance of Beaches to Minimize Invasive Dog Impacts on Threatened Shorebird Populations. In *Impacts of Invasive Species on Coastal Environments* (pp. 397-412). Springer, Cham. https://doi.org/10.1007/978-3-319-91382-7_11
- McKenzie-Mohr, D. (2000). Promoting sustained behaviour: An introduction to community-based social marketing. *Journal of Social Issues* 56(3): 543-554.
- New Zealand Birds Online (2013). New Zealand dotterel. Retrieved from <http://nzbirdsonline.org.nz/species/new-zealand-dotterel>
- NZ dotterel. (n.d). Department of Conservation. <https://www.doc.govt.nz/nature/native-animals/birds/birds-a-z/nz-dotterel-tuturiwhatu/>

- Park, L. O., Manning, R. E., Marion, J. L., Lawson, S. R., & Jacobi, C. (2008). Managing visitor impacts in parks: A multi-method study of the effectiveness of alternative management practices. *Journal of Park & Recreation Administration*, 26(1): 97-121.
- Poškus, M. S. (2021). An evolutionary approach toward pro-environmental behavior. *Evolutionary Psychological Science*, 7(1): 69-75.
- Sastre, P., Ponce, C., Palacín, C., Martín, C. A., & Alonso, J. C. (2009). Disturbances to great bustards (*Otis tarda*) in central Spain: human activities, bird responses and management implications. *European Journal of Wildlife Research*, 55(4): 425-432.
- Taylor, E. C., Green, R. E., & Perrins, J. (2007). Stone-curlews *Burhinus oediconemus* and recreational disturbance: developing a management tool for access. *Ibis*, 149: 37-44. <https://doi.org/10.1111/j.1474-919X.2007.00645.x>
- van der Werff, E., Taufik, D., Venhoeven, L. (2019). Pull the plug: How private commitment strategies can strengthen personal norms and promote energy-saving in the Netherlands. *Energy Research & Social Science*, 54: 26-33.
- Westgarth, C., Christley, R.M., Marvin, G., Perkins, E. (2021). Functional and recreational dog walking practices in the UK. *Health Promotion International* 36: 109-119.
- Weston, M. A., Dodge, F., Bunce, A., Nimmo, D. G., & Miller, K. K. (2012). Do temporary beach closures assist in the conservation of breeding shorebirds on recreational beaches? *Pacific Conservation Biology*, 18(1): 47-55.
- Weston, M. A., & Elgar, M. A. (2007). Responses of incubating hooded plovers (*Thinornis rubricollis*) to disturbance. *Journal of Coastal Research*, 23(3): 569-576. <https://doi.org/10.2112/04-0151.1>
- Weston, M. A., Fitzsimons, J. A., Wescott, G., Miller, K. K., Ekanayake, K. B., & Schneider, T. (2014). Bark in the park: a review of domestic dogs in parks. *Environmental Management*, 54(3): 373-382.
- Weston, M. A., & Stankowich, T. (2013). Dogs as agents of disturbance. In *Free-Ranging Dogs and Wildlife Conservation*. M. E. Gompper (ed.), pp 94-113. Oxford Academic Press, Oxford. doi: 10.1093/acprof:osobl/9780199663217.003.0004
- Williams, K. J., Weston, M. A., Henry, S., & Maguire, G. S. (2009). Birds and beaches, dogs and leashes: Dog owners' sense of obligation to leash dogs on beaches in Victoria, Australia. *Human Dimensions of Wildlife*, 14(2): 89-101. <https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1080%2F10871200802649799>
- Young, H. P. (2015). The evolution of social norms. *Annual Review of Economics*, 7(1): 359–387. <https://doi.org/10.1146/annurev-economics-080614-115322>
- Zapata-Ríos, G. (2018). Dogs are more than wet kisses and tail wags: domestic dogs as invasive species. *Animal Conservation*, 21(4): 287-288. <https://doi.org/10.1111/acv.12440>

Appendix I

The survey participants were asked to complete while walking their dogs on Te Henga/Bethells Beach.

Dogs and Dotterels on Bethells Beach

All responses are confidential, no identifying information will be collected. Respondents need to be 16 years or older to participate in this survey. This survey should take 5 - 10 Minutes to complete. By completing this survey, you are giving consent for the information provided to be used as data for the self-directed study course within the Bachelor of Applied Science, Unitec, Auckland in collaboration with Auckland Council. If you have any concerns please contact our supervisor Dr Diane Fraser, dfraser@unitec.ac.nz. Ethics code: UREC 2020-1060 Fraser

*

1. How many dogs are you walking today?

- 0 1 2
 3+
-

*

2. Are you the owner of these dog(s)

- Yes No Some
-

*

3. How often do you walk your dog(s) on this beach?

- Every day Twice a week Weekly
 Monthly Rarely
-

*

What time(s) do you bring your dog to the beach? *Select all that apply*

- | | | |
|---|-------------------------------|---------------------------------------|
| <input type="checkbox"/> 6am or earlier | <input type="checkbox"/> 11am | <input type="checkbox"/> 4pm |
| <input type="checkbox"/> 7am | <input type="checkbox"/> 12pm | <input type="checkbox"/> 5pm |
| <input type="checkbox"/> 8am | <input type="checkbox"/> 1pm | <input type="checkbox"/> 6pm |
| <input type="checkbox"/> 9am | <input type="checkbox"/> 2pm | <input type="checkbox"/> 7pm |
| <input type="checkbox"/> 10am | <input type="checkbox"/> 3pm | <input type="checkbox"/> 8pm or later |
-

*

4. Where do you walk your dog(s) on the beach? Refer to the map below and select all that apply



A

B

C

D

E

*

5. Of the areas that you walk your dog(s) during *summer*, do you usually have your dog(s) on or off the leash?

Area A

- On
- Off
- Depends

Area B

- On
- Off
- Depends

Area C

- On
- Off
- Depends

Area D

- On
- Off
- Depends

Area E

- On
- Off
- Depends

*

6. When do you put your dog(s) on a leash? *Select all that apply*

When there are people around

When there are birds around

When I am heading back to the car/home

When there are other dogs/dog walkers around

When they are not listening to my commands

When we are in an on-leash area of the beach

My dog(s) is always on a leash

My dog(s) is never on a leash

Other (Please specify)

*

7. When do you let your dog(s) off leash?

Select all that apply

- When there is no one around
- When there are no birds around
- When I arrive
- When there are no other dogs/dog walkers around
- When they are listening to my commands
- When they want to run around and/or swim
- When we are in an off-leash area of the beach
- My dog(s) is always on a leash
- My dog(s) is never on a leash
- Other (Please specify)

*

8. What, if anything, do you find challenging about walking your dog(s) on a leash?

Select all that apply

- I don't carry a leash
- It's unnatural for a dog to be on a leash
- My dog(s) gets excited and pulls on the leash
- My dog(s) cannot exercise properly
- Nothing
- Other (Please specify)

*

9. What, if anything, do you see as beneficial about walking your dog(s) on a leash?

Select all that apply

- Safety for my dog(s)
- Safety for the public and/or other dogs
- Safety for birds
- More control over my dog(s)
- Following the dog walking by-laws
- Nothing
- Other (Please specify)

*

10. Do you think dogs have an effect on native birds on beaches?

Yes

No

*

10a. If yes, what are these effects? *Please write your answer in the box below*

*

10b. If no, why do you think there are no effects? *Please write your answer in the box below*

*
11. Where do the New Zealand dotterels nest? Refer to the map below and select all that apply



A

B

C

D

E

I don't know

*

12. Why do you choose to walk your dog(s) on this beach? *Select all that apply*

- | | | |
|--|---|--|
| <input type="checkbox"/> By-laws | <input type="checkbox"/> Open spaces | <input type="checkbox"/> Scenery |
| <input type="checkbox"/> Close and convenient | <input type="checkbox"/> Safe | <input type="checkbox"/> Few people around |
| <input type="checkbox"/> Somewhere I enjoy walking | <input type="checkbox"/> Somewhere I can have my dog(s) off leash | |
| <input type="checkbox"/> Other (Please specify) | | |

*

13. Are you aware of the Auckland Council by-laws regarding dogs at this beach?

- Yes No

*

14. Where do you look for information on the dog walking by-laws? *Select all that apply*

- | | | |
|---|---|--|
| <input type="checkbox"/> Auckland Council website | <input type="checkbox"/> Department of Conservation website | <input type="checkbox"/> Facebook |
| <input type="checkbox"/> Signage at the beach | <input type="checkbox"/> Local Board website | <input type="checkbox"/> Other dogs' walkers/word of mouth |
| <input type="checkbox"/> I haven't | <input type="checkbox"/> I don't know | |
| <input type="checkbox"/> Other (Please specify) | | |

*
15. Where are dogs allowed off-leash?
Refer to the map below and select all that apply



A

B

C

D

E

I don't know

*

16. What would help you to understand the dog walking by-laws for this beach?

- | | | |
|--|---|--|
| <input type="checkbox"/> A clearer map of on and off leash zones | <input type="checkbox"/> Change location of signage | <input type="checkbox"/> Clearer information on the Auckland Council Website |
| <input type="checkbox"/> Different language than English | <input type="checkbox"/> Nothing | <input type="checkbox"/> I don't know |
| <input type="checkbox"/> Other (Please specify) | | |

Please add any additional feedback that you have about the dog walking by-laws for this beach.

17. Where do you live?

- Local to the beach Auckland Outside of Auckland

17b. Please select your area

- | | | |
|--|--|--|
| <input type="radio"/> Mt Albert - Mt Eden | <input type="radio"/> Devonport - Takapuna | <input type="radio"/> Franklin |
| <input type="radio"/> Great Barrier | <input type="radio"/> Henderson - Massey | <input type="radio"/> Hibiscus and Bays |
| <input type="radio"/> Howick | <input type="radio"/> Māngere - Ōtāhuhu | <input type="radio"/> Manurewa |
| <input type="radio"/> Maungakiekie - Tāmaki | <input type="radio"/> Ōrākei | <input type="radio"/> Ōtara - Papatoetoe |
| <input type="radio"/> Papakura | <input type="radio"/> Puketāpapa | <input type="radio"/> Rodney |
| <input type="radio"/> Upper Harbour | <input type="radio"/> Waiheke | <input type="radio"/> Waitākere Ranges |
| <input type="radio"/> Waitemātā | <input type="radio"/> Whau | <input type="radio"/> Not sure |
| <input type="radio"/> Other (Please specify) | | |

18. Please indicate the gender you identify with.

Male

Female

Gender diverse

Prefer not to say

19. Please indicate your age group.

16-19

20-29

30-39

40-49

50-59

60-69

70 +

Thank you very much for taking the time to complete this survey!

Your answers will help us to understand the level of awareness of dog leash bylaws at Te Henga/Bethells, people's knowledge of the native birds present at the beach, and the drivers/barriers to keeping dogs on-leash. We appreciate your contribution!
