Barriers to Compliance: Dogs in New Zealand National Parks

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Dogs in New Zealand National Parks

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Abstract

The New Zealand Department of Conservation is seeking to combat barriers to compliance with their no dog in National Parks policy. Experts and current literature agree that dogs pose a significant threat to New Zealand's native fauna. We used surveys and interviews to assess the public's perceptions of the dog ban in National Parks. While the majority of the population knows about the ban, casual park visitors do not always know the rules while others simply choose to ignore them. We provide recommendations to DOC about how to refine their current communications, develop a national awareness campaign, and improve their Compliance and Law Enforcement system to improve compliance with the ban.

Acknowledgements

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Section 4.4	Tribble, Jahnz	Nerkowski, Dorman
Section 4.5	Nerkowski	Jahnz, Tribble
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Section 5.2	Nerkowski	Dorman, Tribble
Section 5.3	Tribble, Jahnz	Nerkowski
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Appendix B	Nerkowski, Tribble	Dorman, Jahnz
Appendix C	Nerkowski	Tribble, Jahnz
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Executive Summary

With the passage of the 1987 Conservation Act, New Zealand created the Department of Conservation. It tasked them with maintaining the country's natural and cultural heritage for future generations. National Parks are the most protected among the conservation areas under the jurisdiction of DOC. They were meant to protect parts of the country that "contain scenery of such distinctive quality, ecological systems, or natural features so beautiful, unique, or scientifically important that their preservation is in the national interest" (New Zealand Department of Conservation, 2022). DOC is responsible for overseeing and managing the protection of National Park ecosystems. **Every year, DOC receives roughly 300 dog-related calls to its hotline for reporting issues of non-compliance. These calls range in severity from reports of dogs being off lead on beaches and dogs attacking wildlife to just dogs entering National Parks**. **Therefore, this project aims to assist DOC in identifying barriers to and encouraging compliance with their "no dogs in National Parks" policy.** To meet this goal, we created three objectives, shown in Figure 0.1.

Goal: Assist DOC in understanding the barriers to improving compliance with their no-dog policy for National Parks

Objectives:

| Understand why dogs are banned in New Zealand National Parks | Investigate the reasons and common pathways for non-compliance | Identify effective ways to motivate dog owners to change behaviors |
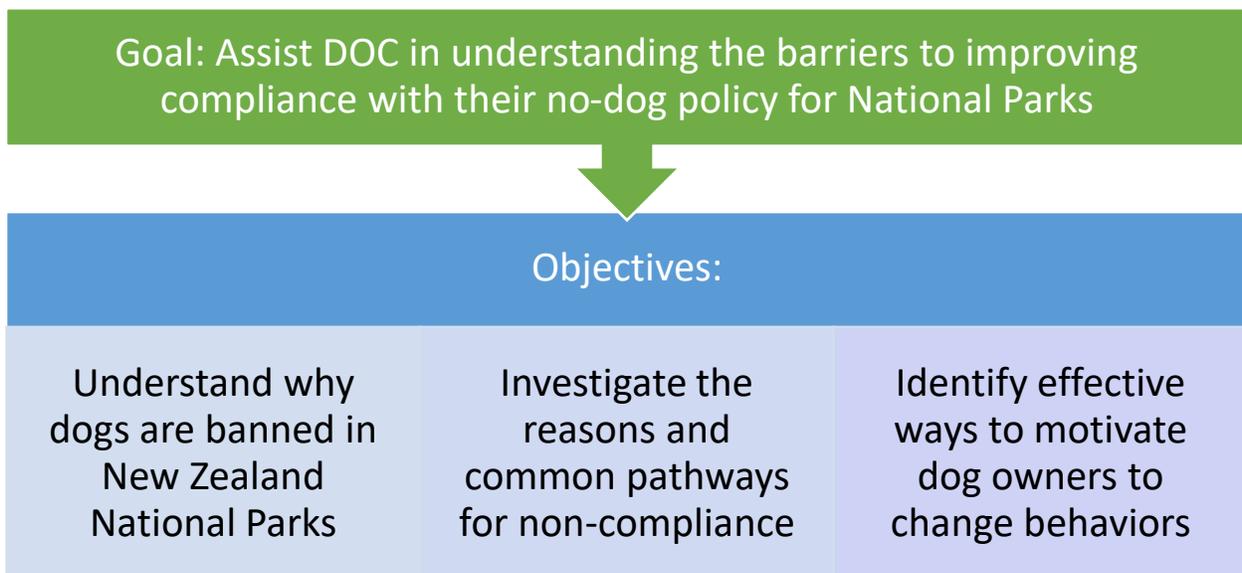
Figure 0.1: Project Goals and Objects

According to Jeffery Hall, a Principal Compliance Officer at DOC, the native fauna of New Zealand, "many of which are ground living and/or nesting, [have] no defense to rats, mice, cats, ferrets, stoats etc... A dog, off leash, in a National Park could come across kiwi, weka, or tuatara in the undergrowth and easily attack, injure, or kill" (Hall, personal communication, Jan 31, 2023). According to Nelson Lakes National Park (NLNP) Senior Ranger Sandra Wotherspoon, "dogs are particularly attracted to kiwi scents because the scent is very strong, and when the dog smells it its very new" (Wotherspoon, personal communication, Feb 4, 2023). DOC had to come up with a solution to protect the native birds.

DOC's priority when it comes to enforcement is citizen education. When education is ineffective, laws empower DOC to take appropriate legal action to protect the environment, such as providing violators with a warning letter or issuing an infringement notice carrying a $200-800 fine (Enforcement Policy, n.d.). In 2020, DOC implemented a new digital Compliance and Law Enforcement (CLE) system to record and manage an online database on infringements nationwide. Analysis of the database shows that Nelson Lakes National Park (NLNP) has the highest number of infractions, shown in Figure 0.2.
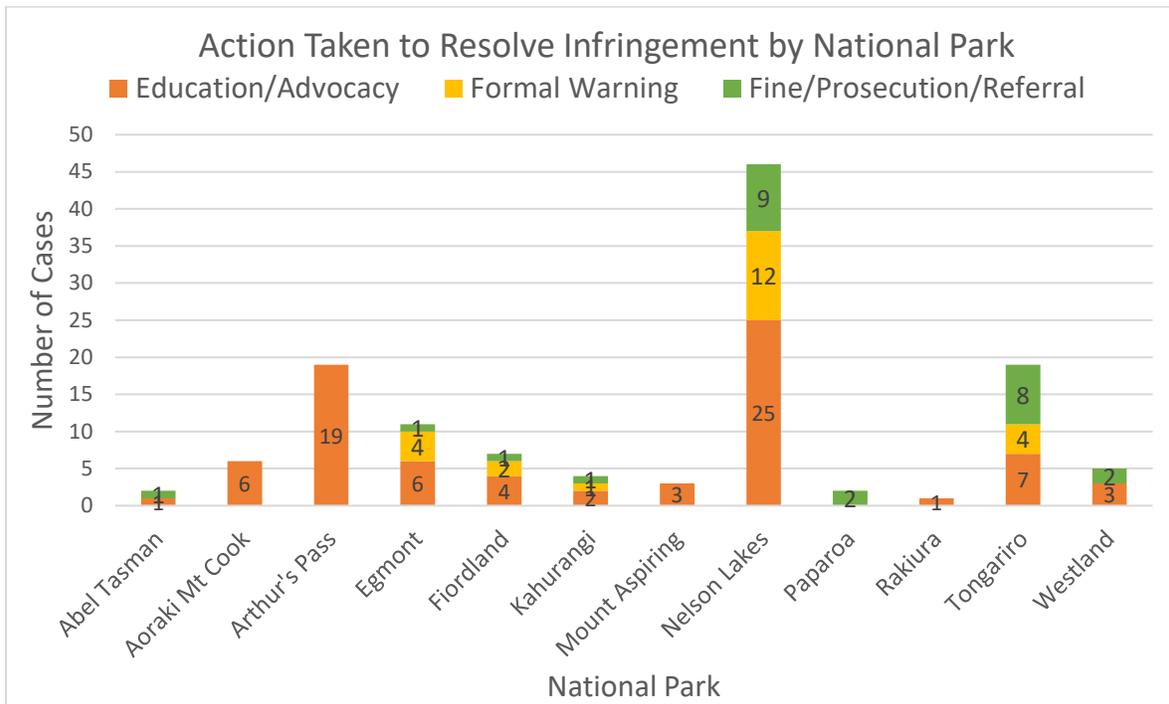
Figure 0.2: Action Taken to Resolve Infringement by National Park

We observe from Figure 0.2 that NLNP is a good candidate for further understanding the issue of compliance. **NLNP has a high infringement rate but aligns with how an average National Park resolves infringement issues.**

The first objective we established was to understand why dogs are not allowed in National Parks. We met objective one through our review of existing literature augmented by findings through interviews with DOC employees and other conservationists connected to the National Park system. Second, sought to understand the reasons for non-compliance and how to change people's behavior. To achieve objective two, we interviewed park visitors at Nelson Lakes to gauge their understanding of the ban. Finally, we used the information we received from DOC experts and park visitors at Nelson Lakes to meet objective three. We created a set of proposed interventions asking the public which interventions they felt would effectively increase compliance.

Our data analysis revealed that all park visitors who visited Nelson Lakes' Very Often' were aware of the ban. However, **only 50% of the people who said they visited Nelson Lakes either 'Rarely' or 'Never' were aware of the ban's existence.** This difference demonstrates a significant correlation between visiting Nelson Lakes less frequently and not being aware of the

ban (p=2.744e-22). We also tried to find out if being born and raised in New Zealand impacted their awareness of the ban. **Of the 10 participants who moved to New Zealand later in life, 40% were unaware of the ban. Of the other 64 participants born and raised in New Zealand, 11% were unaware of the ban.** Despite the gap between the percentage of native New Zealanders aware of the ban and those who immigrated to New Zealand, the sample size for those who immigrated is significantly smaller. Therefore, there is no correlation between being born and raised in New Zealand and being more conservation aware (p=0.395, r=0.277).

Park visitors said they preferred to use the DOC website to learn about National Parks. We found that while users of the DOC website could find the information they were looking for, it was tedious for them to find. **We recommend that DOC make information about where people can and cannot take their dogs more prominently featured on their website and add sections about dog-friendly areas near each National Park on each park's respective page.** Implementing this allows users of the website positive alternative solutions for where they can bring their dogs instead of just information about places they cannot go. Also, our site analysis found that DOC currently utilizes many clear and well-placed signs to communicate to visitors within parks the rules about where they can take their dogs and the fines associated with violating the rules**. We recommend that DOC continue to employ these large and effective signs, especially on roads leading into the National Parks**. We the number of through and access roads going into a park and found a strong correlation between a park having more roads per thousand square kilometers and the number of reported incidences of dogs in the park (r=0.7719). This correlation suggests that the more accessible a park is, the more likely it is to have an issue with people taking their dogs into the park.

We investigated if the park's utility to visitors could be a barrier to compliance. We asked each visitor their purpose for visiting the park that day. Every person who said they lived nearby or were camping knew about the ban, suggesting that it may be common knowledge for locals or those who have more experience spending time in nature. Meanwhile, those who said they were passing through had the highest rate of people who did not know about the ban, with 36% unaware they could not bring their dog into the park. **We recommended developing an awareness campaign to inform people about the ban, tell them why it exists, and the consequences for violating it.** The campaign would also inform people about pet-friendly DOC areas where they could take their dogs. **We also recommended that DOC partner with local councils in their awareness campaign inform new dog owners about key pet-related conservation policies when they first register their dogs.**

Our final recommendation to DOC was to improve its current CLE system to better respond to, process, and deter people from bringing their dogs into National Parks. Our background identified shortcomings in the current system, including a complex workflow for reporting incidents and a lack of adequate training for bio rangers and park volunteers tasked with responding to dog infringements. Participants in our online survey felt most strongly that fines and enforcement of the ban would be an effective way to get dog owners to stop bringing their dogs into National Parks, indicating that the public feels strongly that CLE process improvements could go a long way to encourage compliance with the ban.

Chapter 1. Introduction

Over the last four hundred years, New Zealand has changed remarkably. Prior to the arrival of humans, what is today the island nation had no native land mammals. When European settlers introduced predators such as rats and stoats to the islands, these mammals began to wreak havoc on the environment. New Zealanders saw a solution: turning land into National Parks to allow ecosystems to thrive and humans to enjoy pristine, untouched nature. However, with nearly a third of all New Zealand residents being pet owners, domestic dogs can pose a serious threat to the fragile balance of protected lands. For this reason, the New Zealand Department of Conservation (DOC) has banned visitors from bringing dogs into National Parks.

DOC has considerable responsibility for overseeing and managing the protection of National Parks. Among their many conservation measures, the agency facilitates community outreach programs to educate community members on environmental hazards, trains compliance officers to enforce regulations, and encourages community awareness about the importance of local ecosystems. To make protecting these ecosystems a community effort, DOC also provides a hotline for individuals to report issues of non-compliance with environmental regulations. They also developed an infringement database where they record and track such complaints. Every year, DOC receives roughly 300 dog-related calls to its hotline, ranging from reports of dogs being off lead on beaches and dogs attacking wildlife to dogs entering National Parks.

DOC hopes an assessment of existing and new data could measure the extent to which visitors understand and comply with current regulations and provide preliminary evidence demonstrating the efficacy of our proposed interventions. Therefore, this project aims to assist DOC in identifying barriers to and encouraging compliance with their "no dogs in National Parks" policy. To meet this goal, we have identified and done extensive research into three objectives: 1. To understand why New Zealand has established the dog ban in their National Parks; 2. To investigate the common reasons for non-compliance; 3. To identify effective ways to motivate dog owners to change their behaviors. We met each objective by reviewing existing data and literature on the issue, as well as primary data collection in New Zealand. Our research revealed interesting links between the utility of a park or how often people visit with their understanding of the ban. We also gained valuable insights about the ways people learn about parks, and how this varies across demographic groups. With the data collected, we have tailored recommendations that will effectively improve compliance with the dog policy in New Zealand.

In the coming chapters, we provide background on DOC, its ban on dogs and enforcement policy, and methods for motivating change. In addition, we discuss our methods for data collection, followed by our analysis of the data collected, and finally, our recommendations for DOC to improve compliance with the dog ban in National parks.

Chapter 2. Background

In this chapter, we review existing data and the literature related to our project's goal. We briefly discuss DOC's mission, followed by recent analyses of the legal background behind DOC's policymaking and enforcement-related work. We transition into the issue in New Zealand specifically, analyzing recorded incidents of dogs in each park and diving deeply into one park in particular. Finally, we discuss best practices to motivate a change in human behavior and increase compliance with the no dogs in National Parks policy. Woven throughout is information provided by experts at DOC during field research, supplementing the information provided in secondary sources and data from DOC's infringement database.

2.1 Understanding the DOC mission

New Zealand created the Department of Conservation with the passage of the 1987 Conservation Act. The act tasked them with maintaining the country's natural and cultural heritage for future generations (New Zealand Department of Conservation, 2022). To accomplish this mission, DOC oversees a variety of policy decisions as well as takes an active role in planning enforcement and collaborates with local communities to encourage protection efforts.

National Parks are foremost among the conservation areas under the jurisdiction of DOC. To manage these parks effectively, the New Zealand Parliament created legislation to guide the DOC's actions in these wilderness areas. Parliament passed the National Parks Act passed in 1980 and has been updated almost every decade to stay relevant to the modern environmental and cultural needs of New Zealand. DOC's primary goal is to protect the environment and endemic flora and fauna of New Zealand; this includes protecting all wildlife from the risk dogs pose to the ecosystem.

2.2 The threat dogs pose to ecosystems

DOC does not allow dogs at any of New Zealand's thirteen National Parks because of the biosecurity risks they pose to flora and fauna. Some of the dangers that domesticated dogs pose to protected areas can be seen worldwide. At the same time, other threats are specific to New Zealand because of its isolation from mainland areas and many endemic species.

Evidence from around the world highlights the threat dogs pose to native species and supports restricting dogs from entering protected natural environments. One meta-analysis reported publications regarding dog interactions in parks from 29 countries (Weston et al., 2014). In one of these studies from India, researchers found that pet canines reportedly attacked over 80 different species of animals (Home et al., 2018). In Madagascar, over 40% of dog owners interviewed admitted that their dog had attacked and killed wild animals, demonstrating that many animals are at risks from dog attacks, which are also very common (Valenta et al., 2016). Domestic dogs attacking wildlife is just one of the many threats they pose; when interacting with endangered species, dogs can also introduce foreign diseases to

native populations within a protected area (Zapata-Ríos, 2018); (*Risks to Wildlife from People - Watching Wildlife (U.S. National Park Service)*, n.d.).

Some visitors argue these risks can be mitigated by keeping their dogs on lead, but the presence of dogs in the parks means that wildlife is less likely to inhabit those areas. When dogs live near National Parks, wildlife populations tend to become more concentrated further within park boarders where there is less human activity (Lord et al., 2001). A study from Brazil confirmed that native wildlife tended to avoid the park peripheries, which correlated to areas where the researchers had documented tracks left by pet dogs (Lacerda et al., 2009).

New Zealand has developed a diverse ecosystem featuring many bird species, "of which 94 (46%) are endemic (i.e. found only in New Zealand)," and these birds are not adapted for fighting off invasive predators like dogs (*Bird Taxa | Collections Online - Museum of New Zealand Te Papa Tongarewa*, n.d.). According to Jeffery Hall, a Principal Compliance Officer at DOC, "a dog, off [lead], in a National Park could come across kiwi, weka, or tuatara in the undergrowth and easily attack, injure, or kill," the animal (Hall, personal communication, Jan 31, 2023). Dogs can make birds with ground nests, which are some of the most at-risk species in New Zealand, feel threatened (Lenth et al., 2008; New Zealand's Threatened Birds, n.d.). Furthermore, Sandra Wotherspoon said, "dogs are particularly attracted to kiwi's scents because the scent is very strong, and when the dog smells it its very new," which could cause even the best-behaved dog to act uncharacteristically, attacking or killing the endangered bird.

2.3 Compliance and enforcement of dog infractions

Since dog interactions can negatively affect ecosystems, many local municipalities have implemented policies similar to DOC (Weston et al., 2014). The issue of compliance with environmental regulations is not unique to New Zealand; reports published across the globe indicate that people, even those who know the rules, do not always follow them. In one study, investigators concluded that dog owners often ignore environmental pet regulations when the public sees them as unnecessary (Miller et al., 2013). An Australian study found high rates of non-compliance with lead laws on Victorian beaches (Schneider et al., 2020). A report from the same beach found nearly nonexistent enforcement of dog restrictions (Williams et al., 2009). Other research found compliance tended to be highest where policies were strictest: people tended to comply with outright bans on canines but would often allow their pets off lead in areas where dogs were only allowed if they were on lead (Maguire et al., 2019).

2.3.1 Understanding DOC's enforcement approach

DOC's priority when it comes to enforcement is citizen education. Darren Foxwell, a Biodiversity Ranger at Kahurangi and Abel Tasman National Park, said that rangers are trained to educate dog owners infringing on the rules to prevent a second offense (Foxwell, Feb 1, 2023). According to the agency's *National Compliance Strategy*, DOC prefers to focus on education to encourage compliance. The agency argues that "most people are willing to comply, and so lower-level compliance actions should be sufficient in most situations" (*Enforcement Policy*, n.d.). Figure 2.1 illustrates how DOC implements the Braithwaite compliance model, which emphasizes education but recognizes the need for stricter enforcement mechanisms when more serious situations arise. Legislation empowers DOC to

issue warning letters or infringement notice that carry a $200-800 fine when necessary (*Enforcement Policy*, n.d.). The highest level of enforcement would be prosecution, which DOC only pursues if "required in the public interest," (*Prosecution Policy*, n.d.). For example, if a dog attacks wildlife, the owner could be convicted under the Wildlife Act, which could result in a fine of up to $100,000 (Wotherspoon, personal communication, Feb 4, 2023).
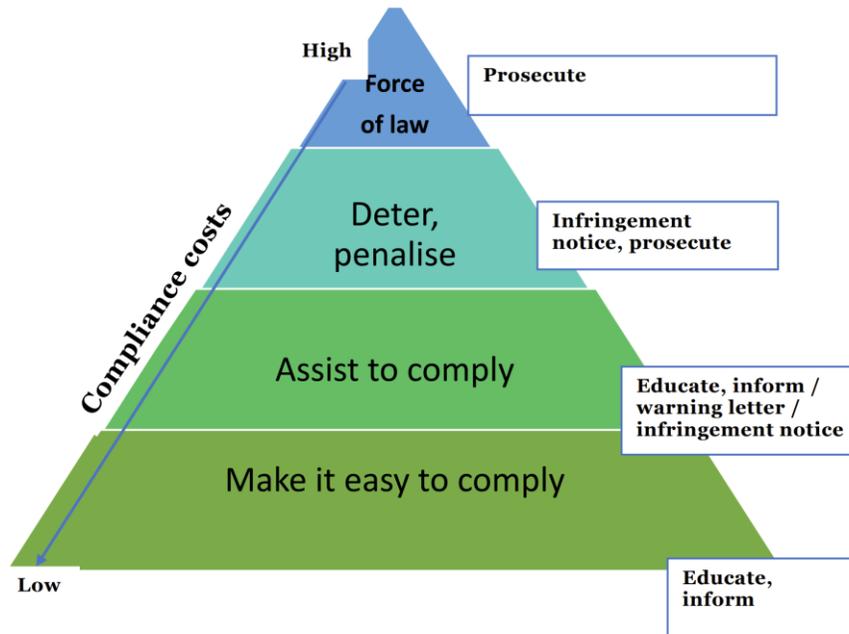
Figure 2.1: DOC Compliance Model
(Source: Department of Conservation Enforcement Policy)

To aid with policy enforcement, DOC employs warrant officers. Warrant officers receive training on the importance of the park's ecology and educating park visitors on the importance of conservation policies; they can also issue warning letters and infringement notices when necessary (*Enforcement Policy*, n.d.). At the same time, DOC uses strategies to engage the public with enforcement, such as a hotline people can call "to report any possible illegal activity on any conservation matter," (Department of Conservation, n.d.). All these education and enforcement mechanisms assist DOC in its mission to foster compliance with park regulations and ultimately protect ecologically and culturally significant areas.

2.3.2 Reporting and recording compliance issues

Unfortunately, education alone has not been enough to eliminate policy infractions. In 2020, DOC implemented a new digital Compliance and Law Enforcement (CLE) system to record and manage a database of infringements nationwide. When a dog incident arises, a bio ranger or warrant officer can log it as a job in the CLE system. When logging the job, there are fields to record information about the assailant, the date and time of the infraction, the location where it occurred (including the town, DOC region, and the latitude and longitude), and a description of the incident. According to National Compliance Coordinator Sharron McCormack, depending

on the position of the person logging the job, the permissions they have within the CLE system will vary (McCormack, personal communication, Feb 15, 2023). A generic bio ranger will only have the ability to record the incident. Warrant officers, who receive additional law enforcement training and certification, will be able to resolve the incident by issuing a warning letter or fine.

If an incident is not immediately resolved, a Regional Compliance Officer will follow up. When an infraction is recorded in the CLE system, the compliance officer for the region where the job originated investigates the incident and decides what action should be taken against the assailant. Compliance officers are also tasked with noting compliance trends within their region and working with the district level to find proactive solutions to improve compliance. These trends, as they relate to the issue of dogs in National Parks, are explored in the next section.

2.4 The risks dogs pose to individual New Zealand parks

To understand the level of dog-related risks at each park, we worked to identify which parks had the highest infraction rates. We analyzed a data extract from the infringement database spanning from September 2020, when DOC implemented it, to November 2022, when we began our research. In that time, DOC logged 265 alleged offenses in National Parks.

Information about the methodology used to determine where a report came from can be found in Appendix A. Twelve of the thirteen National Parks in New Zealand have at least one recorded instance of infringement in the database, with Whanganui National Park being the only park not represented. Figure 2.3 shows that NLNP has the highest number of infractions at 91, nearly three times higher than the next highest, Tongariro, which had 35.
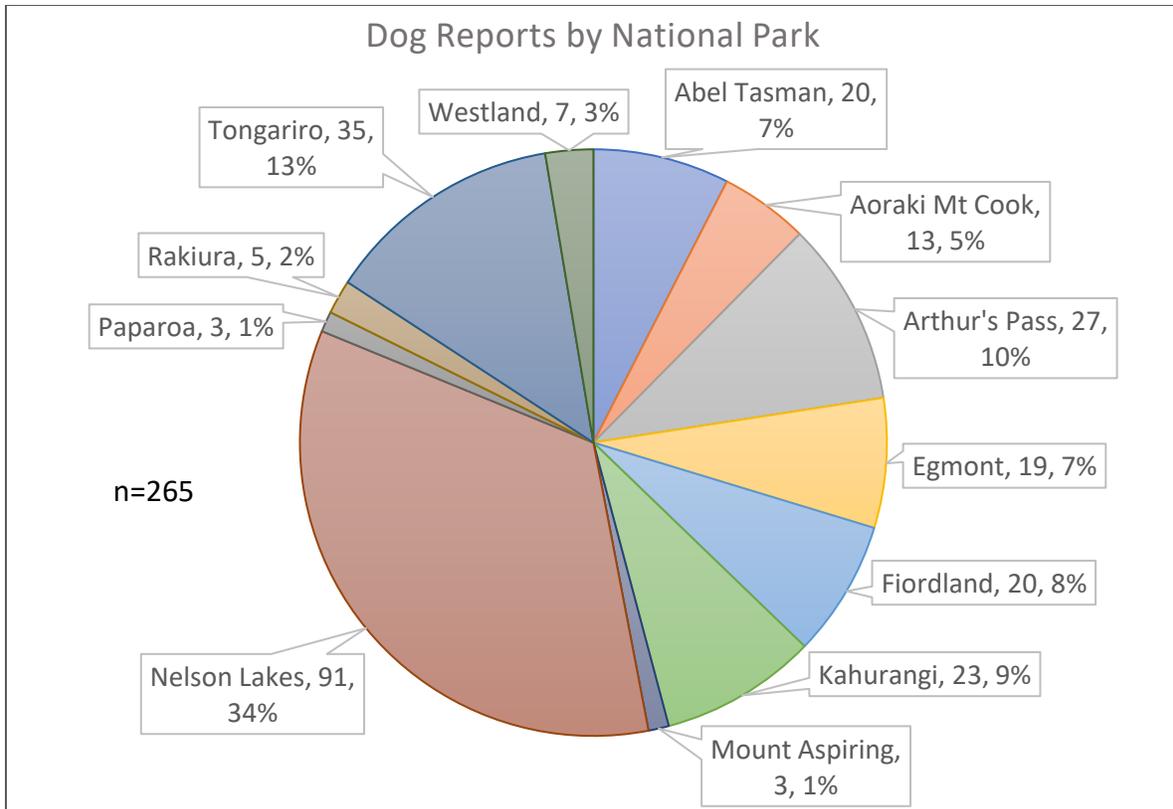
Figure 2.2: Number of Dog Reports by National Park

To determine the risk each incident posed, we gave each report an Offense Severity rating. Based on the description in the "Alleged Offense" field, we categorized the offense into one of four buckets: low severity, medium severity, high severity, and very high severity (methodology in Appendix A). Figure 2.3 shows how each parks' offenses break down by severity. NLNP had the greatest number of reported incidents, but 76.9% of the 91 reports, were medium severity. This contrasts with other parks such as Able Tasman and Kahurangi, which had much higher rates of high or very high severity offices – 47.4% and 26.0%, respectively – indicating that the threat each park faces is unique to each park.
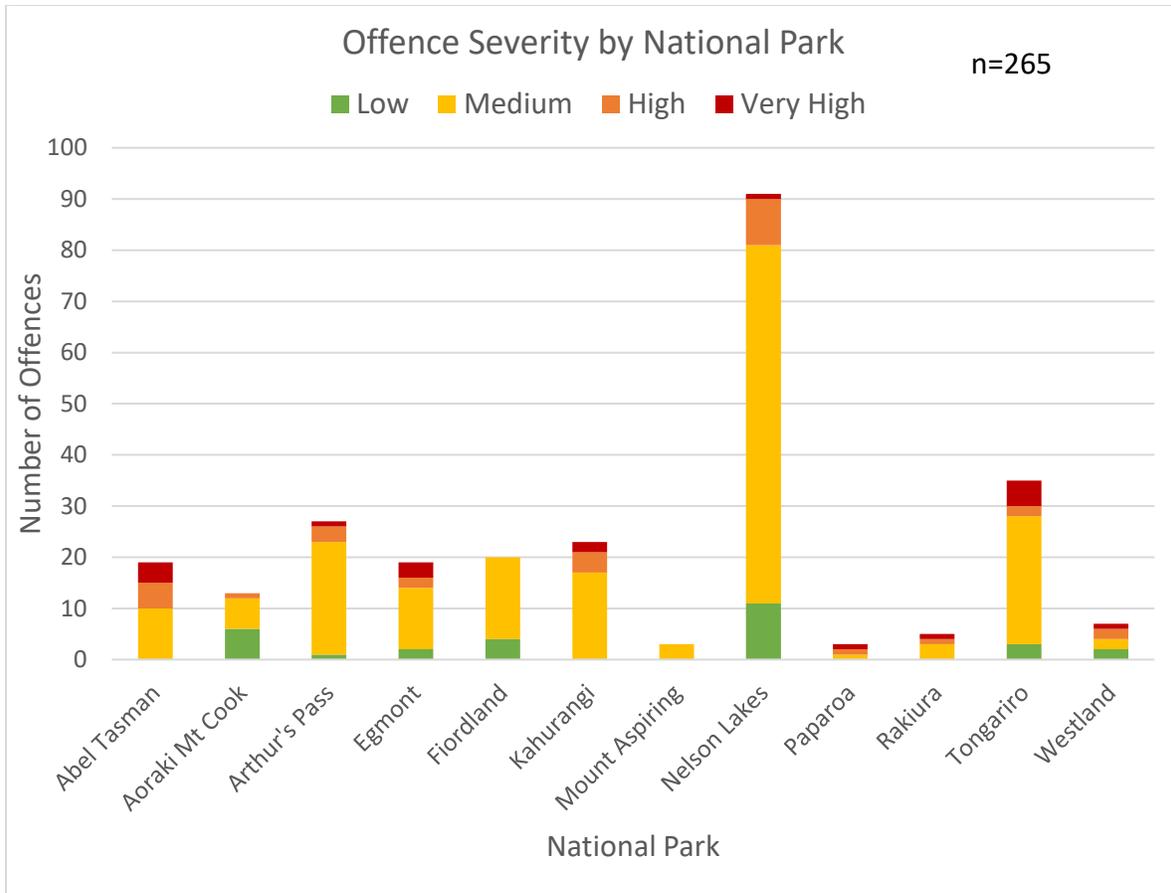
Figure 2.3: Offense Severity by National Park

The final key statistic we analyzed in the database was the incident resolution method. We investigated how DOC dealt with each incident and compare it to their stated compliance strategy. We categorized the resolution method into one of five buckets: Education/Advocacy, Formal Warning, Fine/Prosecution/Referral, Insufficient Evidence, or No DOC Action. Of the 265 offenses in National Parks, we identified the resolution method of 245. In 49% of cases, DOC either did not act against the assailant or they had insufficient evidence to issue a fine. According to Graeme Quinn, a Field Ranger at Kahurangi National Park, the main barrier to issuing fines is often a lack of evidence, supported by the breakdown of the resolution methods in Figure 2.4 (Quinn, personal communication, Feb 2, 2023).
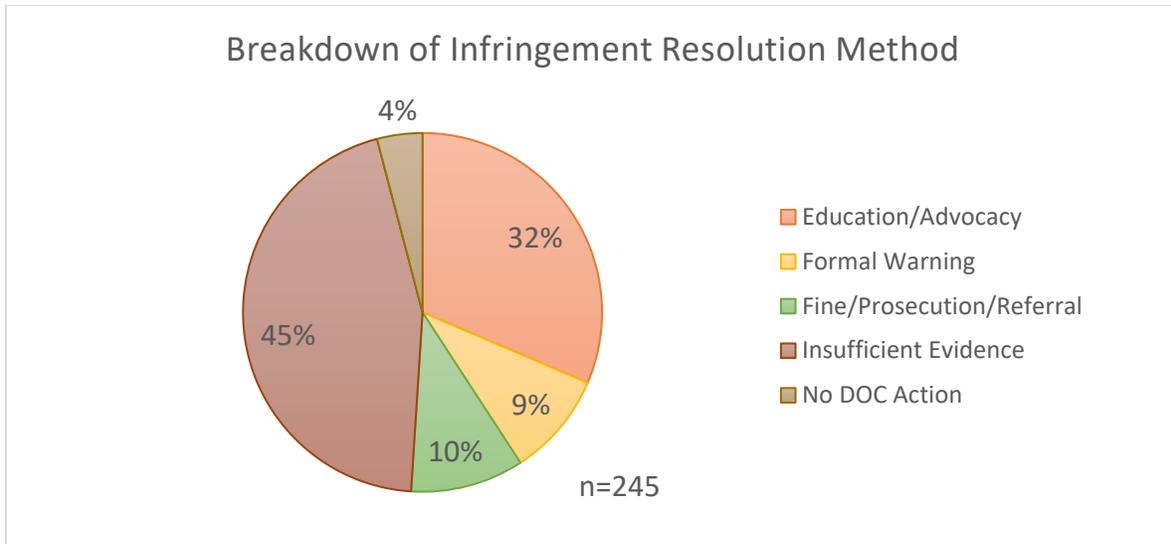
Figure 2.4: Breaking Down Infringement Resolution for Dogs in National Parks

Boren and McCormack said that while training on how to use the CLE system is available to DOC employees on the DOCLearn training platform, the training is only mandatory for warrant officers, so a bio ranger may not know what needs to be documented to issue an infringement notice. They also may not have time to properly document the infringement since time working on CLE may account for as little as 2% of the ranger's duties, depending on the park (Boren and McCormack, personal communication, Feb 15, 2023). In the 51% of cases where DOC was able to act against the assailant, what action the bio ranger or compliance officer decided to take varied widely by the park, as shown in Figure 2.5.
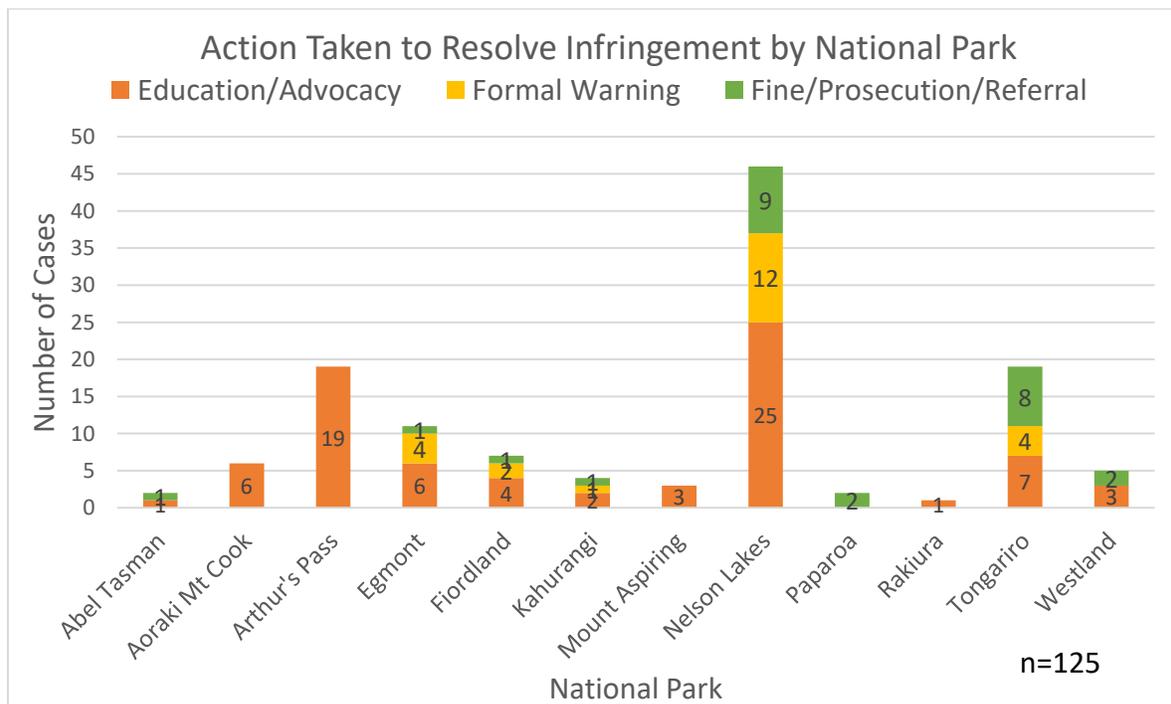
Figure 2.5: Action Taken to Resolve Infringement by National Park

The percentage of cases where action DOC took action also varied by park. In Tongariro, 42.1% of cases were resolved using Fines/Prosecution/Referral, but only 19 out of 35 logged incidents could be resolved. In Arthur's Pass, where only Education/Advocacy was used to resolve infringements, bio rangers, warrant officers, and compliance officers were able to act in 100% of cases. In Nelson Lakes, DOC acted against the assailant in 50.1% of cases, in line with the average across all parks (51.0%, n=245). Of cases where DOC acted in NLNP, 54.3% were resolved with Education/Advocacy (61.6% across all parks), 26.1% were resolved with a Formal Warning (18.4% across all parks), and 19.6% were resolved with Fines/Prosecution/Referral (20.0% across all parks). This makes Nelson Lakes a good candidate for further understanding the compliance issue since it has a high rate of infringement, but it is representative of an average National Park in terms of how issues are being resolved.

2.5 Nelson Lakes National Park

With the highest rate of non-compliance being at Nelson Lakes, we decided to explore what sets it apart from New Zealand's other National Parks. The park is located on the South Island and is shown in red in Figure 2.6. At the northern tip of Lake Rotoiti is the town of St Arnaud, home to the park's main visitor center. Homes in the town of St Arnaud border right up against the park. DOC employee Laura Boren suggested people in the nearby town of St Arnaud might use Nelson Lakes as a place to walk their dogs and be regularly taking their dogs into the park for exercise. NLNP is entirely in the 'No Dogs Allowed' zone (red on the map), but other areas around St Arnaud do allow dogs (green and blue areas). Teetotal Campsite, a dog-friendly campsite managed by DOC, is located just a two-minute drive (1.8 km) from the Visitor Centre.
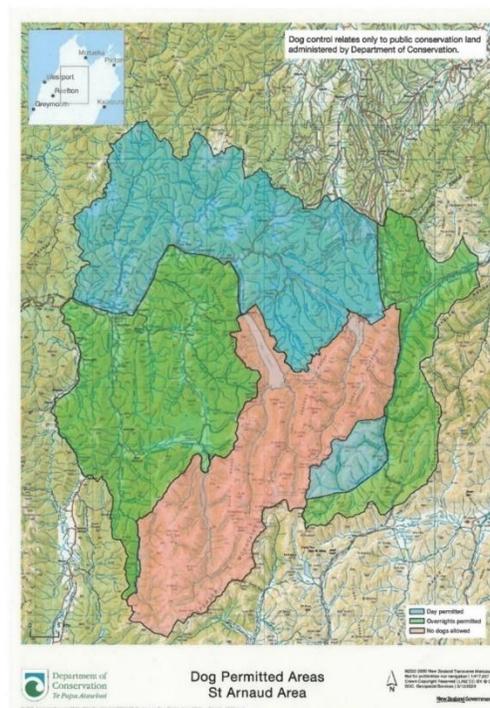
Figure 2.6: Dog Permitted Areas, St Arnaud Area
(Source: Department of Conservation)

The Rotoiti Nature Recovery Project has been working to reduce the number of non-native predators inside NLNP to allow native species to thrive. One of the species is the Great Spotted Kiwi, a flightless bird being reintroduced to its native lands (*Nelson Lakes National Park*, n.d.). Kiwis were native to the Nelson Lakes but went extinct from the area in the twentieth century. Since 2004, the non-profit Friends of Rotoiti has reintroduced over fifty kiwis from Kahurangi National Park back into Nelson Lakes (*Great Spotted Kiwi*, Friends of Rotoiti; Wotherspoon, personal communication, Feb 4, 2023). According to information in the Nelson Lakes Visitor Center, adult Great Spotted Kiwis "can generally defend themselves against all but dogs" (Department of Conservation, *n.d.*). An attack by a dog can undo years of restoration work, as shown in Figure 2.8, which depicts seven kiwis killed in dog attacks.

Figure 2.8: Seven kiwis killed by dog attacks in Kerikeri
(Source: Department of Conservation, 2015)

2.6 Identifying barriers and changing behavior

Although creating and enforcing wildlife protection laws can be important to keep these parks safe, it only matters if the visitors follow the rules. Dogs are companion animals, and a recent study stated that humans view their dogs as family, with 36% of dog owners traveling with their dogs (Dolesh, 2021). This section seeks to understand possible motives for disregarding regulations and strategies to improve compliance.

Lack of public awareness of biosecurity risks dogs pose to native species may contribute to the low rates of pet-owner compliance with such regulations. According to Weston's meta-analysis, "while most dog owners (96%) surveyed on Victorian beaches were aware of dog control laws, only 18% of dog owners were aware of the lasting negative impact that dogs can have on beach-nesting birds," (Weston et al., 2014, p. 387). A study of Canada's Pacific Rim National Parks found that people said they would be more likely to comply with leashing rules if they knew the environmental hazards allowing dogs to be off lead would pose (Bowes et al., 2018). Signage had little effect on rates of compliance, as a study from Kaikoura found that only 65% of visitors noticed signage telling them to maintain a safe distance from seals; they also found no significant difference in the behavior of people who saw the signs (69% complied) versus those that did not (60% complied) (Acevedo-Gutiérrez et al., 2011).

The most prominent management programs for preventing dog-wildlife interactions include education, regulations, and environmental modification. However, education is the most effective because it can help to reshape values, and "people are more likely to be motivated to change their behavior when they feel they are in control, and that their behavior aligns with their values" (Miller et al., 2013 p. 298-299). Education is particularly effective in New Zealand. One study found much higher compliance rates with the New Zealand Craft Risk Management Standard compared to California Biofouling Regulations despite implementing an awareness campaign, showing how education was more effective at soliciting a behavior change among Kiwis than Californians (Scianni et al., 2021).

One method to passively prevent dog-wildlife interactions comes from the idea of stigmatization. Based on the second consideration of *The Theory of Planned Behavior*, individuals rely on the perception of whether their peers approve or disapprove of their actions. This consideration relies heavily upon a person's motivation to comply with social norms (Aizen, 1991). By creating a stigma against bringing dogs into National Parks, people will be motivated to comply with social norms, thus complying with the ban on dogs in National Parks.

2.7 Summary

We have developed a crucial understanding of DOC's role in the ecological conservation of New Zealand's natural landscapes, particularly their enforcement policies and methods used to regulate protected land under their jurisdiction. Case studies from around the globe show that dogs threaten protected lands in National Parks. The infringement database revealed that non-compliance with DOC's dog ban is a significant hurdle to protection efforts in some of New Zealand's National Parks. This is especially true in NLNP, which has the highest rate of non-compliance of any National Park. As such, we looked closer at what sets Nelson Lakes apart from other National Parks in New Zealand. We also found that decreasing rates of non-compliance will require important steps to effectively motivate people to rethink their behavior before entering a park along with their pet dogs.

Chapter 3. Methodology

The goal of our project was to assist DOC in understanding the barriers to improving compliance with their no-dog policy for their National Parks. To that end, we identified three objectives:

- Objective 1. Understand the reason for the dog ban in New Zealand's National Parks
- Objective 2. Investigate the reasons and common pathways for non-compliance
- Objective 3. Identify effective ways to motivate dog owners to change behaviors

The data collection strategies for each objective are listed in greater detail below.

3.1 Understanding the dog ban in New Zealand's National Parks

Our first objective, understanding why dogs are not allowed in National Parks, was met through our review of existing literature and analysis of reported infraction from DOC's infringement database. We augmented these findings with interviews with DOC employees and other conservationists connected to the National Park system. We interviewed department employees who are experts in park conservation about why the policies exist and why they are important. Our sponsor, Laura Boren, referred these employees to us, chosen based on their expertise in their respective fields. We made these interviews open-ended, as our primary objective was to allow DOC employees to voice their opinions on the importance of the no-dogs in National Parks policy. The interview guide can be found in Appendix B.

Additionally, we met with technical experts at DOC to understand their Compliance and Law Enforcement system. Understanding this dimension of the ban was vital to evaluating the current enforcement state and identifying any barriers to compliance in this area. We met with members of the national compliance team to learn more about this process, and the questions we asked during these conversations can be found in Appendix C.

3.2 Investigating the reasons and common pathways for non-compliance

Our second objective was to understand the reasons for non-compliance and how to change people's behavior. To achieve objective two, we conducted interviews with park visitors in the National Park with the highest-frequency rate of infractions: Nelson Lakes. There, we talked to visitors to measure their understanding of the ban's different dimensions. While on-site, we also gauged compliance levels through observations and site assessments.

Upon arriving at Nelson Lakes, we familiarized ourselves with the area using maps of the park and surrounding area. Team members used the DOCgis and other maps of Nelson Lakes to identify the location of all signage that included dog information. Having data on the location and types of signs throughout the park could help us better understand what areas needed more effective signage and markers to better communicate information about park policies to visitors.

While at Nelson Lakes, we also interviewed park visitors by stationing ourselves at the locations we determined as optimal. We consulted the park enforcement officers to determine these locations based on where bio rangers suggested we were likely to see high visitor traffic

and people not in compliance with the ban. The locations selected are highlighted in Figure 3.1. These on-site conversations aimed to gauge attendees' understanding of park policies regarding dogs.

Figure 3.1: Interview Locations at Nelson Lakes National Park

When interviewing park visitors, we aimed to see what communication methods they were most likely engage with. We asked people whether they knew about the dog policies in the park, and if they already knew the policies, we asked them how they learned about them. We also tried to understand if they knew the reason for the ban since our background revealed that over 9 in 10 people knew about the regulation; however, less than 2 in 10 knew the reason behind them (see Section 2.6).

We proposed a hypothetical scenario to visitors where they saw a person walking their dog in the park and asked them how they would react. Our research showed that social pressure is a major driving factor in changing people's actions, so we investigated if non-compliance is considered anti-social behavior (see Section 2.6). We also allowed each interviewee to share potential solutions to improve compliance to collect ideas the public thought would be helpful. The complete list of interview questions can be found in Appendix D. All of the data we collected to understand why people were bringing their dogs into parks was used to create effective ways to prevent these acts from happening in the future.

3.3 Recommending effective ways to motivate dog owners to change behavior

Using the information that we received from DOC experts (Section 3.1) and park visitors at Nelson Lakes (Section 3.2), we created a digital survey that we posted on social media. The survey questions can be found in Appendix E. The survey aimed to collect data on what New Zealand residents thought the most effective potential interventions would be.

We identified eight potential interventions to improve compliance based on the expert and park visitor responses. Each participant was asked how strongly they agreed or disagreed that it would be effective at improving compliance. Each level of agreement was assigned a

numerical rating: strongly disagree received a score of negative two, disagree received a negative one, neutral received a zero, agree received a one, and strongly agree received a two. By representing the level of agreement numerically, we could take the average of all responses to find the average level of agreement. If survey participants indicated they used the DOC website to learn about dog policies, we also asked how they felt about their experience using it. The same rating scale was used as the intervention statements, and the data was analyzed similarly. While park visitors helped us understand common pathways for non-compliance, these evaluations helped us identify what the public feels would be the best ways to promote a change in dog-owner behavior. These answers helped our proposed recommendations fit the cultural attitudes of the local population in order to deter people most effectively from bringing dogs into National Parks.

3.4 Timeline

We divided up our time in New Zealand by each week we were there. Figure 3.1 shows a Gantt chart for our time in New Zealand and what part of our data collection we worked on each week. During the first two weeks in New Zealand, we revised our survey and interview questions with DOC social scientist Joanne Aley to effectively and efficiently capture data to help us meet our objectives. Once finalized, we began DOC experts during our third week on-site in New Zealand. In weeks four and five, we traveled to Nelson Lakes, where we mapped out dog hotspots in these National Parks using site surveying and counting. While at the parks, we also conducted interviews with park visitors. Upon our return to Wellington, we edited the online survey questions to include the proposed interventions from NLNP visitors with Aley's advice. We waited until week six to conduct our online surveys to avoid causing people to modify their behavior before we conducted the in-person interviews. During weeks six and seven, we left our survey posted online and awaited results. Week eight was primarily focused on developing recommendations and having them evaluated by expert stakeholders working at DOC at the final presentation of our findings.

Timeline	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Dates	09/01	16/01	23/01	30/01	06/02	13/02	20/02	27/02
Interviews			■	■	■	■		
Site Assessment				■	■	■	■	
Online Surveys						■	■	

Figure 3.2: Methods Implementation Timeline

3.5 Summary

This chapter reviewed and discussed how we will complete each of the three objectives we created. We planned to interview experts to learn about the reasons for the dog ban in New Zealand's National Parks to complement our literature review and analysis of DOC's infringement database. We followed the plan for these interviews with an outline of our

method to investigate the reasons and common pathways for non-compliance. The primary methods we implemented to meet this objective which included in-person interviews at NLNP and a site assessment of the park. To tie our research together, we created a survey to identify which we solicited from park visitors in NLNP the public thought would be the most effective ways to motivate dog owners to change their behaviors.

Chapter 4. Results and Analysis

In this chapter, we present and discuss the data collected following the methodology in Chapter 3. From our interviews with NLNP visitors, we analyze what factors contribute to New Zealanders' understanding of dog-related policies in National Parks. This chapter also explores how geographical aspects of the park might be a barrier to compliance using data collected during the Nelson Lakes site assessment. Finally, the public's attitudes toward potential recommendations are evaluated with data from our online survey, ultimately informing the recommendations proposed in Chapter 5.

4.1 Demographics of study participants

While at NLNP, we conducted 74 interviews with park visitors. After our time there, we surveyed an additional 101 New Zealanders online. Table 4.1 shows the ages of our interviewees broken into categories that align with current generational trends. Grouping the ages in this way allowed us to understand how each generation interacts with each dimension of the ban. The lack of representation of 18–29-year-olds in Nelson Lakes was because of the lack of younger adults in the park. Young people made up a large portion of the online sample since older groups are less likely to use social media. Age range is an important statistic as the dog ban in National Parks was passed in 1980, so those in the 45 and higher age range may remember a time before dogs were banned in National Parks – some may have even grown-up taking dogs into National Parks. 60% (n=73) of interviewees at NLNP were alive or grew up before the dog ban was enacted in 1980; only 16.5% (n=97) of the online survey participants were born before the dog ban was created.

Table 4.1: Age Distribution of Interviewees Based on Data Collection Method

Age	Number of People Surveyed Nelson Lakes	Number of Online Surveys Fully Completed
18-29	7	32
30-45	22	49
46-60	21	15
60+	23	1
Grand Total	73	97

In Nelson Lakes, 85.1% of our sample said they were born and raised in New Zealand, compared to 70.1% of the online survey sample. At Nelson Lakes, 76% of our sample were residents of the South Island. Residents of Nelson made up 45% of the South Island residents we spoke to, 34% of the total sample. The number of South Islanders in our Nelson Lakes sample starkly contrasts with our online survey sample, where only 37.4% of participants lived

on the South Island. With ten of the thirteen National Parks located on the South Island, we investigated if where someone lived played a role in their understanding of the ban.

4.2 Understanding what people know about DOC's dog policies

To understand the reasons and common pathways for non-compliance with the dog ban in National Parks, we looked to understand what park visitors knew about DOC's dog policies. To begin, we looked at what park visitors knew about the dog ban in National Parks and tried to determine if their frequency of visiting National Parks or length of residency in New Zealand affected their understanding. We then sought to determine what activities owners engaged in if they ever brought their dog to a National Park.

Table 4.2 shows that 94% of dog owners and 65% of non-dog-owners we interviewed were aware of the ban on dogs in National Parks. This data helps to reinforce the idea that most people know about the ban's existence, so awareness is not the lead factor contributing to non-compliance with the dog ban in National Parks.

Table 4.2: Dog Owner vs. Knew About Ban

	Dog Owner		
	No	Yes	Grand Total
Didn't Know of Ban	8	3	11
Did Know of Ban	15	47	62
Grand Total	23	50	73

Table 4.3: NLNP Visit Frequency vs. Knew About Ban

	Knew About Dog Ban		
NLNP Visit Frequency	No	Yes	**Grand Total**
Never	2	5	7
Rarely	8	5	13
Sometimes	0	3	3
Often	1	12	13
Very Often	0	37	37
Grand Total	**11**	**62**	**73**

We also tried to determine if the frequency at which people visit NLNP affects their knowledge of the ban. As seen in Table 4.3, all participants who visited Nelson Lakes 'Very Often' were aware of the ban, while only 50% of the people who said they visited Nelson Lakes either 'Rarely' or 'Never' were aware of the ban's existence. As opposed to those who visit 'Sometimes', 'Often', and 'Very Often' only 2% of participants were unaware of the ban. This

demonstrates a statistically significant difference between the knowledge of the ban in groups that visit Nelson Lakes less frequently versus those that visit more frequently (p=2.744e-22).

Finally, we explored whether being born and raised in New Zealand impacted one's awareness of the ban. Of the 10 participants who moved to New Zealand later in life, 40% were unaware of the ban. Of the other 64 participants born and raised in New Zealand, 11% were unaware of the ban. Despite the gap between the percentage of native New Zealanders aware of the ban and those who immigrated to New Zealand, the sample size for those who immigrated is significantly smaller. Therefore, there is no statistically significant difference in the knowledge of ban between those born and raised in New Zealand and those who moved to New Zealand later in life (p=0.395).

Every person we interviewed who said they knew of the ban cited its link to protecting native birds, indicating a lack of understanding of why the ban exists is not an issue. In New Zealand, where Māori culture has led to a national emphasis on conservation, many born and raised here have felt the ban was common knowledge, as seen in Figure 4.1 (Kauffman & Martin, 2018). Those in the 18-29 category, the youngest group of people interviewed, were most likely to have learned about the ban online from the DOC website, while no one over 45 said they learned of it this way. Discrepancies between the way different age groups learned about the ban show that to reach the entire population, more than one method will be needed for educating the public because of generational differences that influence how people consume information.
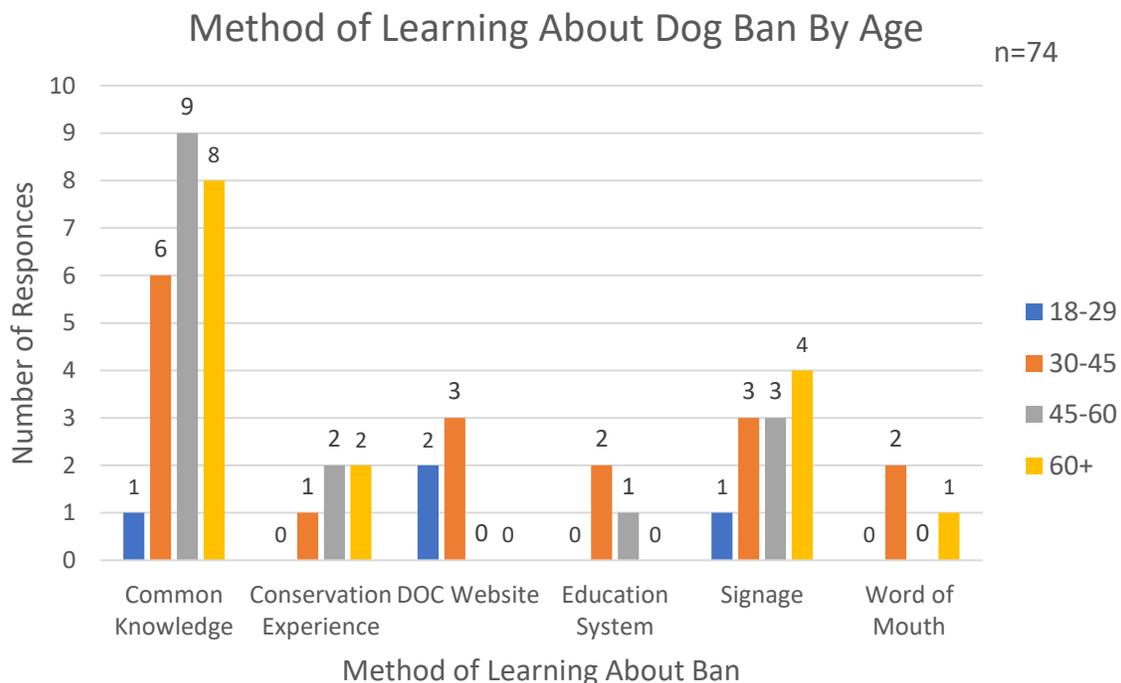
Figure 4.1: Method of Learning of the Dog Ban by Age

Of the dog owners we spoke to, only 16% of them admitted to ever bringing their dog into a National Park, most of whom did it before the ban was in place. Members of this group

30

often mentioned their opposition to the ban in its current form; however, when we spoke to these visitors, they still obeyed the rules and kept to the road with their dogs. The other instances of participants bringing a dog into the park include:

- passing through with the dog in the car,
- hunting with a permit, or
- being aware of the ban once they arrived at the park.

Based on the reported activities, the threat posed by these visitors was low and of negligible risk to wildlife.

4.3 Identifying New Zealanders' interactions with DOC

Park visitors and online survey participants reported all the different methods they used to learn about DOC, and the results are shown in Figure 4.2. People in the online survey were more likely to select multiple options since we presented them with a list of choices, while park visitors only reported what they thought of themselves. In both samples, the most commonly reported tool for learning about DOC policies was the DOC website, indicating this should be a primary focus when ideating ways to communicate about the ban. Local council websites were used by 56 of the 95 people who took the online survey, suggesting that these pages are also crucial for reaching dog owners.
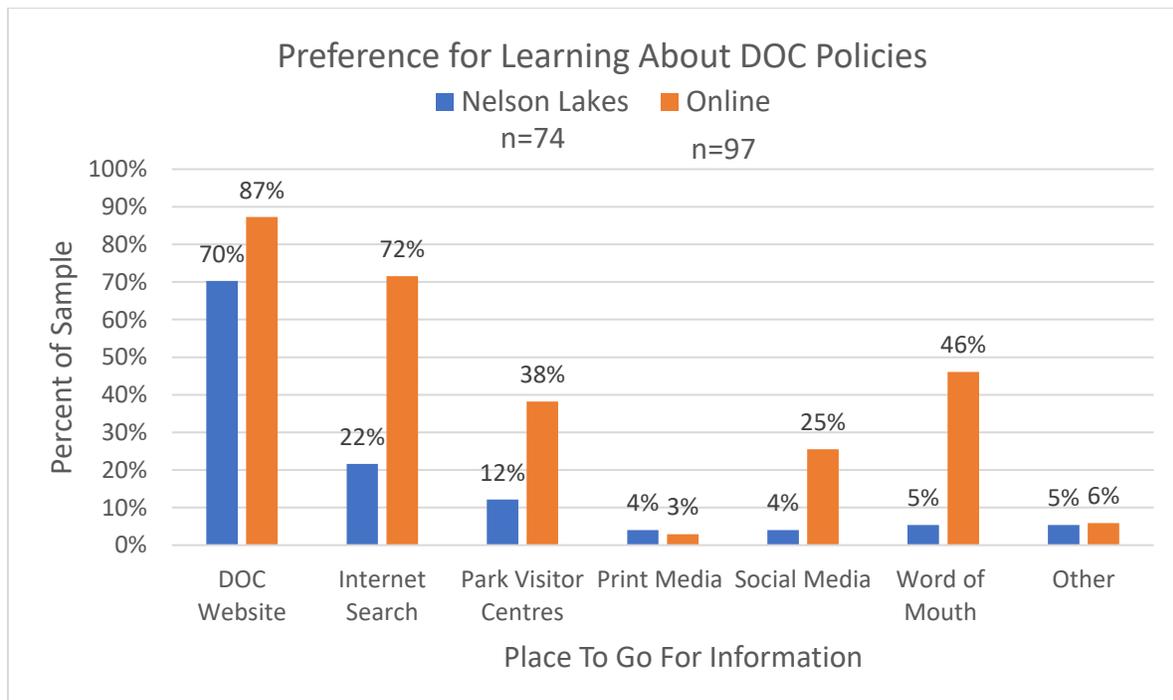
Figure 4.2: Preference for Learning About DOC Policies

We also asked bio rangers their thoughts on the most effective ways to improve compliance among dog owners. These experts mentioned that a campaign (like Smokey the Bear in the United States) could help to deter visitors from wanting to bring their dogs in the first place. They identified that DOC currently has no awareness or education campaigns at the local or national level. Experts cautioned that many people who live close to National Parks do

not go to the website for park information, so an awareness campaign using other forms of media could be more effective at reaching them.

Park visitors shared their ideas to improve compliance, which we grouped into seven categories shown in Figure 4.3. The Education/Awareness category indicates when an interviewee suggested that promoting the ban more, such as on social media, would help improve compliance, which had the most responses. The fines/enforcement category included suggestions from visitors such as more Bio Rangers stationed in high-traffic areas, immediate fines for violators, or higher-value monetary fines. Five out of seven experts we interviewed also corroborated the idea that increased fines and utilization of the infringement logging system could help to deter violators and improve compliance.
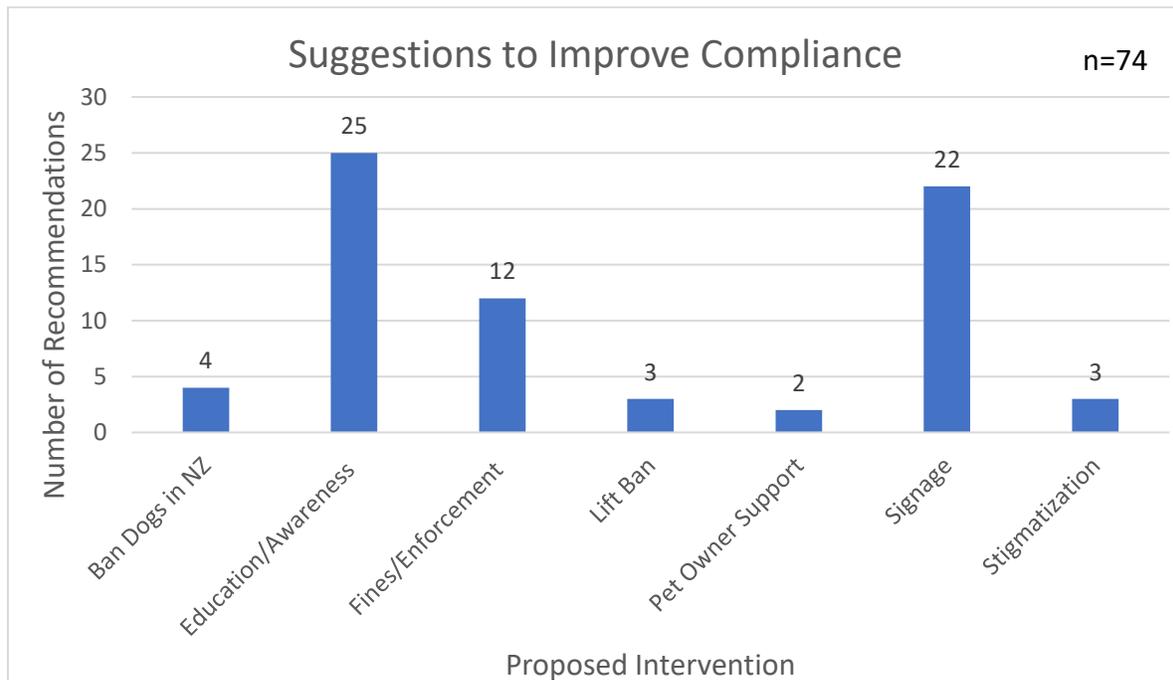
Figure 4.3: Interviewee Suggestions for DOC to Improve Compliance

A small number of visitors proposed either lifting the ban (3) or banning dogs in New Zealand entirely (4). These answers represent the extreme positions of park visitors and were deemed unrealistic to implement. Some experts did suggest allowing dogs in some park areas, but our background suggests that people tend to take advantage of looser regulations when compared with outright bans (see Section 2.3). A small number of visitors also suggested Pet Owner Support (providing more pet-friendly areas near parks) or Stigmatization (creating a social norm against brining dogs in National Parks) as potential interventions. While these answers were given less frequently than Education/Awareness, Signage, and Fines/Enforcement, they represented interesting ideas that warranted further exploration in the online survey.

Further exploring the idea of stigmatization, people said they would respond to seeing a dog in a National Park one of four main ways, as shown in Figure 4.4. Many people also answered that they would change their reaction depending on how "scary" the owner/dog looked, showing that many are hesitant to act because they do not want to confront someone

who are breaking the rules. People who said they would give a dirty look might be open to reporting the visitor to DOC if encouraged to do so through an awareness campaign. People feeling afraid to stand up to rule breakers is another barrier to compliance because people who refuse to comply will feel enabled to keep bringing their dogs into National Parks because of the lack of consequences.
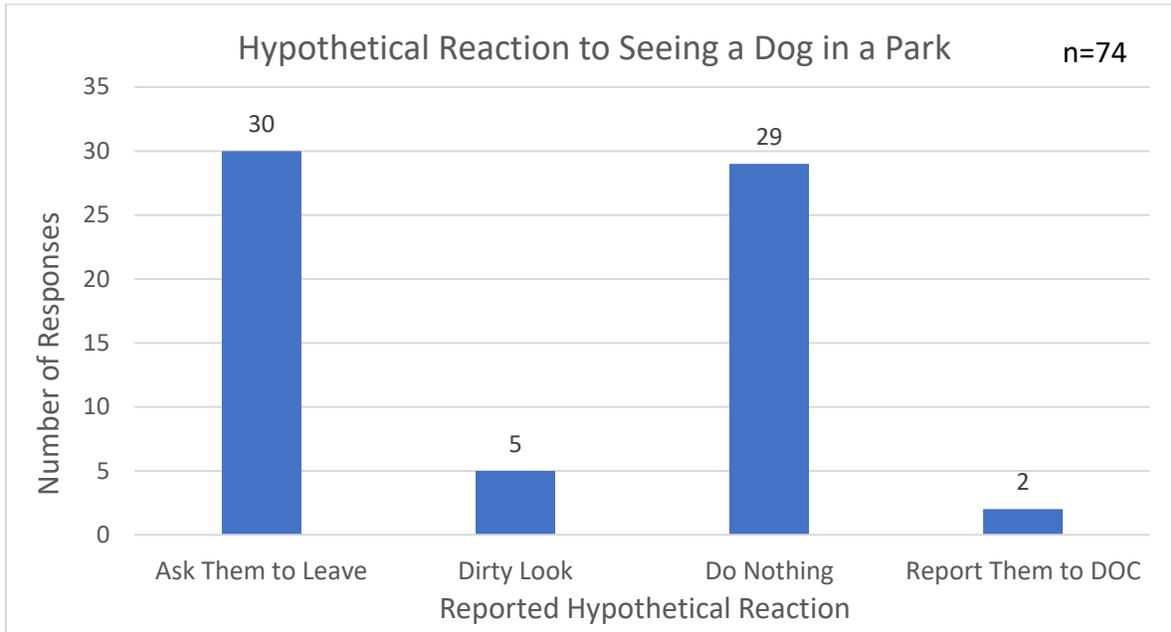
Figure 4.4: Hypothetical Reactions to Seeing a Dog in a National Park

4.4 Assessing the role geography plays in compliance

One common hypothesis from the experts we interviewed was that park geography might play a key role in determining whether people comply. Rates of non-compliance varied widely by National Park (See Section 2.4), and the experts we interviewed suggested factors such as sign placement, proximity to conservation land, private property, and population centers, and the number of through roads and access roads could all play a role in that discrepancy. We evaluated these three hypotheses to determine which areas might be barriers to compliance that need addressing.

We first utilized our on-site assessment to visualize the placement of all the no-dog signs at Nelson Lakes to see if the number or placement of signage was a barrier to compliance. The map in Figure 4.5 shows where each no-dog sign in Nelson Lakes was located. With recent additions to the already large amount of signage telling visitors about the dog ban, all high-traffic areas except for the park's visitor center featured effective signage to inform visitors about the ban. Appendix E contains images of each sign style, and reveals that signs came in a range of shapes and sizes. Larger signs were posted on main roads entering the park and trail heads featured small no-dog placards on posts. Many informational signs also contained the no-dog icon someone on them. Despite all the signage, 32% of park visitors we interviewed about signage (n=72) said they did not notice any signs about dogs since they had arrived at Nelson Lakes, a similar figure to rate of people who noticed at Kaikoura (see Section 2.6). Table 4.4 lists those who noticed signs based on whether the park visitor owned a dog.

Figure 4.5: Locations of each no-dog sign with insets for West Bay and Kerr Bay. Color coded areas show each of the zones identified for high traffic areas to conduct interviews. A table of what each sign looks like can be found in Appendix E

Table 4.4: Dog Owning Status vs. Noticed Signs About the Dogs in Park

	Dog Owner		
	No	Yes	Grand Total
Didn't Noticed Signs	7	14	21
Noticed Signs	15	36	51
Grand Total	22	50	72

Rates of visitors who noticed dog signage were similar among those who did and did not own dogs. Even though many park visitors recommended increased and improved signage to improve compliance, the data does not support the idea that putting up more signs in the park would cause a behavior change.

Next, we explored if proximity to conservation land, private property, and population centers played a role in compliance. Nelson Lakes staff hypothesized that people might need clarification about what areas were part of the National Park, what areas were located on conservation land, and what was private property, which all have different dog rules. However, 100% of the people interviewed (n=74) correctly indemnified if the interview location was within NLNP, so confusion about park boundaries does not appear to be a barrier to compliance. Even though people were aware of the park boundaries and rules, multiple people we interviewed suggested that more approved places to take dogs would improve compliance.

Table 4.5: Reason for Visiting Nelson Lakes vs. Knowledge of Ban

	Knew About Dog Ban		
Reason for Visiting NLNP	No	Yes	**Grand Total**
Camping	0	4	4
Event	4	7	11
Lives Nearby	0	18	18
Passing Through	5	11	16
Recreation	1	14	15
Vacation	1	5	6
Grand Total	**11**	**59**	**70**

We investigated if the park's utility to visitors could be a barrier to compliance. Table 4.5 shows why visitors (n=70) said they were visiting Nelson Lakes on the day we interviewed them and whether they knew about the ban. Every person who said they lived nearby or were at NLNP to camp knew about the ban, suggesting that it may be common knowledge for locals and those who have experience spending time in nature. Meanwhile, those who said they were passing through had the highest rate of people who did not know about the ban, with 36% unaware they could not bring their dog into the park. This data corroborates the conclusion that the less often someone visited NLNP, the less likely they were to know about the ban (see Table 4.3). One person who said she was passing through brought her dogs into the park to get exercise, even though she knew this was not allowed. The high rate of people visiting Nelson Lakes while passing through St Arnaud, combined with direct evidence that people stop to toilet their dog while en route elsewhere, suggests that a quick stop to let dogs get exercise or toilet in the National Park may be a common reason for non-compliance.

Overall, 88% of park visitors interviewed knew that dogs were not allowed in National Parks, and they all knew they were in a National Park where the rule would be in effect, but it is unclear if they knew that there were options for places to take their dogs. Nelson Lakes is

surrounded by areas that permit dogs (see Figure 2.6), which could reduce the number of people who pass by and let their dogs relieve themselves in the National Park. It also would provide locals with other places around St Arnaud to take their dogs for exercise or recreation.

The final expert hypothesis we evaluated was that the number of through and access roads going into a park might correspond to rates of non-compliance. Table 4.6 compares the number of roads per thousand square kilometers of land in the National Park to the number of reported cases of dogs in the park per thousand square kilometers. Appendix G explains the methodology used to count the number of roads and breaks down the count at each park. There was a strong correlation between a park having more roads per thousand square kilometers and the number of reported incidences of dogs in the park (r=0.7719). This correlation suggests that the more accessible a park is, especially for someone passing through with a dog in their car, the more likely it is to have an issue with people taking their dogs into the park.

Table 4.6: Count of Roads in National Parks vs Reported Dog Infractions

National Park	Dog Infringements per Thousand Square Kilometers	Roads per Thousand Square Kilometers	Through Roads per Thousand Square Kilometers	Access Roads per Thousand Square Kilometers
Nelson Lakes	89.30	18.65	4.91	13.74
Able Tasman	80.17	16.88	0.00	16.88
Egmont	55.56	14.62	2.92	11.70
Tongariro	44.53	16.54	6.36	10.18
Aoraki Mt Cook	18.01	8.31	0.00	8.31
Arthur's Pass	14.00	3.63	1.04	2.59
Westland	5.30	14.39	1.52	12.88
Kahurangi	5.08	13.69	2.87	10.82
Rakiura	3.57	0.71	0.00	0.71
Fiordland	1.59	2.22	0.24	1.98
Paparoa	1.51	6.04	1.51	4.53
Mount Aspiring	0.84	3.09	0.56	2.53
Whanganui	0.00	2.70	1.35	1.35

Overall, being so close to St Arnaud right off Highway 63 affects why people visit NLNP. Identifying the opportunity to utilize the conservation land around the National Park will inform the recommendations in Chapter 5. However, it cannot be directly linked to barriers to compliance regarding the dog ban in National Parks. Nonetheless, the results from the site assessment must be addressed when analyzing the data to create a complete picture of the issue facing DOC and identify remedies.

4.5 Public feedback on potential interventions

Having identified possible barriers to compliance, we began to evaluate each of the potential interventions we received from Nelson Lakes, Figure 4.6 shows the agreement with each potential intervention's ability to improve compliance. The concepts visitors most strongly agreed would improve compliance were fines and enforcement, media coverage, and education and awareness. Visitors agreed that social media and signage could improve compliance to a lesser extent and disagreed that an honor code or pet owner support would improve compliance.
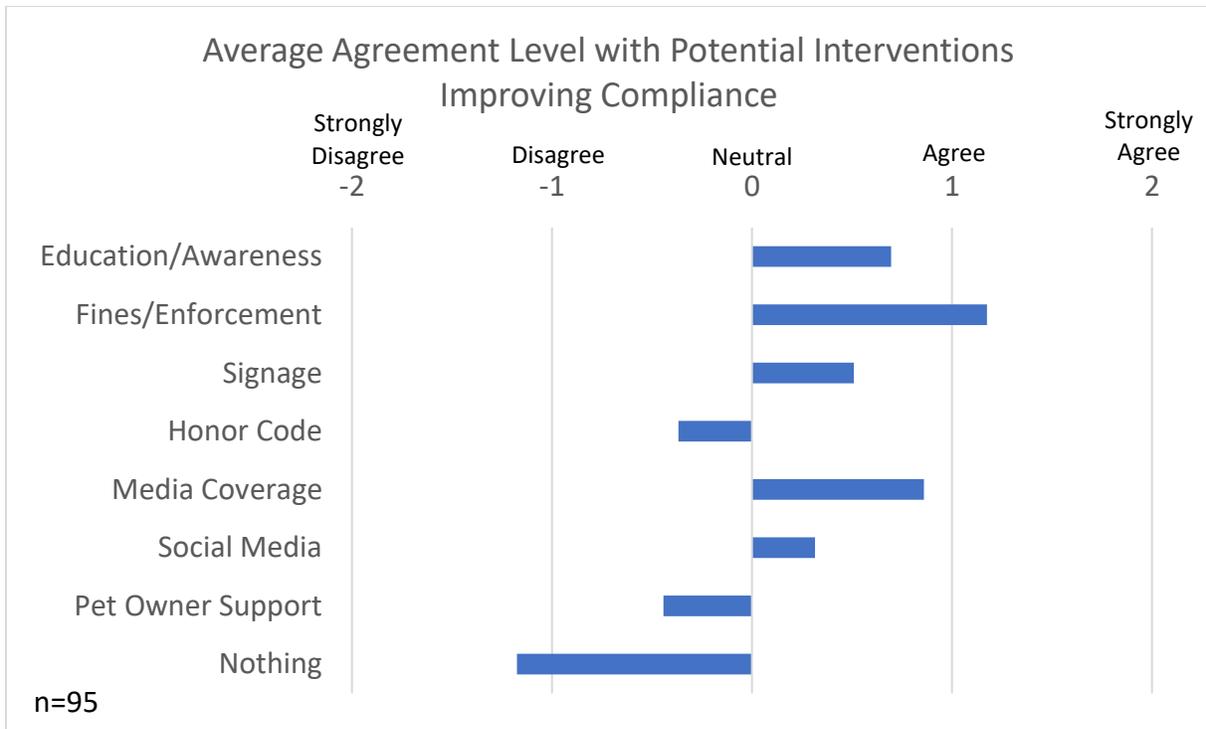
Figure 4.6: Average Agreement Level with Potential Interventions Improving Compliance

Given that the DOC website was the most popular way to get information about the ban, we evaluated the website user experience. Figure 4.7 shows participants' level of agreement with five statements about navigating the DOC website. Most people agreed that the website was a good resource for information, and they had a positive experience using the website, but reported having to spend time hunting for information. These results indicate that while the website is a valuable tool for planning a visit to a National Park, key information needs to be more accessible.
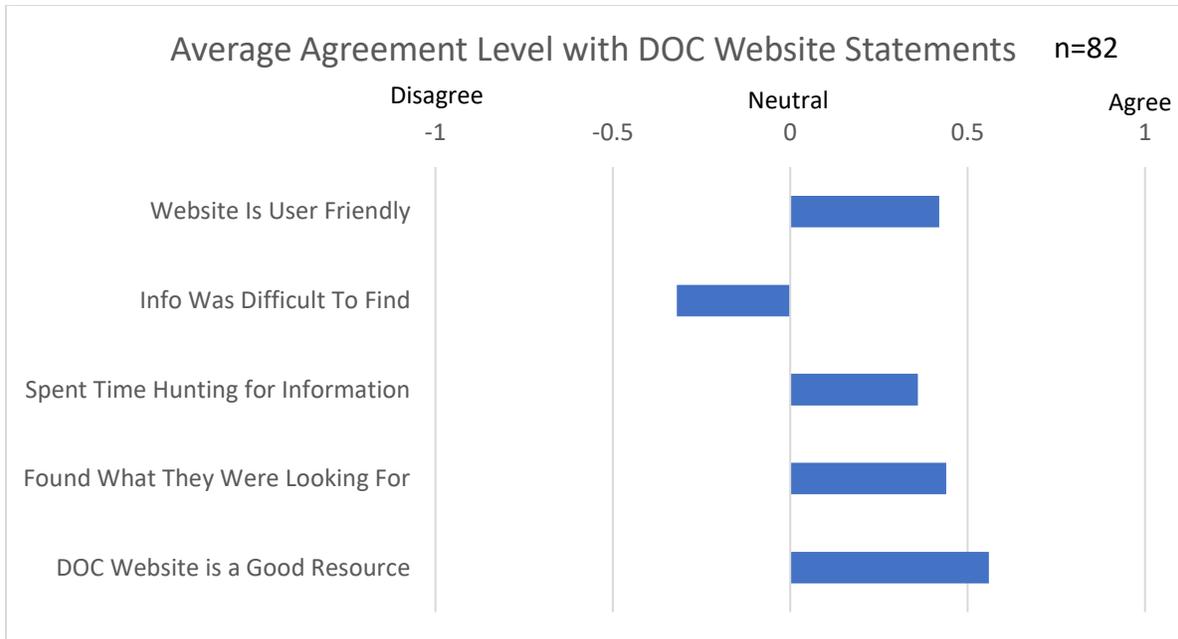
Figure 4.7: Average Agreement Level with DOC Website Statements

4.6 Summary

This chapter reviewed and discussed the data we received on-site in NLNP and through our online surveys. The chapter analyzes participants dog owning experience, knowledge of the ban, sources of information, the frequency at which they visit parks, and suggestions to improve compliance with the dog ban. In addition, we examine the impact of geographical factors on compliance with park policies. We found a correlation between visiting Nelson Lakes less frequently and not knowing about the ban. We also found a correlation between the number of roads a park has and the number of infringements it has. Analysis of how people learned about the ban revealed the need for more than one method of communication with the public, as age plays a significant role in how people gather their information. Many people utilize the DOC website when trying to learn about park policies; people felt the DOC website was a good resource to use but they had to spend time searching for the information they wanted.

Chapter 5. Recommendations

Having identified the importance of the ban on dogs in New Zealand National Parks through our background and identifying the reasons and common pathways for non-compliance by analyzing data from our interviews, surveys, and site analysis, we can move on to objective three of our project: finding effective ways to motive park visitors bringing their dogs to change their behavior. In this section, we introduce three recommendations that will most effectively improve compliance. Our data analysis identified three key areas where DOC can focus its efforts. The first is their current communications, where we recommend DOC make improvements to their website and continue to employ signage to make clear the rules to park visitors. Secondly, we suggest DOC develop a national awareness campaign targeting people most likely not to comply with the ban. Finally, we propose reviewing and enhancing DOC's current enforcement strategy to eliminate choke points in their CLE system workflow.

5.1 Refine current communications

To begin improving compliance with the dog ban in National Parks, we recommend that DOC refine their current methods of communicating the ban to reach populations where non-compliance is most prevalent most effectively. With the DOC website being the number one destination for people trying to learn more about National Parks and an essential conduit for communicating the ban to younger generations, updates and improvements to digital presence will be a critical part of these improvements. DOC can also review where and what types of signage they post to communicate park policies to the public.

We found that users of the DOC website could find the information they were looking for, but it was tedious for them to find. Currently, users must scroll to the bottom of pages and/or make two to three clicks to navigate from the website homepage to the page where they can take their dog. We recommend reducing that to one click, potentially as a quick link on the welcome block highlighted in red in Figure 5.1. This permanent link would give dog owners a way to quickly find out where they can and cannot take their dogs and keep information accessible from the home page's featured links.

In addition, we recommend that the webpage for each National Park provide notice that dogs are not allowed there, noting that some parks may have slight policy differences. Currently, only three (Nelson Lakes, Abel Tasman, and Egmont) of the thirteen National Parks pages on the DOC website have information about the no-dog policy in the park, and the ones that do have it located at the bottom underneath a dropdown menu, as shown in Figure 5.2. Furthermore, there needs to be more consistency between how this information is displayed and the level of detail provided across the three National Park pages where the information was available. We recommend that this information be more prominently displayed and for it to be consistent between each of the National Park pages. For example, DOC's iconic no-dog logo, shown in Figure 5.3, is displayed on signs throughout each park and could be included on each National Park webpage. This update would provide consistency across all pages and between notices in and out of the digital space.
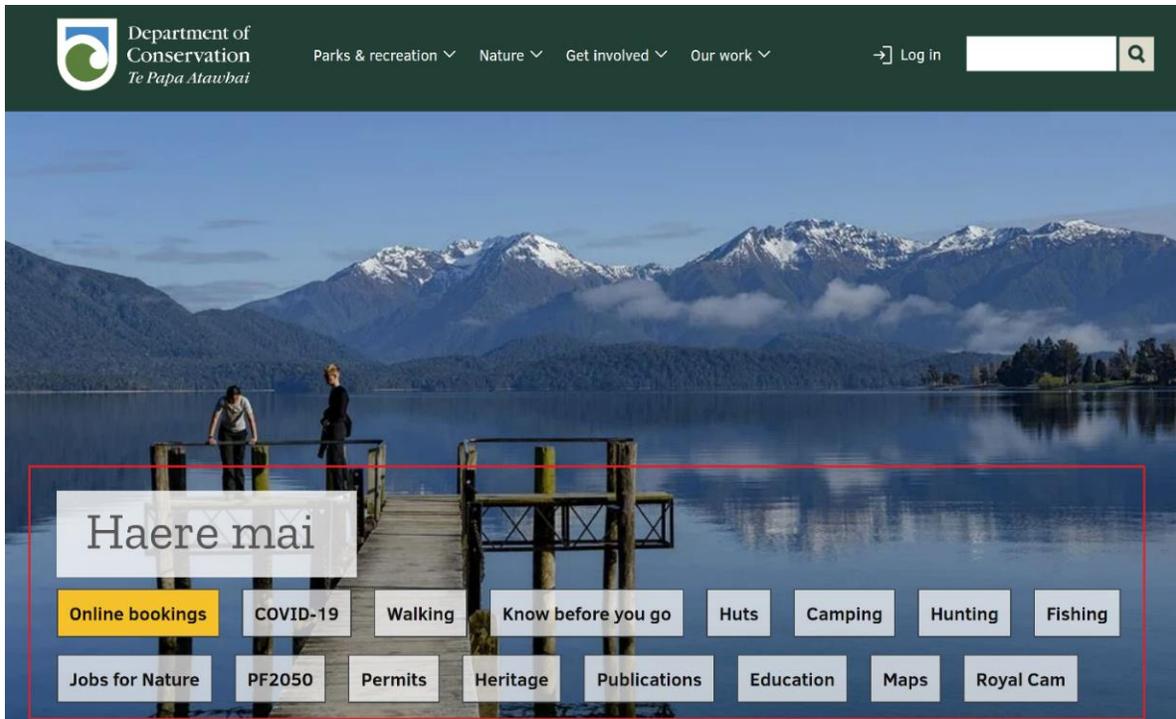
Figure 5.1: DOC Website Welcome Page
*(Source: Department of Conservation)*
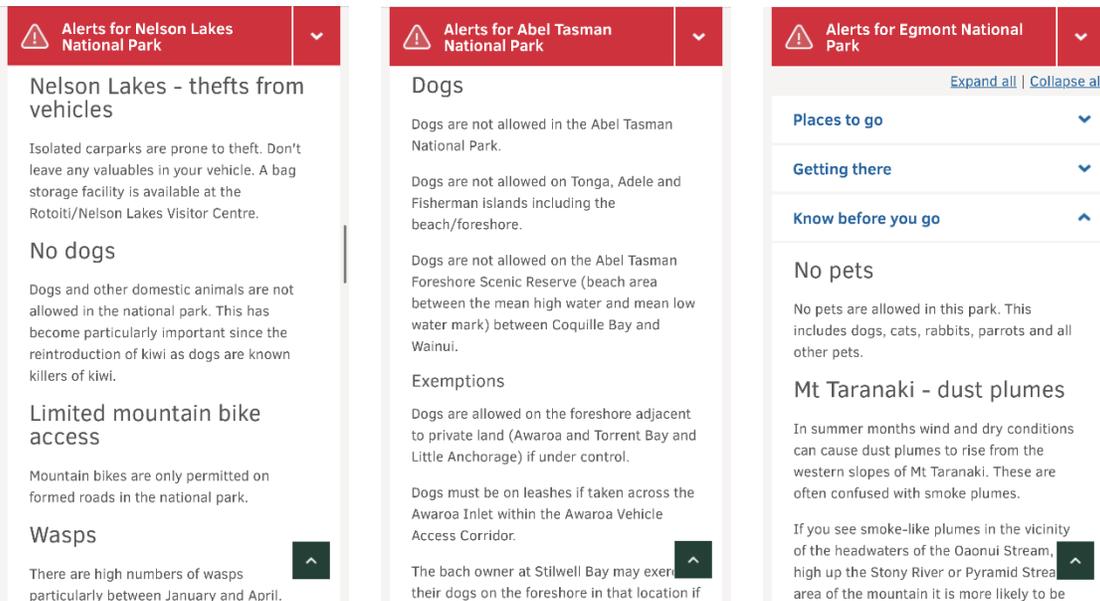
Figure 5.2: Nelson Lakes, Abel Tasman, and Egmont National Park webpages' dog information
(Source: Department of Conservation)

Figure 5.3: Basic No-Dog Sign, Nelson Lakes National Park

We also recommend that DOC add sections about dog-friendly areas available near each National Park on each park's respective page. Implementing this would allow website users to be met with positive alternative solutions for where they can bring their dogs instead of bombarding them with places they cannot. Our data suggested that most people who are not aware of the ban are those who are just passing through National Parks which is corroborated by higher rates of non-compliance in parks with more roads per square kilometer. DOC Senior Web Adviser Adrienne Montgomery said one long-term goal is to create a tool allowing users to help plan road trips through New Zealand (Montgomery, personal communication, Feb 21, 2023). The interview questions for Montgomery can be found in Appendix H. Suppose this tool could help those intending to bring their dog on a road trip find places to stop and toilet the dog on pet-friendly DOC land. In that case, it could help more casual park visitors find places it is acceptable to go. This positive reinforcement also helps to improve perceptions that DOC wants to assist pet owners in finding places to go with their dogs rather than restrict or punish them.

DOC also currently utilizes many clear and well-placed signs to communicate to visitors within parks the rules about where they cannot take their dogs and the fines associated with violating them. We recommend that DOC continue employing these large and effective signs that warn visitors, "No dogs or other animals – not even in your car: You may be fined up to $800," (Department of Conservation). Since our research revealed a correlation between the number of roads going into a park and the number of infractions recorded in that park, we recommend that big signs or even billboards be added to the high-traffic roads leading into parks. These could be used to warn visitors *before* they are on park property that dogs are not allowed since most current signage is only within the park, and by the time a person sees it, they would already be violating the ban. Billboards could point people on road trips towards dog-friendly areas if they are passing through and looking for a place to toilet their dog.

5.2 Develop an awareness campaign

Our data revealed that while most park visitors were aware of the dog ban, and those who were first-time visitors or rarely visited Nelson Lakes were more likely not to know about the ban. For this reason, we recommend that DOC develop a national awareness campaign targeting all New Zealand residents. This campaign would allow DOC to inform New Zealand residents about why there is a dog ban, the dangers of bringing a dog to a national park, and

where dogs can be taken in New Zealand. From the online surveys, we found that residents agreed that education and awareness, media coverage, and utilizing social media would be effective ways to get dog owners to comply with the dog ban in National Parks.

The first part of the national awareness campaign could utilize social and news media to promote awareness of the ban among casual park visitors. Social media is an excellent tool for communicating with younger audiences. Using photos that arouse curiosity amongst viewers and witty captions would also help to improve engagement with the campaign, as studies show that when brands integrate their messaging with popular online trends, they see better social media engagement (Forbes Agency Council, 2022). One example is the United States National Park Service, which often references popular culture in its social media captions while still making them thorough and informative, as shown in Figure 5.4. Engagement will be one of the keys to a successful campaign, as the target audience is people who do not already closely follow DOC.
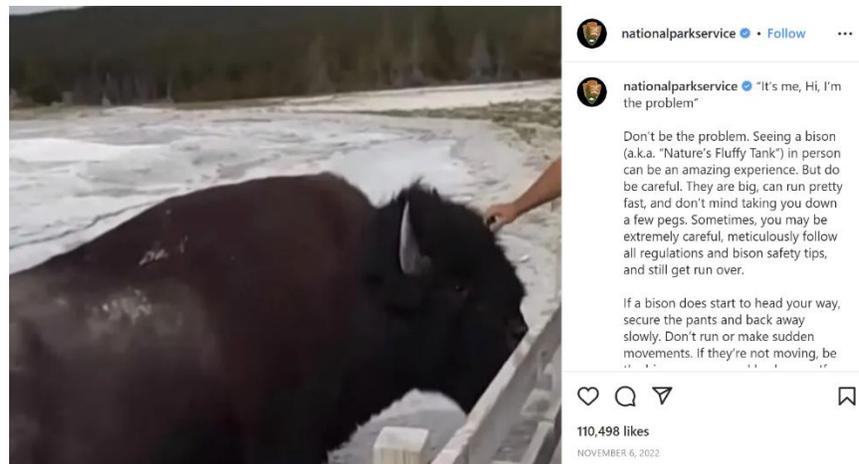
Figure 5.4: Taylor Swift Quote in USNPS Instagram Caption
(Source: National Parks Service Instagram)

News media coverage could also help the campaign gain traction with audiences of all ages. By working to promote the ban ahead of the summer holiday travel season, DOC could warn people before they go on road trips to make sure they have a plan for where to take their dog if they plan to visit a National Park. News media can be of a longer form than a social media post. A single news story could include information about the ban, why it exists, and help people plan around if they want to get out into nature and see the country. It could also communicate the potential fines as further deterrence for someone who thinks their dog will not do any harm on a quick bathroom break in a National Park.

In conjunction with digital marketing, we recommend that DOC partner with local councils in their awareness campaign to inform residents of the dog ban. New Zealand residents must register their dogs on city councils' websites (Wellington City Council). As seen in Figure 5.5, Wellington has an online website where the forms are filled out. Adding a link to this page taking users to information on how to be a conservation-minded pet owner would help target new dog owners with information about where they can take their dogs. Additionally, registering residents must leave an email to be contacted regarding news and information for

dog owners. If DOC could partner with local councils to access this information, they could send them a one-time email with information similar to what might be on the link. These partnerships would allow DOC to reach dog owners directly; targeted communications like this complement the shotgun approach of the campaign on social and news media.

Figure 5.5: Register your dog for the first-time webpage
(Source: Wellington City Council)

While the primary goal of the awareness campaign would be to educate people about the ban, a secondary objective would be encouraging park visitors to speak out against those continuing to bring their dogs into National Parks. Since park visitors are more likely to observe an infraction than bio rangers, visitors must be willing to either say something or report the infraction to local enforcement. Once a critical threshold of visitors knows the rules, social pressure dissuading people from bringing their dogs will help further break down barriers to compliance.

5.3 CLE process improvements

Finally, we recommend that DOC improve its current CLE system to better respond to, process, and deter people from bringing their dogs into National Parks. Our background revealed a complex workflow for reporting incidents and minimal training for those who would otherwise be tasked with responding to someone with a dog in the park. Participants in our online survey felt most strongly that fines and stricter enforcement of the ban would be effective in getting dog owners to stop bringing their dogs into National Parks, indicating that the public feels strongly that CLE process improvements could go a long way to encourage compliance with the ban.

The first prong of improving the CLE system is a workflow process review. Currently, the process DOC utilizes for reporting infractions and issuing infringement notices is lengthy and complex; optimizing this workflow would help streamline the reporting process and help to resolve jobs more quickly. One potential weak point in the current workflow is the need for follow-up on some reported infringements. 4% of infringements we reviewed had a resolution of No DOC Action. Workflow improvements could ensure that if a warrant officer does not have

time to address an issue personally, a regional compliance officer could still issue an infringement notice. Maximizing the effective use of bio ranger's time and the efficiency of the CLE system would help to reduce the number of unmanaged or inadequately managed ban violations. If the CLE system alerted anyone logging a job that the person brought their dog into protected areas in the past, this could help bio rangers formulate a proper response to the situation. Three DOC employees we spoke to said that while confusion or lack of awareness may lead to some infractions, arrogant people will continue to ignore the rules and bring their dogs into parks until they are hit with more fines or prosecution. The workflow review should identify ways to target these repeat offenders who feel they are above the law.

In reviewing this workflow, DOC should also evaluate what permissions different users of the CLE system have. Expanding what park staff and volunteers can log jobs in the CLE system might help capture all those not compliant with the ban. DOC could also improve its existing MyCLE app, allowing DOC employees to log reports into the CLE system. Sharron McCormack cited cost, a clucky user interface, and IT problems as barriers to successfully rolling out the app (McCormack, personal communication, Feb 15, 2023). Prioritizing the app's roll-out and creating user roles for non-DOC employees could help improve reporting. For example, having limited permissions for volunteers at Friends of Rotoiti or Lake Rotoiti Water Taxis employees to use the MyCLE app and log jobs would allow those who spend more time in higher-traffic visitor areas to report dog-related incidents at NLNP.

Our review of DOC's infringement database found that jobs were most commonly marked as having insufficient evidence to identify or take legal action against the assailant and subsequently closed. This was the case in 110 of the 245 infringements for which we had data, or 45% of the total. DOCLearn provides training on logging a job in the CLE system, but we recommend improving and expanding this training. According to Graeme Quinn, bio rangers and park volunteers are not trained on what information to collect when logging a compliance issue (Quinn, personal communication, Feb 2, 2023). Bio rangers who are not warrant officers also lack training in de-escalation tactics if a park visitor with their dog reacts aggressively to being confronted. By equipping these volunteers with the tools to document dog-related issues effectively and providing basic de-escalation training, compliance officers would have better information to target dog owners who refuse to comply with the ban.

5.4 Summary

To address the issue of non-compliance, we have proposed three recommendations for the Department of Conservation to motivate park visitors to change their behavior: optimizing current communications, developing a national awareness campaign, and enhancing enforcement strategies. These recommendations are based on our data analysis, which shows that improving communication channels, increasing awareness, and enhancing enforcement efforts can significantly improve compliance with the dog ban in National Parks. We hope our findings and recommendations can inform the Department of Conservation's efforts to protect the environment and promote responsible behavior in New Zealand's National Parks.

Chapter 6. Conclusion

The main goal of our project was to assist DOC in understanding the barriers to improving compliance with their no-dog policy for National Parks. Over 400 years, settlers introduced mammals to New Zealand, disrupting the previously bird-dominated ecosystem. In response, New Zealand established National Parks to protect and preserve the native habitats of plants and animals. However, heavy visitation by pet owners and their dogs can cause harm to the delicate balance of these protected lands.

We focus on three objectives to complete during our time in New Zealand. We began by researching to understand the ban in New Zealand's National Parks. We found that the threats that dogs pose to National Parks greatly affect the ecosystem, primarily the endangered ground-dwelling birds that inhabit these areas. After this, we investigated the reasons and common pathways for non-compliance. Through our interviews with park visitors and DOC experts, we gathered that many young people get their information from some form of online search, while older people tend not to use the internet in this way at all. From this data, we were able to summarize that we will need to focus on more than one specific avenue that DOC will need to make changes to going forward. With all our research and data analysis, we produced three effective recommendations that DOC can implement to improve compliance with the dog ban. These are to develop an awareness campaign, refine their current communications with the public, and improve their CLE process. Future projects could explore how to implement these recommendations.

The time we spent in NLNP and Wellington collecting data and doing research was a life-changing experience for our entire group. Being able to see and be a part of something as beautiful as this impacted all of us and gave each of us a personal reason to want to preserve New Zealand's unique and serene beauty and recognize the broader importance of our work.

References

Acevedo-Gutierrez, A., Acevedo, L., Belonovich, O., & Boren, L. (2011). How Effective are Posted Signs to Regulate Tourism? An Example with New Zealand Fur Seals. *Tourism in Marine Environments*, *7*(1), 39–41. https://doi.org/10.3727/154427310X12826772784874

Ajzen. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes., 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Bird taxa | Collections Online—Museum of New Zealand Te Papa Tongarewa. (n.d.). Retrieved February 24, 2023, from https://collections.tepapa.govt.nz/topic/2872

Boren, L. (2023, February 15) Personal Communication [Personal Interview].

Bowes, M., Keller, P., Rollins, R., & Gifford, R. (2018a). *Habits, beaches, dogs and leashes: Non-compliance with park regulations*. https://doi.org/10.25316/IR-1155

Department of Conservation. (n.d.-a). Retrieved November 18, 2022, from https://www.doc.govt.nz/

Department of Conservation. (2020). *Enforcement policy*.

Department of Conservation. (n.d.-a). *National Compliance Strategy*.

Department of Conservation. (n.d.-b). *Prosecution policy*.

Dogs—Register your dog—Wellington City Council. (n.d.). Retrieved February 24, 2023, from https://wellington.govt.nz/dogs-and-other-animals/dogs/register-your-dog

Dolesh, R. (2021, December 16). *Top Trends in Parks and Recreation for 2022 | Feature | Parks & Recreation Magazine | NRPA*. https://www.nrpa.org/parks-recreation-magazine/2022/january/top-trends-in-parks-and-recreation-for-2022/*Flora and fauna*. (n.d.). Retrieved December 8, 2022, from https://www.doc.govt.nz/parks-and-recreation/places-to-go/central-north-island/places/tongariro-national-park/about-tongariro-national-park/flora-and-fauna/

Foxwell, D. (2023, February 1). Personal Communication [Personal Interview].

Great Spotted Kiwi. (n.d.). Friends of Rotoiti. Retrieved February 24, 2023, from https://www.friendsofrotoiti.org.nz/great-spotted-kiwiHall, J. (2023 January 31). Personal Communication [Email Correspondence].

Home, C., Bhatnagar, Y. V., & Vanak, A. T. (2018). Canine Conundrum: Domestic dogs as an invasive species and their impacts on wildlife in India. *Animal Conservation*, *21*(4), 275–282. https://doi.org/10.1111/acv.12389

Kauffman, C. M., & Martin, P. L. (2018). Constructing Rights of Nature Norms in the US, Ecuador, and New Zealand. *Global Environmental Politics*, *18*(4), 43–62. https://doi.org/10.1162/glep_a_00481

Lacerda, A. C. R., Tomas, W. M., & Marinho-Filho, J. (2009). Domestic dogs as an edge effect in the Brasília National Park, Brazil: Interactions with native mammals. *Animal Conservation*, *12*(5), 477–487. https://doi.org/10.1111/j.1469-1795.2009.00277.x

Lenth, B. E., Knight, R. L., & Brennan, M. E. (2008). The Effects of Dogs on Wildlife Communities. *Natural Areas Journal*, *28*(3), 218–227.

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

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 C. Makowski & C. W. Finkl (Eds.), *Impacts of Invasive Species on Coastal Environments: Coasts in Crisis* (pp. 397–412). Springer International Publishing. https://doi.org/10.1007/978-3-319-91382-7_11

McCormack, S. (2023, February 15). Personal Communication [Personal Interview].

Miller, K. K., Ritchie, E. G., & Weston, M. A. (2013). The human dimensions of dog–wildlife interactions. In M. E. Gompper (Ed.), *Free-Ranging Dogs and Wildlife Conservation* (p. 0). Oxford University Press. https://doi.org/10.1093/acprof:osobl/9780199663217.003.0012

Montgomery, A. (2023, February 22). Personal Communication [Personal Interview].

National Parks Act 1980 No 66 (as at 28 October 2021), Public Act Contents – New Zealand Legislation. (n.d.). Retrieved November 18, 2022, from https://www.legislation.govt.nz/act/public/1980/0066/latest/DLM36963.html?search=ts_act%40bill%40regulation%40deemedreg_National+Parks+Act+1980_resel_25_a&p=1

NLNP. (n.d.). Retrieved November 18, 2022, from https://www.doc.govt.nz/parks-and-recreation/places-to-go/nelson-tasman/places/nelson-lakes-national-park/

New Zealand's threatened birds. (n.d.). Retrieved November 18, 2022, from https://www.doc.govt.nz/nature/conservation-status/threatened-birds/

Quinn, G. (2023, February 2). Personal Communication [Personal Interview].

Risks to Wildlife from People—Watching Wildlife (U.S. National Park Service). (n.d.). Retrieved November 16, 2022, from https://www.nps.gov/subjects/watchingwildlife/animals.htm

Schneider, T. J., Maguire, G. S., Whisson, D. A., & Weston, M. A. (2020). Regulations fail to constrain dog space use in threatened species beach habitats. *Journal of Environmental Planning and Management*, *63*(6), 1022–1036. https://doi.org/10.1080/09640568.2019.1628012

Scianni, C., Lubarsky, K., Ceballos-Osuna, L., & Bates, T. (2021). Yes, we CANZ: Initial compliance and lessons learned from regulating vessel biofouling management in California and New Zealand. *Management of Biological Invasions*, *12*(3), 727–746. https://doi.org/10.3391/mbi.2021.12.3.14

Seven kiwi killed by dog attacks in Kerikeri. (n.d.). Retrieved February 24, 2023, from https://www.doc.govt.nz/news/media-releases/2015/seven-kiwi-killed-by-dog-attacks-in-kerikeri/

Valenta, K., Gettinger-Larson, J. A., Chapman, C. A., & Farris, Z. J. (2016). Barking up the right tree: Understanding local attitudes towards dogs in villages surrounding Ranomafana National Park, Madagascar can benefit applied conservation. *Madagascar Conservation & Development*, *11*(2), Article 2. https://doi.org/10.4314/mcd.v11i2

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. https://doi.org/10.1007/s00267-014-0311-1

Williams, K. J. H., 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://doi.org/10.1080/10871200802649799

Wotherspoon, S. (2023, February 4). Personal Communication [Personal Interview].

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 A: Infringement Database Analysis Methodology

In order to determine which National Park each entry in the database came from, we had to use a combination of the different location fields in the database. Since some entries did not have all the same fields filled out, we gave priority to the "Longitude" and "Latitude" fields first in discerning which park the report originated from. If the "Longitude" and "Latitude" fields were blank, we then moved to the field "Location (Exact Detail)" to find which park the report came from. Sometime the "Location (Exact Detail)" would contain more vague information, such as stating that the dog sighting was near a specific river. In this case, we used either the "Nearest Town/City" field or the "Description" field to match the "Location (Exact Detail)" to a specific National Park. If the "Land Status" or "Alleged Offense" field clearly indicated that the entry was not associated with any National Park, rather a scenic reserve, National Forest, public land, or other DOC managed land, it was not included in our analysis. Additionally, if when we determined the location of an offense and it was significantly far away from any National Park, then we safely assumed it was associated with some other type of protected land and not one of the thirteen National Parks.

The offense severities were determined in the following manner: Low severity offenses posed the least risk to the wildlife in National Parks, such as the dog being inside of a car inside the National Park. Medium corresponded to a dog in a park on lead. If the "Alleged Offense" field did not specify whether the dog was on or off lead, such as simply stating "Dog in National Park" then the corresponding offense was given a medium severity rating. High severity offenses correspond to the dog being off lead or being in the park overnight as part of a camping trip. Finally, an offense rated as very high severity corresponds to when the dog was documented as having attacked wildlife or people, or where the dog was in a particularly protected area such as a kiwi sanctuary.

Appendix B: Bio Ranger/Compliance Officer Interview Questions

Our sponsor provided us with a list of potential interviewees. The following table includes the name of each interviewee, their role at DOC, their response to our request for an interview, and the method by which the interview was conducted. Laura introduced us via email, and we followed up by scheduling interview times with them. The interviews were held online, in person, and via email, based on what was easiest for the DOC employee.

Table B.1: Bio Ranger and Compliance Officer Interview Information

Interviewee	Role at DOC	Interview Date	Interview Method
Darren Foxwell	Kahurangi National Park	01/02/2023	Phone Call
Dave Guppie	Kahurangi National Park	02/02/2023	Phone call
Jeffery Hall	Northern South Island Compliance Officer	30/01/2023	Email
Graeme Quinn	Kahurangi National Park	02/02/2023	Phone call
Sandra Wotherspoon	NLNP	04/02/2023	In person

If we conducted the interview in-person or via Zoom, one member of the group served as the interviewer asking questions and one member served as the notetaker to assist. If needed, the interviewer or notetaker would ask follow-up and clarifying questions based on the interviewee's responses. With the interviewee's prior consent, the interview was also audio recorded on a mobile device so it could be revisited at a later time. If the interview was conducted via email, the interview questions were sent to the DOC employee. The interviewee could then type their responses and email them back to us.

1. During your time at DOC, in what kind of roles have you worked?
   1.1. In your roles, have you done any field work, and if so, where?
   1.2. What have you learned about the relationship between people and dogs in your different roles at DOC?
2. In your opinion, how important is the ban on dogs in National Parks? Why do you say that?
3. What are the challenges you face in enforcing this policy?
4. What are the biggest reasons people give for non-compliance?
5. In your experience, how do park visitors feel about this policy?
6. What does DOC do to inform people about this policy?
7. What are steps do you think DOC could take to improve the level of compliance
   7.1. Are there things DOC is already doing but need improved public visibility?

Appendix C: CLE Team Interview Questions

1. During your time at DOC, in what kind of roles have you worked?
   a. What was your role in creating the compliance database?
2. How many people at DOC have access to the database and in what kinds of different roles would those people serve?
   a. Who can access information about an infringement recorded in the database?
   b. What training do volunteers and full time DOC employees receive on how to use the database?
   c. What different kinds of access do park employees and volunteers have?
3. What different fields exist within the database? Are names and addresses recorded?
4. Are there any features of the database that would notify someone when they submit an entry if the assailant has prior infractions?
5. Can you speak to the process that is followed after an incident is recorded in the infringement database?
6. How do DOC employees feel about the infringement database?
7. What challenges, if any, has DOC had implementing the database?

Appendix D: Interview Questions for NLNP Visitors

We stationed ourselves at different locations around the park which we determined through our mapping and conversations with park rangers. Two group members greeted the potential interviewee to begin a friendly interaction. We introduced ourselves as students from the United States doing a project in New Zealand and asked them if they would like to participate in a short interview about dogs. We informed them it would take no more than two minutes and that their responses would be anonymous and confidential. If they were willing to participate, one of the two group members would ask the interviewee each of the questions listed below. The other group member would input the interviewee's responses into a Google Form. Once the form was completed, the two interviewers determined if they should ask any extra follow-up questions. The two group members would then estimate the age and gender of the interviewee and record the location of where the interview took place. At the end of the interview, we thanked the interviewee for their time.

1. Are you a New Zealand resident? *If no, thank them for their time and terminate the interview.*
2. Were you primarily born and raised in New Zealand, or did you become a resident at a later date?
   2.1. *If they became a resident at a later date*: How long have you lived in New Zealand?
3. To the best of your knowledge, are we in a National Park right now? (Yes/No/Unsure) *After they answer, explain that they are currently in NLNP.*
4. Why did you come to Nelson Lakes today?
5. How often would you say you visit NLNP?
   - Never
   - Rarely/Once or Twice
   - Sometimes/Every Couple Years
   - Often/About Once a Year
   - Very Often/Multiple Time per Year
6. How often would you say you visit other National Parks in New Zealand besides Nelson Lakes?
   - Never (First time visitor)
   - Rarely (Been once or twice)
   - Sometimes (Less than once a year)
   - Often (One to three times per year)
   - Very Often (More than three times per year)
7. If you wanted to learn more about National Parks in New Zealand, what resources would you use? (Check all that apply)
   - ☐ Print Media
   - ☐ Social media

- ☐ Visitor Information Centers
- ☐ DOC Website
- ☐ Word of mouth
- ☐ Other (Please specify):

8. Do you currently own a dog, or have you owned a dog in the past? (Current/Past/Neither)

   8.1. *If current or past:* How many years of dog-owning experience do you have?

9. Have you ever brought your dog to a National Park, including driving through a park with a dog in the vehicle? *If they say yes, we will emphasize that it is okay. Many people bring their dogs to parks, and we are trying to learn more about the issue, not get anyone in trouble. Assume yes if they already have their dog with them. If yes:*

   9.1. About how many times have you brought your dog into a park with you?

   9.2. When was the last time you did this?

   9.3. Why did you bring your dog to the National Park?

   9.4. What activities do you do with your dog when you take it into a National Park?

10. Since you arrived at Nelson Lakes, have you noticed any signs about dogs?

    10.1.   *If yes:* What did you notice about them?

11. Imagine you were in a National Park, and you see someone walking around in the park with their dog. What would you do or say in that situation?

12. To the best of your knowledge, are dogs generally allowed in New Zealand National Parks?

    12.1.   *If yes:* How did you learn that dogs are not allowed in New Zealand National Parks?

    12.2.   *If yes:* Could you explain, in your own words, the reason dogs are banned from New Zealand National Parks?

    We then explained to the interviewee that dogs are harmful to native wildlife in National Parks, and for this reason they are not allowed.

13. What do you think could be done to get people to stop bringing their dogs to National Parks?

14. Do you have any more information you'd like to share with us today about dogs in National Parks today?

15. In which region of New Zealand do you live?
    - o Auckland
    - o Bay of Plenty
    - o Canterbury
    - o Gisborne
    - o Hawke's Bay
    - o Manawatu-Whanganui
    - o Marlborough
    - o Nelson
    - o Northland
    - o Otago
    - o Taranaki
    - o Tasman
    - o Southland

- Waikato
- Wellington
- West Coast
- Other (Please specify):

Appendix E: Internet Survey Questions

For the internet survey we used Qualtrics. Before they started the survey, participants were asked to agree to the following consent form:

Informed Consent Agreement for Participation in a Research Study

"Barriers to Compliance: Dogs in New Zealand National Parks"

Investigators and contact information:

- Student names: Nate Dorman, Josh Jahnz, Chris Nerkowski, and Charlie Tribble
- Email us at: gr-nz-doc-22@wpi.edu

Purpose: The purpose of this study is to understand what information is known by New Zealand residents about dog laws inside the National Parks.

Procedures to be followed: This survey will ask you to reflect on what you know about the dog laws inside National Parks. This study has been approved by the Worcester Polytechnic Institute Institutional Review Board (WPI IRB).

Record keeping and confidentiality: By clicking "next", you are consenting to helping us learn about the knowledge of the rules of dogs in National Parks. You should feel free to answer to any level to which you wish to disclose. Your responses will come to us as anonymous entries. We will also be sharing this information with our advisors for evaluation purposes anonymously. This survey is not a mandatory and your consent is given freely of your own choice.

Records of your participation in this study will be held confidential so far as permitted by law. Any publication or presentation of the data will not identify you.

For more information about this research or about the rights of research participants please contact the investigators. You can see the final project by emailing a request to our contact information or by using keywords in the search at For more information about this research, contact the investigators (email addresses are at the top of this document). You can see the final project by emailing a request to our contact information or by using keywords in the search at https://digitalcommons.wpi.edu/iqp/. In addition, you can contact WPI's IRB Manager (Ruth McKeogh, Tel. 508 831- 6699, Email: irb@wpi.edu) and the Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: gjohnson@wpi.edu).

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By clicking "I consent" below, you acknowledge that you have been informed about the study and wish to consent to participate. You do not give up any of your legal rights by agreeing to this statement. You will be asked again after completing the survey for your consent as a matter of respect for your right to change your mind.

We attempted to share the survey online in Facebook groups and Reddit. We posted the survey in Facebook groups titled, Hiking with Dogs in New Zealand, Tramping in New Zealand, and Wellington Tramping Group, however it was taken down from each group because of content moderation, so only a limited number of participants would have found it this way. Most would have found it on Reddit, under the subreddit r/NewZealandWildlife. We created a caption for the post to introduce who we are as a group and why we are doing this project. The caption to the post will go as follows:

> Kia ora, I represent a group of university students from Worcester Polytechnic Institute in the United States. We are working on a project to understand what people know about dogs and New Zealand National Parks. This is a short, voluntary survey with questions to help our group determine the best ways to serve park visitors with dogs while protecting park wildlife. You can help us with our project by taking a couple minutes to fill out the survey using the following link. If you have any questions or concerns, our contact information is available at the link, or you can send me a private message on Facebook. We thank you for your time and hope you have a good rest of your day!

People who saw and chose to complete the survey were brought through a link to Qualtrics, and then prompted to answer the following questions. After they reached the end of the survey and submitted their responses, we displayed a message thanking the respondent for their time.

1. Are you a New Zealand resident?
   - o Yes, I currently live in New Zealand
   - o No, but I lived in New Zealand in the past
   - o I have never been a New Zealand resident *(User survey ends)*

1.1. How long have you lived in New Zealand?
   - o Born and raised
   - o 1-3 years
   - o 4-6 years
   - o 6-10 years
   - o 11-20 years
   - o 20+ years

1.2. What region of New Zealand do you live in?
   - o Auckland
   - o Bay of Plenty
   - o Canterbury
   - o Gisborne
   - o Hawke's Bay
   - o Manawatu-Whanganui
   - o Marlborough
   - o Nelson
   - o Northland
   - o Otago
   - o Taranaki
   - o Tasman
   - o Southland
   - o Waikato
   - o Wellington
   - o West Coast
   - o International
   - o Other (Please specify):

2. Please select your age range:
   - o Under 18 *(User survey ends)*
   - o 18-29
   - o 30-45
   - o 46-60
   - o 60+

3. How often do you visit National Parks in New Zealand?
   - o Never
   - o Rarely (Been once or twice)
   - o Sometimes (Less than once a year)
   - o Often (One to three times per year)
   - o Very Often (More than three times per year)

4. *If 'Never':* If you wanted to learn more about National Parks in New Zealand, what resources would you use? *If other than 'Never':* When you go to learn more about National Parks in New Zealand, what resources would you use?
   - ☐ DOC Website
   - ☐ Internet Search (Google)
   - ☐ Park Visitor Centers
   - ☐ Print Media
   - ☐ Social Media
   - ☐ Word of Mouth
   - ☐ Other (Please Specify):
5. Do you follow the Department of Conservation (DOC) on social media?
   - ○ Yes
   - ○ No
   - ○ Unsure
   - ○ Other (please specify):
6. Are you a current or past dog owner?
   - ○ Yes
   - ○ No
   - ○ Other (please specify):
   6.1. *If yes:* How many years of dog-owning experience do you have?
   - ○ 0-1 years
   - ○ 2-5 years
   - ○ 6-10 years
   - ○ 11-20 years
   - ○ 20+ years

   Pop-up information: In New Zealand, dogs are not permitted inside National Parks. This ban was created to protect the local birdlife who are at risk of predation by dogs. While park visitors can obtain a permit to bring their dog for special purposes, if a permit is not obtained, the dog owner can receive a fine.
7. Before today, were you aware that dogs were not allowed in New Zealand National Parks?
   - ○ Yes, I was aware
   - ○ No, I was not aware
   - ○ I wasn't sure
   7.1. *If yes:* How did you learn about the ban?
   - ☐ DOC Website
   - ☐ Common Knowledge
   - ☐ Conservation Experience
   - ☐ Education System
   - ☐ Online (Other than DOC Website)
   - ☐ Signs/Visitor Centre
   - ☐ Word of Mouth
   - ☐ Other

8. Please rate the following statements on scale of: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree *(Statements 8.1-8.8 are displayed in a random order to avoid bias)*
   8.1. If dog owners were more educated about why dogs are not allowed in National Parks, they would be more likely to comply with the ban.
   8.2. If DOC gave out more fines for violating the ban, dog owners would be more likely to comply with it.
   8.3. Increasing/Improving signage in parks will improve compliance with the dog ban in National Parks.
   8.4. Creating an honor code of not bringing dogs into National Parks will get more dog owners to comply with the ban.
   8.5. More national level media coverage on the dog ban in National Parks will improve compliance with the ban.
   8.6. More social media posts from official government accounts about the ban on dogs in National Parks will get more dog owners to comply with the ban.
   8.7. If there were more pet-friendly accommodations (including space to toilet your dog) near National Parks, dog owners would be more likely to comply with the dog ban in National Parks.
   8.8. Nothing can be done to improve compliance with the dogs in park ban.
   8.9. Do you have any suggestions for improving compliance that we have not already mentioned?
9. If you wanted to learn where you can or cannot do with your dog, where would you go to find your information?
   ☐ DOC Website
   ☐ Internet Search (Google)
   ☐ Local Council Website
   ☐ Park Visitor Centre
   ☐ Print Media
   ☐ Social Media
   ☐ Word of Mouth
   ☐ Other (Please Specify):
   9.1. *If 'DOC Website':* Please rate the following statements on a scale of: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree *(Statements 9.1.1-9.1.5 are displayed in a random order to avoid bias)*
       9.1.1. Navigating the DOC website was simple and user friendly.
       9.1.2. It was difficult to find the information I was looking for on the DOC website.
       9.1.3. I had to spend time hunting for the information I was looking for on the DOC website.
       9.1.4. I have always been able to find what I am looking for when I visit the DOC website.
       9.1.5. The DOC website is a good resource for information about where I can take my dog.
10. Do you have any more information you would like to share with us today about dogs in National Parks?

Appendix F: Nelson Lakes Map Legend

Table F.1 matches each numbered label on the map in Figure 4.6 to the corresponding sign style. The following Figures contain an image of each sign style.

Table F.1: Map Labels and Corresponding Sign Style

Label	Sign Style	Label	Sign Style	Label	Sign Style
1	Sign Style A	15	Sign Style K	29	Sign Style R
2	Sign Style A	16	Sign Style L	30	Sign Style S
3	Sign Style A	17	Sign Style M	31	Sign Style C
4	Sign Style A	18	Sign Style C	32	Sign Style C
5	Sign Style B	19	Sign Style C	33	Sign Style T*
6	Sign Style C	20	Sign Style M	34	Sign Style U
7	Sign Style D	21	Sign Style C	35	Sign Style V
8	Sign Style E	22	Sign Style N	36	Sign Style C
9	Sign Style F	23	Sign Style O	37	Sign Style W
10	Sign Style G	24	Sign Style P	38	Sign Style Z
11	Sign Style G	25	Sign Style C	39	Sign Style Y
12	Sign Style H	26	Sign Style C	40	Sign Style Z*
13	Sign Style I	27	Sign Style C	41	Sign Style C
14	Sign Style J	28	Sign Style Q	42	Sign Style Alpha

*No image is available for these sign styles

To create the map shown in Figure 4.6 and to document each sign style, we visited each trailhead that was directly assessable from the Visitor Centre and car parks around the head of Lake Rotoiti. This included hiking to trailheads where trails that originated at Lake Rotoiti diverged. While this map may not be an entirely complete assessment of every no-dog sign at Lake Rotoiti, it does provide a detailed picture of as many signs as possible that could be located over a twelve-day search.

Figure F.1: Sign Style A

Figure F.2: Sign Style B

Figure F.3: Sign Style C
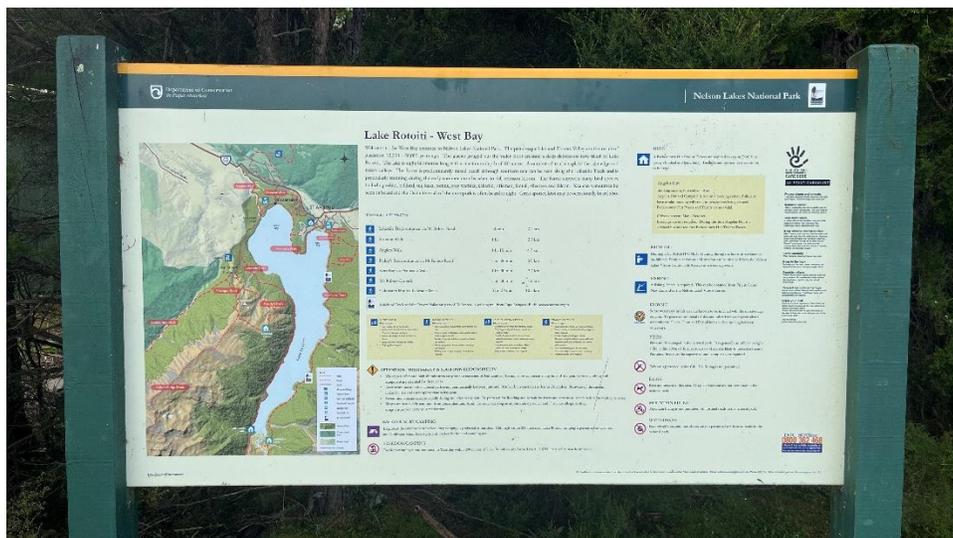
Figure F.4: Sign Style D

Figure F.5: Sign Style E

Figure F.6: Sign Style F

Figure F.7: Sign Style G

Figure F.8: Sign Style H

Figure F.9: Sign Style I

Figure F.10: Sign Style J

Figure F.11: Sign Style K

Figure F.12: Sign Style L

Figure F.13: Sign Style M
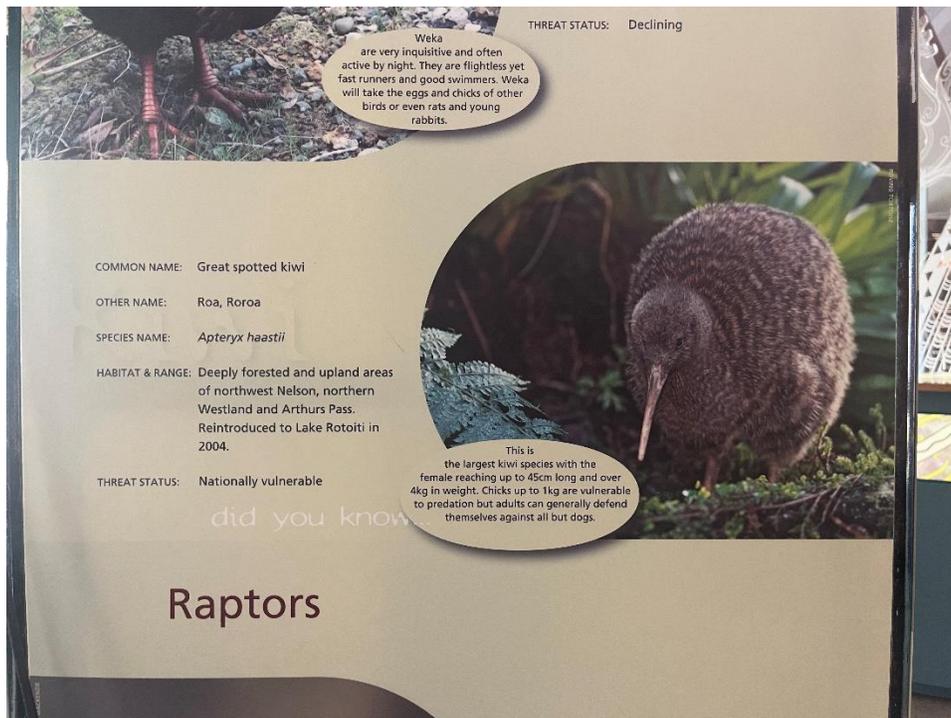
Figure F.14: Sign Style N

Figure F.15: Sign Style O

Figure F.16: Sign Style P

Figure F.17: Sign Style Q

Figure F.18: Sign Style R

Figure F.19: Sign Style S

Figure F.20: Sign Style U

Figure F.21: Sign Style V

Figure F.22: Sign Style W

Figure F.23: Sign Style X

Figure F.24: Sign Style Y

Figure F.25: Sign Style Alpha

Appendix G: DOCgis Analysis Methodology

To determine the number of through and access roads in each National Park, we utilized DOCgis. We used a base map that showed all public roads and included a layer to show EAM roads as well. A road was considered a through road if it entered and exited the National Park at separate points. If the park bordered only one side of the road, it was still included as a through road. Access roads were any road that entered the park at only one point. If an access road branched off in another direction from a different through or access road in the park, it was still included as an additional access road. Data on park area came from Land Information New Zealand. Table G.1 contains the raw data used to calculate the values in Table 4.6.

Table G.1: Roads in National Parks Raw Data

National Park	Public Through Roads	Public Access Roads	EAM Through Roads	EAM Access Roads	Park Area (sq km)	Dog Reports
Nelson Lakes	4	13	1	1	1019	91
Able Tasman	0	4	0	0	237	19
Egmont	1	3	0	1	342	19
Tongariro	5	2	0	6	786	35
Aoraki Mt Cook	0	2	0	4	722	13
Arthur's Pass	2	1	0	4	1929	27
Westland	1	5	1	12	1320	7
Kahurangi	12	38	1	11	4529	23
Rakiura	0	1	0	0	1400	5
Fiordland	2	4	1	21	12607	20
Paparoa	3	6	0	3	1987	3
Mount Aspiring	2	3	0	6	3562	3
Whanganui	1	1	0	0	742	0

Appendix H: Web Team Interview Questions

1. How often does the DOC website get edited?
2. Does a team manage and make edits to the website, or is it just one employee?
    a. If it is a team, can you describe how the team works?
3. What are some of the general restrictions you have when making edits to the website? (i.e. are you able to move things around, change colors, change wording, add information, etc...)
4. Are you able to place ads onto the side bar of the DOC Website?
5. Can you add a tab to the home page in order to directly access information about where you can and cannot take your dog?
6. Why are some pages for National Parks laid out differently than others?
    a. How was the layout decided?
    b. Is there a reason only three of the thirteen pages for National Parks have information about dogs?
    c. To what extent can these pages be reorganized (i.e. can drop downs be moved or can information be moved out of drop downs so it doesn't require a click to access)?