



Oban, Stewart Island/Rakiura Hedgehog Survey

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Abstract

Stewart Island/Rakiura hosts a diverse community of some of New Zealand's most charismatic birds. European hedgehogs (*Erinaceus europaeus*) pose a significant threat to this bird diversity, as they act as a predator to ground nesting eggs as well as a competitor to insectivorous and ground burrowing species. Eradication and control of this invasive mammal is crucial to ensure a safe space for native species to flourish; however, this step is limited by the lack of knowledge the hedgehog community on Stewart Island. This report summarizes the results of a public survey that was done Oban, Stewart Island to determine approximate locations of hedgehog sightings, as well as the public perception of their control. Using these results, the Stewart Island/ Rakiura Community & Environment Trust (SIRCET) and the Department of Conservation (DOC) can plan for management initiatives to control hedgehogs and their effects on the Stewart Island Ecosystem.

Introduction

The European hedgehog (*Erinaceus europaeus*) is a solitary species that is distributed all over New Zealand. This spiny nocturnal insectivore is approximately 620-700g for most of the year, and 540-650g in the winter when it hibernates (King 2005). They have a powerful dorsal muscle called the musculus orbicularis which allows them to roll up into a tight ball when disturbed, or during their winter hibernation (King 2005). Hedgehogs are abundant in lowland, coastal districts, while also being scarce in areas with more than 250 frosty days/year and 2500mm of rain a year (King 2005). Stewart Island has an average rain fall of 1600-1800mm per year, and average summer temperatures of 16.5°C to 18°C and winter average of 10°C to 11°C, making it a suitable climate for them.

Hedgehogs were first introduced to New Zealand by European colonizers as "natural predators" to control slugs, snails, and bugs in gardens and to also remind the settlers of their home gardens (King 2005, Reccio 2016). They are thought to have been introduced to Stewart Island in the 1930s, however it could have been earlier as European settlers began to establish in the early 1800s for the sealing and whaling industry (King 2005). They are competitors for birds and lizard species as they eat up to 160g of invertebrates per day (Wroot 1984). Despite their large intake of invertebrates, they are not successful at providing effective biological control of invertebrate pests such as grass grub beetles (*Costelytra zealandica*) in New Zealand (Campbell 1973). They are a serious threat to indigenous invertebrates that are especially vulnerable.

Hedgehogs have caused ecosystem unbalance in New Zealand by competing with native species for resources, but also because of their predatory behaviour. While they are a threat to indigenous invertebrates, and they are also a serious threat to other vulnerable species that live on invertebrate diets, e.g. kiwi and lizards (King 2005). Hedgehogs are known to eat skinks, with 28% of hedgehog guts found in Macraes Flat in Otago having sink remains inside (King 2005). Kiwi birds and hedgehogs use similar nest sites, leading researchers to believe that hedgehogs could possibly compete for nests, disturb incubating kiwis, or even harm kiwi chicks (King 2005). They also pose a serious threat to other ground nesting birds, such as the New Zealand dotterel or terns. Hedgehogs have been known to eat the eggs and chicks of ground-nesting birds; evident from the toothmarks and holes found in shell fragments, disturbed nest linings (occasionally with yolk staining from licking), and presence of scat (Jackson and Green 1999, King 2005).

The risk of hedgehogs for native New Zealand species is high, thus the prospect of controlling their population numbers should be investigated. On Stewart Island, hedgehog abundance and population numbers are poorly understood. They are considered a pest to many, but are also considered a pleasurable species by others in Oban. In order to investigate the potential for eradication of this pest species, we must first know where to look. This report describes the results of a public survey distributed to the residents of Oban, Stewart Island in February 2019. The results can be used for future eradication planning, and for future public appeal efforts.

Methods

Participants

A survey was created for the locals of Oban, Stewart Island so as to gain more information of the public's knowledge of hedgehog presence in the Bay. The survey was available to all permanent residents of which there are approximately 350.

Design

An 11-question survey was created by myself for the purpose of gaining information the hedgehog population in Oban, Stewart Island for future management ventures. Several questions gave the opportunity for comments for example locations of sightings or any extra details.

Materials

Surveys were distributed using an online survey software called SurveyMonkey®, which was posted to the local Facebook page, and also through hard copy PO Box drop at the local post office. Information collected in the survey was organized and graphed using Excel Sheets, and a map of sightings was visualized using MyMaps on Google.

Results

Return Rate and Demographics

89 of 350 residents answered the survey of which 25 people, or 28% of participants, were 65+ of age. In a census survey done in 2013, 17.3% of Oban residents fell in the 65+ age range. The number of remaining participants in each age class can be seen in Figure 1. In the 2013 census, 67.25% of Oban residents were aged 15-64 years. In this survey, 66.3% of the participants were aged 15-64 years old suggesting an approximately accurate representation. 5.6% of participants did not specify their age. The sample consisted of 89 individuals, 56 females (Mode=65+ years), 28 males (Mode=65+ years), and 5 non-binaries (Mode=no response).

Presence of Hedgehogs

Less than half of participants (37) have seen hedgehogs on their property in the last year (Figure 2A), those that have see them in areas described in Figure 3. 51 out of 89 participants have seen hedgehogs in areas other than their property (Figure 2B). Locations of hedgehog sightings can be seen in Figure 4 and Appendix C.

Attitudes toward control and eradication of hedgehogs

Support for hedgehog control and/or eradication is evident in Figure 5, although 11 of 89 participants responded that they strongly enjoyed seeing hedgehogs in their community and 8 of 89 said that they strongly believe that hedgehogs are part of the ecosystem and should not be eradicated.

Discussion

The results of the survey demonstrate that hedgehogs are frequently found within and surrounding the town of Oban, Stewart Island. Responses indicate that a large number of hedgehogs have been seen in the golf course area, halfmoon bay, and on the main road. These central township sightings are consistent with Hubert et al. (2010)'s study, where hedgehog densities were higher in urban areas compared to rural because of lower arthropod biomass, easier access to cat food, plus more shelter for variable climate conditions. These results are a great starting point for future eradication and/or monitoring projects.

Now that the approximate public sightings of hedgehogs are known, researchers can focus on doing surveys to determine appropriate locales to target for management endeavours. Preceding any eradication or control mechanisms be put in place, hedgehog movement and activity information in Oban should be better understood. On Motutapu Island, over wintering activity of 20 hedgehogs was tracked using radio telemetry to determine the likelihood that poisoning and trapping would lead to

the necessary level of survivorship (Griffith et al. 2015). Hubert et al. (2010) used distance sampling and infrared binoculars to estimate hedgehog densities. Densities can also be determined using markrecapture surveys and systematic transects searches, as successfully implemented by Jackson and Green (1999) in Scotland. While any of the previous methods would be effective, the cheapest option should be considered as public comments in Appendix B suggest that locals believe money would be better spent on conservation initiatives other than hedgehogs.

Using the information from this public survey, and once densities of hedgehogs on Stewart Island are better understood using monitoring techniques, SIRCET and DOC could begin investigating eradication and control programs for this invasive species. Prior to 2011, only six hedgehog eradication projects had been attempted in the world, of which only four had succeeded (Griffiths et al. 2015). In 2011, alien mammalian predators, including hedgehogs, were successfully eradicated from Rangitoto and Motutapu Islands, New Zealand (Griffiths et al. 2015). Hedgehogs were killed from: primary and secondary poisoning using Pestoff 20RTM rodent bait, DOC 200TM traps, DOC 150TM traps, Oneida Victor[®] #1.5 Soft CatchTM, and Mk VI FennTM traps (Griffiths et al. 2015). Many of these traps work well for rats as well as hedgehogs, so using similar methods to these could target both hedgehogs as well as other predators. The challenge, however, is that as of 2006, hedgehogs had only ever been eradicated from islands 100ha and smaller (Clout and Russell 2006). This is concerning, as Stewart Island is a 174,600ha island, thus control methods may need to be adjusted.

It is clear, from this survey, that the local public would be largely in collaboration with trapping efforts, and that most locals would be happy to see hedgehogs controlled in Oban (Figure 5). This is consistent with a survey that was done in Scotland with similarly positive results, with the majority of supportive respondents were mainly males, older people, and people who had previously heard of control and eradication projects (Bremmer and Park 2007). Bremmer and Park (2007) explain that supporters of hedgehog eradication and control were usually knowledgeable about the conservation risks associated with the invasiveness of hedgehogs, and thus concluded that awareness and education of the public is important to ensure support. Seeing as only approximately 40% of respondents agreed strongly that they understood the impact of hedgehogs on the Stewart Island ecosystem, it is recommended that SIRCET and DOC allocate some resources to making this issue better understood to the public. This is important, as you can see several survey responses suggesting opinions of appreciation of hedgehogs on Stewart Island in Figure 5.

Concluding Statement

The results of this survey offer the necessary background information to begin eradication and control efforts of hedgehogs on Stewart Island/Rakiura. Based on the results, managers can focus their efforts to areas where hedgehogs have been known to frequent, and can start investigating the abundance and density of hedgehogs using survey methods. Once their abundance is understood, trapping and poisoning methods can be used in collaboration with the current pest-management methods currently used by SIRCET and DOC. Local community support is relatively high for the regulation of hedgehog populations in Oban, however continued education and awareness is essential to ensure public support. Collaboration with the University of Otago is suggested, as hedgehog surveys could be undertaken by Masters of Wildlife Management students in the Department of Zoology.

Acknowledgments

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Figures and Tables



Figure 1. The number of participants in each age class.



Figure 2. A. The participant response of hedgehogs on their own property. B. Participant response of hedgehogs on sites apart from their property.



Figure 3. The area their property of which participants have seen hedgehogs.





Figure 5. Percentage of participants responses, from online and paper surveys, for opinion based questions on hedgehogs in Oban based on a 5 point scale.

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Appendix A – Survey Questions

1.	Have you ever seen a hedgehog on or around your property? Yes No
	If yes , please supply your address or the general area of Oban that you live in:
	If no , please skip to question 6.
2.	On what part of your property have you seen hedgehog? Select all that apply.
	Garden Pasture Forest Other, please specify
3.	Have you, or anyone you know, ever left milk or food out for hedgehogs?
	Yes 🗌 No
4.	How many hedgehogs have you seen in the past year <u>on your property</u> ?
Γ	1-2 3-5 5-10 More than 10
5.	Do hedgehogs ever cause issues for you on your property? 🗌 Yes 🗌 No
	If yes please explain how:
6.	Have you seen a hedgehog in an area other than your property (i.e. golf course, school yard, beside the road, etc.)?
	If yes , where?
	If no , please skip to question 8.
7.	If yes, how many hedgehogs would you say you've seen in the past year, in areas other than your property?

1-2 3-5 5-10 More than 10

8. For the following questions, please rate the extent to which you agree with each statement using the scale 1 to 5 shown below. Please respond as you really feel rather than how you think "most people" feel.

1	2	3	4	5
Disagree	Disagree a little	Neither agree	Agree a little	Agree strongly
strongly		nor disagree		

- a. Hedgehogs should be completely eradicated from Stewart Island.
- b. I would be willing to let SIRCET monitor hedgehogs on my property.
- c. I would be willing to have traps on my property to kill hedgehogs and other mammalian pests.
- d. Hedgehogs are part of the ecosystem on Stewart Island and should not be controlled.
- e. I enjoy seeing hedgehogs on my property and/or in the community.
- f. I am aware of the impacts that hedgehogs have on the ecosystem.

A bit about you... (optional)

10. Which one of the following age groups do you belong to?

15-24 years old	25-34 years old	35-44 years old
45-54 years old	55-64 years old	65+ years old

11. What is your occupation? _____

Thank you for taking the time to complete this survey, if you have any further questions please feel free to contact Kathleen Lalor at kathleen.lalor@gmail.com or SIRCET at info@sircet.org.nz. If you know someone from SIRCET please give this completed survey to them, alternatively please leave the completed survey at the Stewart Island Flight office/Post shop before February 13th 2019.

Appendix B – Comments from survey participants

"Never seen a hedgehog in all the years I have lived here not even when I lived here in the early 1960s."

> "Hedgehogs serve a purpose and should not be eradicated from the environment, they have their role in the ecosystem too, however as I haven't seen even one in the past 12-24 months I have a feeling the deed has been done!! Hopefully not!"

"I like hedgehogs"

"I don't know enough about the impact of hedgehogs. I'm happy for pests that effect our native wildlife to be controlled." "I feel there are other more urgent priorities on Rakiura. I can't recall ever having seen a hedgehog on Rakiura definitely not on our property (10 Leonard street)."

"I bave lived on SI for

70+ years and bave not seen a bedgebog since I was 20years old." "They eat 'eggs' and food for kíwís etc."

> "I've not seen the hog in this past year...but there was no option for that above...it was the year before and in my cat trap!! they make me grumpy. we've birds and frogs and the hedgehogs have to go"

"Would a

hedgehog

trap catch

a native

bat?"

"In the village, there aren't many ground nesting birds - the only reason I can think of to eradicate? Or maybe little lizardy things? Until recently, I've always thought to encourage hedgehogs to keep down garden pests, limit poison use. Still learning."

"I do not like them as I fear they are competing for food sources of our native birds, feed on invertebrates, lizards and frogs. Are carriers of lice and possibly other nasties for wildlife."

> "Not sure if they are a pest? 9 know where they are living (or were). 9 know whey can carry diseases but they also kill bugs and slugs?"

"I enjoy seeing them even though they are introduced, they are good for gardens. They eat garden pests, as far as I know they are more of creatures open areas, verges and forest perimeter."

> "We don't see hedgehogs that often but there are often droppings on our lawn which I'm sure are from hedgehogs."

Appendix C – Locations of sightings (White on participants properties, Grey outside of property)

Address/Location of Hedgehog Sighting	Number of Reports at this address
Golf course	8
Main Road	6
Halfmoon Bay Grass	4
Leask Bay	3
Rugby Field (Traill Park)	3
Whipp Place	3
Elgin Terrace	3
Golden Bay	3
Bay Motel	2
Dundee Rd	2
Bowling Club	2
Airport Road	2
Community Centre Driveway	2
35 Golden Bay Road	1
Deen Bay Area	1
Peterson Hill	1
Golden Bay Road	1
108A Flgin Terrace	1
Corner of Horseshoe Road and Dress Circle Rd	1
nine tree hill area	1
Io & Andy's Backpackers	1
15 Whipp Place Driveway	1
Corner of Dundee and Avr street	1
Retween dundee and willet street	1
Black Pond	1
Motorou Gordon	1
Horseshoa Doint Dord	1
Pondeida at corner of Horseshoa Ray Pd and Miro	1
Cret	1
21 Dingaringa Dd	1
Traill Road	1
15 main road	1
Scholfields Paddock	1
Horseshoe Bay	1
Smith Place Road	1
Argyle	1
Ferndale	1
33 Main Road	1
Wholers Poedside near Lonnakars Beach	1
Excelsior Doad	1
108a Elgin Terrace	3
58 Main Road	2
Manau Road	2
11 View Street	1
77 Mainroad	1
6 Kaka Didga Doad	1
Aragla Street	1
Alggle Sheet	1
0 Kowhai lana halfmoon hay	1
18 Horreshoa Pay Hotal	1
20 ringo ringo road	1
2 a miga miga road 5 Whinn place (main road error)	1
S whipp place (main road area)	1
womers Ka.	
Dundee Kd.	
Smith Place	

50 Hicks Rd.	1
Bayview 15 Dundee Street	1
6 Nichol Road	1
Kamahi Rd	1
36 Main Road	1
14 Horseshoe Bay Road	1
162 Horseshoe Bay Road	1
55 Horseshoe Bay Road	1
77 Main Rd	1
41 Miro Crescent	1

Appendix D – Additional Graphs



"Number of Hedgehogs on your property"

Figure x. Number of hedgehogs reportedly seen on participants property in the past year, from the online and paper survey.



"Number of Hedgehogs on sites other than your

Figure y. Number of hedgehogs seen on other sites other than the participants properties in the past year, from the online and paper survey.



Figure q. The results of perception of hedgehogs and their impacts on locals' properties, from the online and paper surveys.



"Have you or anyone you know left food out for hedgehogs?"

Figure j. Results for the question of feeding hedgehogs, from the online and paper survey.



Figure z. The results of the public perception of hedgehogs and eractication/control of hedgehogs from the online survey.