NORTH BULL ISLAND DOG TRACKING PROJECT 2018

Final Report to Dublin City Council and the National Parks and Wildlife Service

Project Manager:

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Scope:

The North Bull Island Dog Tracking Project (NBIDTP) is an investigation into the spatial movements of domestic dogs, tracked with collar mounted GPS units, during exercise periods with their owners while on the island. This project deals with spatial movement of dogs defined in kilometres, maximum speed attained defined in km/h, habitats occupied over the course of exercise period and adherence to current bye-laws regarding dog control on the island. This project does not deal with incidences of professional dog walking ventures, dog fouling, specific interactions with resident wildlife, and interactions between individual dogs.

Non-technical summary:

We obtained 102 tracks from 95 individual dogs of multiple breeds, that had been exercised in all three major habitats- beach, dunes, and salt marsh. We reconfirm that adherence to the existing dog control regulations is low. The main findings of this study are (i) dogs travel larger distances and move at faster speeds on the beach front when compared to the dunes, (ii) on average there is no significant difference between the distance travelled and maximum speed reached by dogs on leads versus those off lead in the dunes, and (iii) on average dogs travel 1.25 times the distance of their owner when off lead in the dunes compared to 3.2 times when off lead on the beach. In terms of provision of exercise, our data suggests that the best place to exercise dogs is on the beach front as they have the capacity to cover more distance and achieve greater speeds per unit time and available area. These findings have important implications in relation to any new zonation plan for the island that specifically deals with appropriate management of dog walking on the island.

Acknowledgements:

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Rationale and Aim:

Previous studies on the impact of dogs and dog walkers on North Bull Island have primarily focused on levels of adherence to the bye-laws of the island, dog walker attitudes, and interactions between dogs (see Lauder and Riley 2016). The NBIDTP aims to build upon these previous studies by employing GPS tracking devices to generate an impartial dataset of how dogs use the spatial environment of the island while being exercised.

Introduction:

Local dog owners and walkers are one of the most, if not the most, regular users of North Bull Island and therefore a key stakeholder. Dog walking activities are regularly accused as being the cause of most of the perceived "environmental damage" on the island, e.g; local extinction of the Irish hare (*Lepus timidus hibernicus*) population, abandonment of the island as a breeding ground by the Little Tern (*Sterna albifrons*), disturbance and "worrying" of both seal species (*Halichoerus grypus*, and *Phoca vitulina*), and disruption to feeding regimes of shore and salt marsh feeding birds. However quantified data to corroborate any of these claims is sorely lacking and or inconclusive (For examples see Phalan and Nairn 2007; McCorry and Ryle 2009). Conversely, there is an assumption that dog walkers think that they are entitled to exercise their dogs on the island as they will and that their dogs have little to no effect on the resident wildlife when compared to other activities that also have the potential to disturb wildlife e.g. kite surfing, dune running, mountain biking etc. As it stands, current dog control regulations on the island states that all dogs must always be kept on a lead, however personal observations, a recent study by Lauder and Riley (2016) and the current management plan (McCorry and Ryle 2009) confirm exceptionally low adherence to this regulation.

GPS technologies have been used for studies involving domestic dogs, their effects on wildlife, and potential for spreading disease (for examples see Sepúlveda et al 2015; Hudson et al. 2017) however few have attempted to quantify the spatial

movement patterns of pet dogs over the course of their exercise regime. To this end, we aim to generate robust spatial movement data from a variety of dog breeds, ages and exercise durations to elucidate how dogs utilise the environment of North Bull Island and thus, provide useful insights that can be used to develop more a more realistic and fair management plan than that currently in place.

Methodology:

Study area

North Bull island is Ireland's most designated site in terms of legal protection for the wildlife that inhabit the island and surrounding environs. It is a designated SAC, SPA, Wildfowl Sanctuary, Ramsar Convention site, a Biogenetic Reserve, a Nature Reserve, and a UNESCO Man and Biosphere Reserve. It also has a Special Area Amenity Order attached to it. More detailed information about the qualifiers for the specific conservation designations of the island can be found on the National Parks and Wildlife Service website (https://www.npws.ie/protected-sites).

GPS Units, Data collection and analysis

We deployed 12 small, lightweight, GPS units enclosed within a robust plastic casing (G-PAWS3™, GPAWS LIMITED, Marlborough, Wiltshire, UK)) attached to nylon dog-collars to record spatial movements. These GPS units record geospatial referencing information every 5 seconds and so provide a relatively cheap, high resolution, and easy-to-use means to record the spatial movements of dogs being exercised on the island.

Six survey days were conducted during September and October 2018. Survey days encompassed midweek, weekends and covered morning into early evening time periods. Times were varied to collect the best representative data and as close to an accurate cross section of dog owners who regularly use the island. Survey days were split evenly between the South end of the island at the North Bull Wall and the North end of the island at the causeway.

All participants in the study were selected based on willingness to participate. No reward or compensation was offered nor provided for taking part in the study. The following demographic information was collected; whether the dog(s) was walked on the island regularly, the age, sex, breed of the dog, and whether the dog would be exercised on-, off-lead or a mix. Participants were under no obligation to provide personal contact details. However, when provided, and as a sign of good faith, they were emailed a map of the track generated by their dog(s) along with the associated details of distance travelled, maximum speed attained and duration of the walk.

Once participating dogs were fitted with the GPS tracking unit, owners or walkers were requested to undertake their dog walk regime as they normally would. Distance walked by the dog owner was estimated using Google maps from existing trails and route details provided by them.

The GPS track data were downloaded in the form of .gpx files from each unit and visualised and edited using the freeware software package GPS Track Editor (www.gpstrackeditor.com). The resulting track information (total times, total distance, max. speed) was imported into Microsoft Excel (Microsoft 2013) and incorporated into the overall database containing the associated information to each individual dog. Track data was also visualised and animated in Google Earth™ to assist with editing, ensure accuracy of the data obtained, and identify obvious non-random spatial movement patterns (e.g. chasing a ball etc.).

Statistical analyses were performed in Microsoft® Excel 2016.

Results:

In total 105 tracks were obtained from 95 canine participants (45 females, 50 males) of which 102 tracks were of high enough quality to be included in the analysis. For breed information see Appendix A. One GPS unit failed due to salt water incursion resulting in the loss of one track and destruction of the unit. Partial tracks (due to inadequate signal; n=2) were included in the analysis as is, based on distance travelled per unit time, but excluded from other analysis. Just two dogs were tracked on multiple occasions but in different locations and habitats on the island.

As only one dog was tracked (n=2) exercising in the salt marsh that category was analysed in isolation.

In total, 52 tracks were obtained for the North end of the island (between the causeway and Sutton), 48 for the South end of the island (between the North Bull Wall and the causeway), and two tracks obtained from the "middle" of the island roughly encompassing the area of the old beach parking area east of the visitors centre. Figure. 1 shows examples of visualised tracks.

Most participants (90.5%) regularly walk their dog on the island (at least once but usually multiple times per week) with the other 9.5% of participants occasionally walking their dogs on the island with their primary locations elsewhere.

Of all participants, 80 (84%) exercised their dogs off-lead, nine (9.5%) kept their dogs on a lead for the duration of their exercise, six (6.5%) engaged in a mix of on- and off-lead exercise.

Descriptive statistics

The average time spent exercising dogs was 1hr 13mins ±10mins with an average dog distance of 4.93km ±2.81km. We found a statistically significant difference in the total distance travelled across all breeds between the dune and beach habitats (0.035, $p<0.05$) regardless of whether the dogs were on or off lead. A significant difference was found in terms of distance travelled and maximum speed attained between dogs on and off lead on the beach across all breeds (0.0001, $p<0.05$; 0.0005; $p<0.05$ respectively). Interestingly, no significant difference was found between distance travelled and max. speed across any dog breed in the dune habitat, either on or off lead (0.131, $p<0.05$; 0.311, $p<0.005$ respectively). This also holds true for dogs that engaged in "mixed" location exercise i.e. their route started in the dunes and progressed to the beach and vice versa. This shows that all dogs behave differently (in terms of distance and speed) when in the dune habitats as opposed to the beach habitat irrespective of where they begin or end their exercise routine.

When arbitrarily divided into Toy/Terrier and Working/Sports dog categories the average distance travelled by Toy/Terrier breeds was 3.61km ±1.37km with an average walk distance for Working/Sport dogs of 5.41km ±3.04km. Despite large variance, there was a strongly significant difference in the overall distance travelled between Toy/Terrier and Working/Sports dog categories (0.0001, $p < 0.05$). No significant difference was found in relation to distance travelled between the different dog categories in the dune habitat.

Salt marsh (North and South Lagoons)

A limited number of participants who exercise their dog(s) near or in the salt marsh areas took part in the study (n=1, two tracks obtained), this was potentially an artefact of the location of our base station. Based on our own observations and the high amount of dog faecal material seen along the access routes, people do exercise their dogs in the salt marsh areas of both the north and south lagoons even if they are fewer in number when compared to the dunes and beach front. This observation is also supported by McCorry and Ryle (2009). It is also likely that even low use of the salt marsh by dog walkers will have the biggest effect in terms of disturbance to protected wader and fowl species due to their abundances and concentration in those areas. Although difficult to infer from our small track sample size (n=2), it does appear that at least this dog (a Springer spaniel cross off-lead) in the salt marsh areas was actively engaged in pursuit of avifauna. This is inferred from random movement patterns, high speeds, and sharp turn angles (see Appendix B(i)). This random movement pattern was also observed in several tracks (n= <15) in dune and beach habitats but, generally, to a much lesser extent and over much shorter distances.
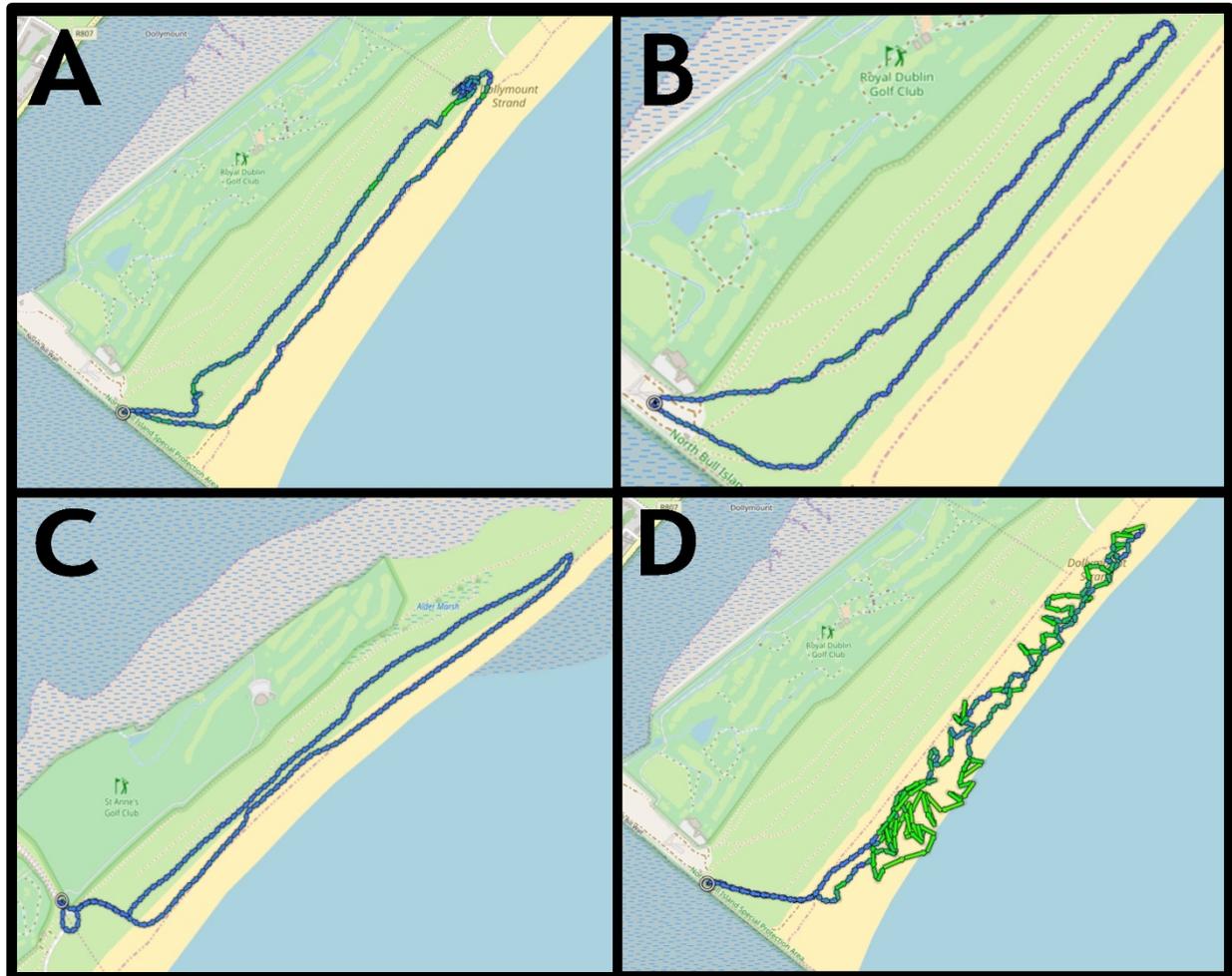
Other findings:

When considering the visualised and animated tracks the spatial movements of most dogs (including those exercised off lead), appear to be highly structured with limited random deviation from the direction of movement. This strongly suggests that most

dogs are following a set routine and not engaging in random large-scale movements in pursuit of wildlife. In cases where sharp turn angles, high speeds and jagged, non-random directional movement patterns were seen, this was usually an indication that the dog in question was engaging in a retrieval exercise with its owner (see Appendix B(ii)).

Other potential sources of disturbance

During our study we were also witness to other potential sources of wildlife disturbance in the form of; off-road mountain biking (Alder marsh), kite surfing, body boarding, dune running, jet skis, and large groups of people (families, recreational groups) navigating the dunes. How these activities are deemed to be of greater or lesser disturbance to resident wildlife when compared to dog presence was not the focus of this study. Such data would be difficult to quantify and therefore remains unclear.

Figure 1. Examples of tracks obtained during the NBIDTP. **A**= A Cocker spaniel off lead exercised on a mix of beach and south dune system; **B**= A Terrier X off lead in the south dune system; **C** = A Greyhound exercised on lead on mix of beach and dunes; **D** = A Pointer exercised off lead on beach front. Green arrows indicate speeds >15kph, blue arrows <15kph.

Discussion:

The results of this study show that most dogs exercised on the island have a known and somewhat fixed exercise routine. This is evident from the relatively small number of tracks obtained featuring random and highly complex movement patterns usually coupled with sharp turning angles which we deem to indicate the pursuit of wildlife, usually birds (see Appendix B(i) for an example). It is also interesting that we found no significant difference in distance travelled and speed for dogs exercised both on versus off lead in the dune system. Overall the primary findings of the NBIDTP make sense, e.g. dogs cover greater distances and attain greater speeds on the beach front compared to the dune system. This is likely due to several factors involving line of sight with their owner and obstructive substrates at eye level in the dune system. Our findings contrast greatly with prior assumptions that dogs behave in an erratic wildlife-disturbing manner when exercised off lead in all habitats on the island. In terms of exercise for dogs, we have provided irrefutable evidence that the beach front is the best place for exercising dogs. It is also likely to be the location least disruptive to resident wildlife.

We acknowledge that there are limitations of this study, namely the GPS units only record spatial positioning every 5 seconds. While this is deemed quite a high resolution for other wildlife orientated studies, there is the potential to miss very fine scale movements patterns such as those involved in rapid, random turning pursuit. The limited data obtained for the salt marsh areas, while suggestive, ideally needs a greater sample size covering multiple breeds. We also acknowledge that those most likely to exercise their dogs in known sensitive areas, such the north and south salt marshes, are likely to be those who were unwilling to take part in this study. Lastly, the age and ability profile of the owner may also affect the length of time and distance covered on the island with their dog. As we did not collect personal information of this nature from participants in this study this effect remains unknown.

Conclusions and Recommendations

Ultimately, dogs will take their exercise where their owners bring them therefore dog management on North Bull Island is and always will be primarily a people management issue rather than a dog management issue. Almost all human participants in this study acknowledged the importance of the island to local wildlife populations and most, if not all, are keen proponents of the conservation initiatives and educational benefits of the island.

Given such a situation, where dog walkers recognise the intrinsic value of the resident wildlife on the island but also have need to exercise their dogs appropriately, it is likely that an "appeal to peoples better nature" through the use of regular, obvious, sympathetic, and easy to understand signage may be the most appropriate and fair way to encourage adherence to zonation/regulation schemes for the island, thereby achieving desired outcomes. Temporal restrictions will ultimately confuse island users and lead to the current status quo of *en masse* non-compliance resurfacing. Based on our data, we suggest that easy to identify and defined spatial restrictions will be much more likely to be adhered to and enforceable especially when coupled with a designated "off-lead" area on the beach front. We also suggest that the provision of a designated "off lead area" will also help to mitigate the impact of enforcing the salt marshes and northern tip of the island as "restricted/no access areas". A designated area for off lead exercise will also aid in reducing confrontational enforcement of the "on-lead only" regulation for the rest of the island as there will be an obvious location for wardens to send people with their dogs.

It is inevitable that some will not adhere to any new zonation, as is the case now, no matter what efforts have been made to make them fair and easy to follow. In cases such as these it should be made clear that failure to follow the bye-laws of the island will be met with strict enforcement. Given that the population of the local area and rates of dog ownership is only going to increase in the future, appropriate enforcement is and must remain a priority.

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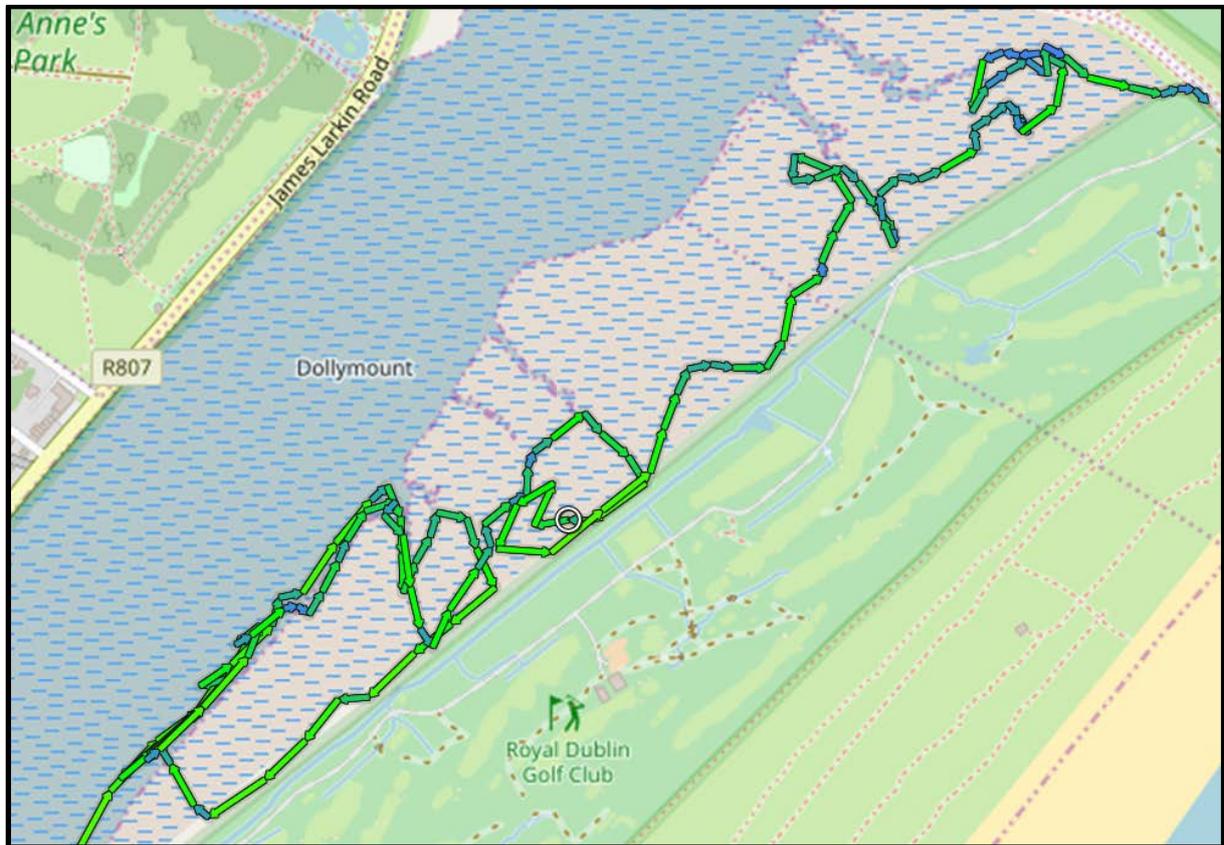Phalan, B. & Nairn, R.G.W. (2007) Disturbance to Waterbirds in South Dublin Bay. Irish Birds, 8, 223-240.

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Appendix A: Dog Breed participants

Springer X, Yorkshire terrier, Retriever X, Lurcher X, Lurcher X, Cocker spaniel, Beagle, Cockapoo, Springer X, Westie-Jack Russell X, Bichon Yorkie X, Labrador X, Tibetan Terrier, Cocker spaniel, Cocker spaniel, Golden Retriever, Cavachon X, English pointer, Labradoodle, Bernese Retriever X, Pointer, Westie, Westie, Collie X, Cocker spaniel, Terrier X, Bichon Terrier X, Boxer, Retriever, German Shepherd, German Shepherd, German Shepherd, Springer X, Cairn-Jack Russel X, Labradoodle, Westie, Springer X, Border terrier, Boxer, Dachshund, German Sheppard Staffie X, Cocker spaniel, Cocker spaniel, Tibetan Terrier, Schnauzer, Cocker spaniel, Weimaraner, Terrier X, Terrier, Old English Sheepdog, Staffie, Cavalier-Japanese Spitz X, Labrador X, Labradoodle, Parson's Terrier, Irish Water Spaniel, Springer Spaniel, Labrador X, Bichon Maltese X, Collie, Westie, Lurcher, Scottish Wolfhound X, Labrador, Jack Russell/Husky/Shitzu X, Golden Retriever, Cavalier-Jack Russell X, Cavalier King Charles, Golden Retriever, Labrador-Japanese Spitz X, Irish Red Setter, Yorkie X, Springer Collie X, Border Collie, Cairn Terrier, Beagle, Cavalier poodle X, Jack Russell X, Labrador X, Old English Sheepdog, Beagle, Jack Russell Terrier X, Labradoodle, Boxer Lab X, Irish Water Spaniel, Whippet, Black lab, Greyhound, Jack Russell X, Whippet, Tibetan Terrier, Jug, Spitz Pom X, German Shepard, Beagle, Jack Russell

Appendix B

(i) Track exhibiting sharp turn angles, high speeds (green arrows) and jagged, random directional movement pattern indicative of pursuit behaviour in south salt marsh & lagoon area

Appendix B

(ii)   Dog track exhibiting sharp turn angles, high speeds (green arrows) with structured, non-random, human controlled directional movement pattern indicative of retrieval in and out of the sea