

Monitoring Native Herpetofauna on North Bull Island, Dublin 2015



Final Report to Dublin City Council

Monitoring Native Herpetofauna on North Bull Island, Dublin. Final Report to Dublin City Council

Gandola, R.,^{1,2} and Ennis., C.¹

¹Herpetological Society of Ireland, 67 The Ramparts, Cabinteely, Dublin 18

²Ocean and Earth Science, National Oceanography Centre, University of Southampton Waterfront Campus, European Way, Southampton SO14 3ZH
U.K

*rgandola@thehsi.org



Citation:

Gandola, R., and Ennis, C. (2015) Monitoring Native Herpetofauna on North Bull Island, Dublin. Final Report to Dublin City Council

Cover photo: © Common lizard (*Zootoca vivipara*) yearlings R. Gandola

The H.S.I Project Officer for this report was: Robert Gandola

© Herpetological Society of Ireland

Table of Contents

Executive Summary

Acknowledgements

1. Introduction

1.1 Publicity/Volunteer Recruitment

2. Methodology

2.1 Field Surveying on N.B.I

3. Results

3.1 Amphibians

3.2 Reptiles

4. Discussion

5. Conclusions and Recommendations

6. References

Executive Summary

The Herpetological Society of Ireland resumed the native reptile and amphibian species monitoring project on North Bull Island at the end of February 2015. Due to favourable weather conditions the monitoring surveys continued until the end of October. Nocturnal and diurnal surveys of water bodies, the surrounding terrestrial dune habitat and both golf courses reconfirmed the presence of a large, healthy population of the common frog. 124 observations were obtained of the common lizard including definitive evidence that they are breeding on north bull island. The smooth newt was not detected on the island. These results highlight the importance of multi-year monitoring, appropriate survey design, and the use of citizen scientists.

Acknowledgements

The Herpetological Society of Ireland would like to thank all the volunteers who got out into the field helped with the survey. Without a doubt, this study would not have been possible without their hard work and determination. We would like to thank (in no particular order; omissions are entirely accidental): Dublin University Zoology Society (Trinity College Dublin) students: Holly English, Aoibheann Gaughran, Fionn Ó Marcaigh, Rosie Carroll; Meg Doyle, Ronan Hickey, Tony Wilson, Jack Wilson, and Karen Buckley.

Thanks also goes to Dublin City Council (DCC) particularly Maryann Harris and Niamh Ni Cholmain for funding and support. We would also like to thank the National Parks and Wildlife Service (NPWS) for licensing. Particular thanks goes to St. Anne's and the Royal Dublin golf courses and their Green-keepers for access, assistance and knowledge of the island and wildlife that they imparted freely.

Finally, I would like to thank the Herpetological Society of Ireland committee for their support.

1. Introduction

North Bull Island, a 5km long, 800m wide island located in Dublin Bay, is a recognised area of international importance within the core zone of the newly designated UNESCO Dublin Bay Biosphere Reserve. It also has Ramsar Site status among other European and national designations. The island has both public (1,318 ha) and private ownership (118 ha), with the majority being a public park managed by Dublin City Council (DCC). The island comprises extensive areas of fixed coastal dunes with herbaceous vegetation, humid dune slacks and man-made amenity grasslands with a number of natural, ephemeral and artificial, permanent water bodies (McCorry and Ryle, 2009). This diverse landscape offers an ideal mosaic of habitats for the two species of native Irish herpetofauna that are currently known to inhabit the island; the common frog (*Rana temporaria*) and the common lizard (*Zootoca vivipara*) (Gandola et al. 2014). The preliminary study in in 2014 provided evidence that the common frog is the more abundant and widespread of the two species. However the timescale and means by which these species colonised the island remain obscure (Gandola et al. 2014). With anthropogenic demand and disturbance on the island on the increase, the continued monitoring of these insular populations, to determine their response to this human activity and pressure, should be remain a priority.

1.1 Publicity/Volunteer Recruitment

The Herpetological Society of Ireland made huge efforts to publicise and promote the North Bull Island 2015 survey in order to i) recruit volunteers to assist with the surveying and fieldwork and ii) create awareness of North Bull Island and its potential reptile and amphibian diversity and the threats to their continued existence in the islands various ecosystems.

The North Bull Island survey was advertised specifically online via social media; Facebook and Twitter and at public events (for a list of events and advertisements see Appendix). The Dublin University Zoological Society (Trinity College Dublin) were specifically approached due to the nature of their membership and their working relationship with the H.S.I to date.

2. Methodology

Surveying was conducted from late February until the end of October 2015 in accordance with the project protocols. The methodology employed was modified from that used in 2014 (Gandola et al. 2014) to specifically to maximise the efficiency of the monitoring surveys. Non-invasive, DNA samples were also collected from a number of individuals of common frog to conduct a preliminary investigation into the genetics of the frog population on the island. This analysis formed part of a final thesis for a student undertaking an MSc degree at Trinity College Dublin. All surveying work was carried out under license from NPWS.

2.1 Field Surveying

All surveying was conducted out in accordance with the mixed methods protocols recommended in Sewell et al. (2013). The techniques used in detecting reptiles and amphibians were standard methods utilising nocturnal and diurnal visual encounter searches and searches of suitable terrestrial refugia and artificial cover objects, both man-made and natural. All survey work was carried out by an experienced surveyor with either the assistance of a team of volunteers or at least one other person. All sightings of a focal species were recorded on a Garmin 60CSx GPS unit or suitably equipped smart phone.

Due to the nature of the habitat on North Bull Island, and in line with the 2014 survey, we deemed that a minimum of twelve survey occasions be conducted, ideally, spread over a period spanning February to September. This number was based on the low

detection rates from 2014, particularly for the common lizard, and that marginal habitat should have a higher survey effort (Sewell et. al 2013). It also allow provided a standardised minimum survey effort. A direct benefit of such a high number of surveying occasions also allowed for multiple opportunities for volunteer participation while also allowing for any non-detection of a species to be interpreted as a true absence on the island with a degree of confidence (Sewell et. al 2013). The initiation of the surveying period began slightly earlier (approximately 3 weeks) at end of February compared to 2014 in order to maximise encountering spawning adult frogs.

Permits and Permissions

Permissions from the two golf clubs (St. Anne's Golf club and the Royal Dublin Golf club) on the island were obtained in order to install and check net traps. The main project surveyors (RG and CE) obtained all relevant licenses from the National Parks and Wildlife Service.

Survey techniques

Amphibians

Common frog (*Rana temporaria*)

Nocturnal and diurnal visual encounter surveys were conducted at all permanent and ephemeral water bodies to detect individuals and spawn clumps. Counts of encountered individuals and spawns clumps were made as were sightings of tadpoles. Water bodies were surveyed on multiple occasions as per Dingerkaus et al (2011).

Smooth Newt (*Lissotriton vulgaris*)

Nocturnal and diurnal searches of permanent and ephemeral water bodies and of natural and artificial cover objects were employed for detection of individual newts.

DNA collection and genetic analysis

Non-invasive, dermal swab samples were collected from adult frogs. Frogs were captured by hand. MW100 swabs were rubbed over the dorsal and ventral skin surfaces to collect a DNA sample. The swab tip was stored in 70% etOH. Where large

numbers of tadpoles (>100) were present a mixture of both swab and whole individuals were collected (max. of 10 individuals) and stored in 70% etOH. All subsequent extraction, sequencing and alignment analysis was conducted by Meg Doyle at TCD. Shed skins from common lizards were also collected opportunistically when encountered as they have been shown to be an excellent source of DNA from a natural, non-invasive source (Horreo et al. 2015).

Reptiles

*Common Lizard (*Zootoca vivipara*)*

Diurnal searches along the dunes were undertaken using existing trails as 'surveying routes'. Searches of man-made and natural refugia were conducted. Artificial Cover Objects (ACO) (n = 30, 1m x 1m felt sheets) were again employed for the purpose of this survey. ACOs stolen or badly weathered from the 2014 survey were replaced and installed in appropriate vegetated dune/golf course margin areas prior to the beginning of the survey season so as not to cause disturbance and to maximise the chances of them being utilised by the lizards as basking spots/refugia. The location of some ACOs were changed for 2015 (Figure 1.). This was to allow surveying to be conducted in what we deemed to be better habitat and also to limit the number taken/moved by people using the dunes.

Statistics

Appropriate descriptive statistics were performed in Microsoft Excel[®] on the resulting dataset.



Figure 1. The location of the artificial cover object (ACO) array on North Bull Island (yellow dots indicate an individual ACO)

3. Results

A total of two (2) nocturnal survey occasions for amphibians were conducted over the period spanning February to October 2015 with a total of twenty (20) diurnal surveys conducted for the amphibians and the common lizard. The low number of nocturnal surveys was a direct result of insufficient numbers of volunteers to fulfil insurance criteria (min. of two people). Also, nocturnal surveys for frogs are not paramount as records of their presence can just as easily be detected for most of the survey season during diurnal surveys e.g. sightings of spawn clumps, free swimming tadpoles etc. The protracted survey season in 2015 was a direct result of the mild start to autumn with temperatures remaining well within the activity range for common lizards. We endeavoured to continue surveying until we failed to encounter any lizards on three consecutive surveying occasions, indicating that they had retreated for hibernation.

3.1 Amphibians

Common frog (*Rana temporaria*)

Nocturnal and diurnal visual encounter surveys in water bodies have reconfirmed that there is a large, viable population of common frogs present on North Bull Island. All life stages were detected throughout the survey period; spawn, tadpoles, new metamorphs, yearlings and adult animals were encountered.

The North Bull Island frog population utilizes several permanent and ephemeral water-bodies as breeding/spawning sites across the island, with the 'rough' areas on the both golf courses, the Bull Wall reed marsh and the Alder Marsh comprising the majority of their terrestrial habitat (Figure 2). Counts of spawn clumps, tadpole and the observed number of newly metamorphed individuals indicate that this is likely to be a relatively healthy, stable population.

Smooth Newt (*Lissotriton vulgaris*)

Both nocturnal and diurnal searches of permanent and ephemeral water bodies and searches of terrestrial refugia failed to detect the presence of smooth newts on the island. It is unlikely that smooth newts occur on North Bull Island unless they occur in particularly low numbers.

3.2 Reptiles

Common lizard (*Zootoca vivipara*)

Diurnal searches along the dune slack system resulted in 131 confirmed sightings of *Z. vivipara* (Figure 2) with the last sighting on an individual on the 22nd October. This reconfirmed presence of common lizards on the island builds upon the single sighting in 2014. All life stages (juveniles, immature, adults) were detected during the surveys. The first and last individuals were encountered on the 1st May and the 22nd October, respectively. Significantly more encounters with lizards were associated with the artificial cover objects ($p = 0.008333$, 95% CI). Association was defined as sightings of lizards on top of, or underneath an ACO. Specifically, total counts of lizards associated with ACOs were 5.5 times greater compared to individuals encountered during visual encounter surveys alone. The majority of lizard sightings were of this year's juveniles ($n = 77$, 95%), with the first sighting on 6th August. These sightings coupled with sightings of adults and yearlings provide definitive evidence that there is a breeding population and ongoing recruitment on NBI.

We also acquired sufficient information on 16 (5 females, 11 males) non-juvenile individuals that we now have the basis for a photographic identification database which can be added to in future years and whereby future sightings can be used to eventually approximate the population size on the island (Figure 4).



Figure 2. Map showing the locations where the common frog (green) and common lizard (red) were encountered on North Bull Island.

3.3 Preliminary genetic analysis

Common frog

Preliminary genetic analysis focusing in the cytochrome-b (*cyt-b*) gene revealed that the haplotype present for the common frog on NBI is shared with populations on the south side of the city (Figure 3). Although this work was preliminary and limited in resolution it does indicate that there is high genetic diversity and admixture within the greater Dublin area (see Doyle 2015) with Tolka Valley Park, Swords and two populations sampled from Howth exhibiting different haplotypes to that found on North Bull island and in the south of the city.

The significantly higher numbers of lizard sightings in 2015 was surprising. However the increase in encounters seems to be largely driven by association with the ACOs. These artificial refugia could mitigate disturbance caused by ‘off lead’ dogs. They also provide thermoregulatory benefits as the covers act as a solar panel, heating up quicker and staying warmer for longer, and in doing so reduce the amount of time an individual lizard may spend exposed to avian predators while basking. The boundary with St. Anne’s golf course has again been identified as an important location for common lizards. The two observations of juveniles to the south of the visitors centre, along the boundary with the Royal Dublin golf course suggest that the lizards are utilising the habitat differently on that part of the island. This may be due to the much higher levels of human traffic.



Figure 4. Adult male (l) and female (r) *Z.vivipara* on North Bull Island

5. Conclusions and Recommendations

The 2015 monitoring project has been very successful in terms of data collection on the status of native herpetofauna on North Bull Island. Our study also shows the benefits and importance of multi-year monitoring programs for a proper determination on status of a species compared to 'one off' surveys. We highly recommend a continuation of the monitoring project on NBI in 2016. We further recommend that future studies increase the numbers of ACOs used in the monitoring and extend their placement towards the north end of the Alder Marsh and into the middle of the dune slacks between the visitor centre and the Bull Wall Reed Marsh.

Based on our observations, parts of North Bull Island continue to provide a highly suitable environment for the two species of native herpetofauna that we encountered during this survey. However we reiterate that if certain management protocols were put into place, particularly in relation of dog control, we suspect that proportion of the island utilised by the common lizard would increase dramatically particularly in the area of the Bull Wall reed marsh.

We welcome the new volunteer ranger initiative outlined by DCC and hope that improved visibility of rangers on the island will limit dog fouling and destructive behaviours on the island. We also posit that improved habitat management be revisited in conjunction with NPWS and discussion invited on the use of 'net gain' methods such as invigoration of the Irish hare (*Lepus timidus hibernicus*) population on the island and the creation of scrapes for water retention, particularly in the Alder marsh. These interventions would allow a more natural management of the habitat. Failing that, a prudent intervention may be to fence off a number of plots (200-500m²) throughout the dune slacks thereby creating exclusion zones for wildlife free from disturbance. We also recommend that the golf courses be encouraged to use the least harmful fertilizer available, in order to keep the available water sources as viable locations for common frog spawning, tadpole growth and metamorphosis (Baker et al 2011), and that intensive management of Sea Buckthorn (*Hippophae sp.*) continues.

6. References

Baker, J., Beebee T., Buckley, J., Gent, A. and Orchard, D. (2011) Amphibian Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

Doyle, M. (2015) Genetic analysis of urban frog (*Rana temporaria*) populations in Dublin City – the role of civilian translocations in assessing their success, and effective habitat creation. Unpublished MSc. thesis. Trinity College Dublin

Edgar, P., Foster, J. and Baker, J. (2010) Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth

Gandola, R., Ennis, C. & Doyle, M. (2014) Evaluation of the Status of Native Herpetofauna on North Bull Island, Dublin. Final Report to Dublin City Council

Horreo, J. L., Peláez, M. L., & Fitze, P. S. (2015) Skin sheds as a useful DNA source for lizard conservation.

McCorry, M and Ryle, T. (2009) North Bull Island Management Plan. Dublin City Council

Sewell, D., Griffiths, R.A., Beebee, T.J.C, Foster, J & Wilkinson, J.W. (2013) Survey protocols for the British herpetofauna Version 1.0

http://www.narrs.org.uk/documents/Survey_protocols_for_the_British_herpetofauna.pdf.