

A curious distributional shift of hedgehogs in a London Park

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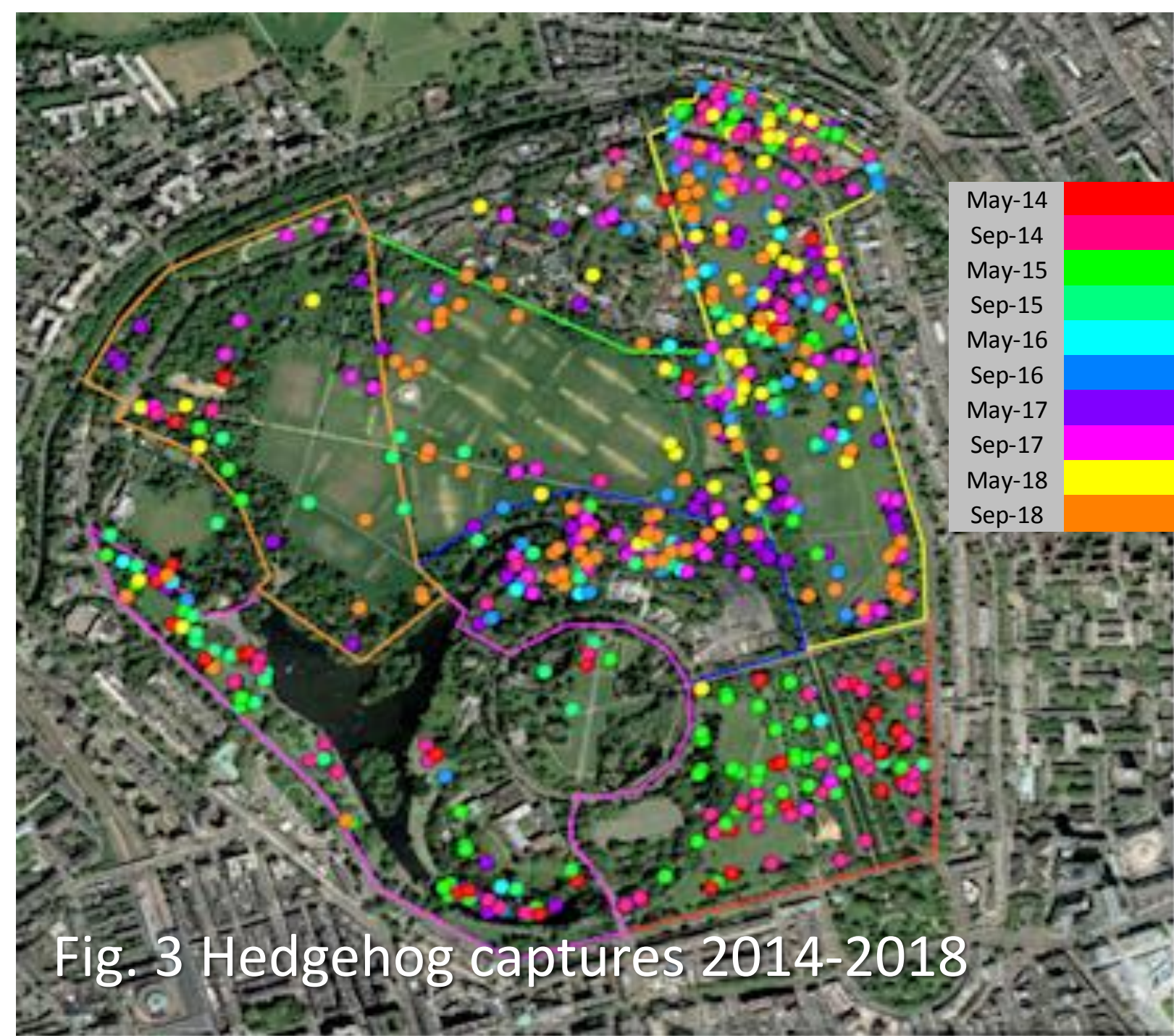
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Background The Regent's Park (166 ha) in central London is home to a small and isolated population of hedgehogs. To get a better understanding of the conservation status of this population, volunteers have carried out spring and autumn spotlighting surveys across the park since 2014. One finding from these surveys is that the distribution of hedgehogs in the park has been patchy. Moreover, there has been a noticeable shift in the distribution of hedgehogs during the survey period. Here we describe this distributional shift and speculate as to why it occurred and what may happen in the future.

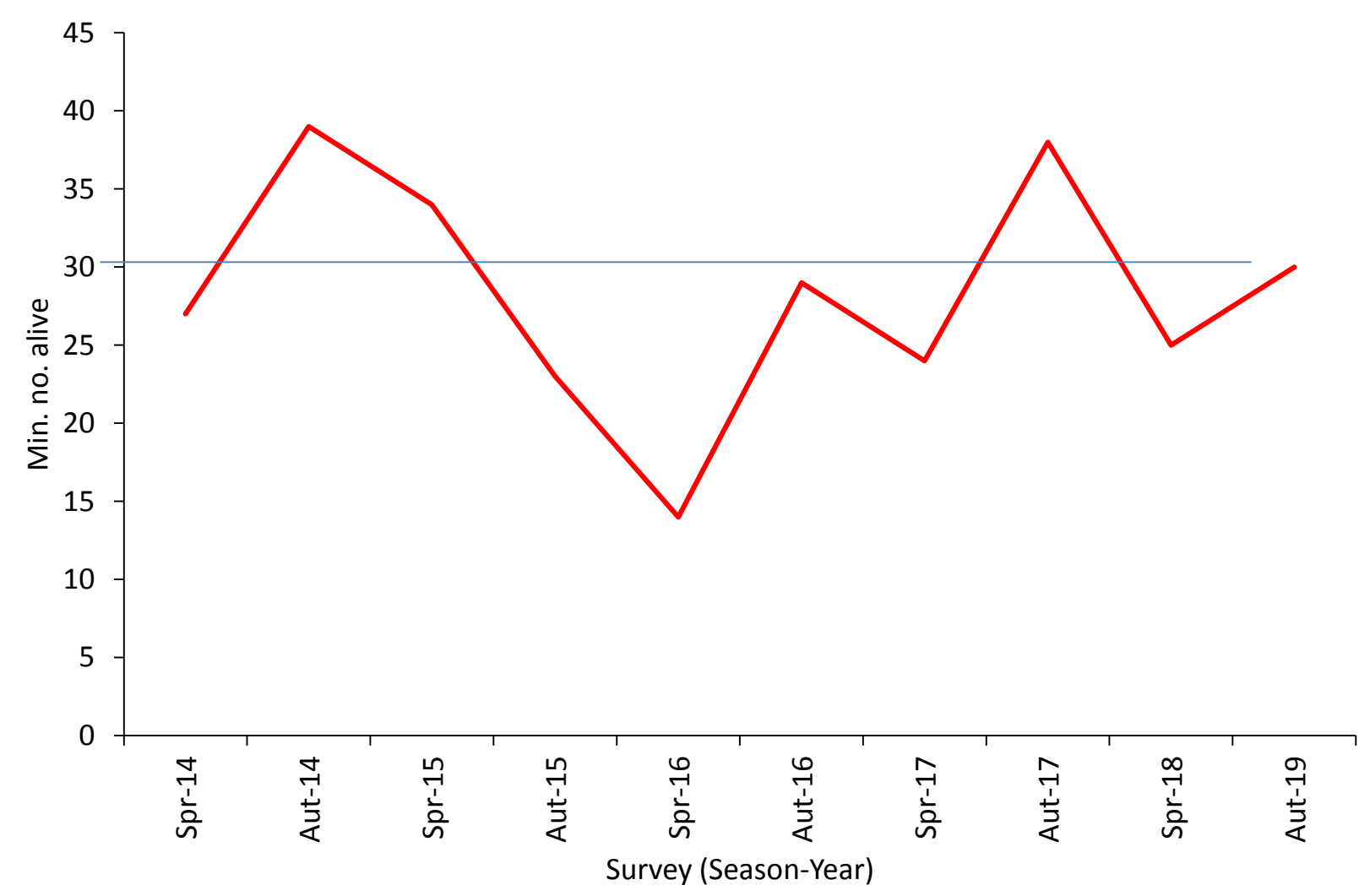
Surveys At the start of the study, the park was divided into seven approximately equal survey zones to standardise survey effort (Figure 1). In May and September of each year between 2014 and 2018, groups of 4-6 volunteers followed predetermined routes around each zone for a set amount of time during two consecutive Friday nights using torches and thermal imaging cameras. Captured hedgehogs were weighed, sexed and individually marked with 6 uniquely numbered plastic spine sleeves (Reeve *et al.* 2019). The position of each hedgehog found was determined using a hand-held GPS tracker and marked on a map.

Numbers of hedgehogs 2014-2018 Overall, numbers of hedgehogs captured were small averaging 27 individuals across all surveys (Figure 2). However, there was a dramatic decline between autumn 2015 and winter 2015-2016 leading to very small numbers captured in spring 2016. Thereafter the population recovered to 2014 levels by 2017.



Distribution of captures 2014-2018

Over the study period, hedgehogs have been captured across the park, but there has been a noticeable difference in their distribution each year. In 2014, three 'hotspots' were identified: Zone 1, Zone 5 and Zone 2 (Figure 3). By 2018, Zones 1 and 5 were no longer favoured with most captures occurring in Zones 2 and 4 (Figure 4). Over time there has been a small increase in numbers in Zone 3, which mainly consists of sports pitches. Few hedgehogs were found in Zone 6 across the study. Also of note is the consistently large number of captures in the Zoo Car Park (2.9 ha of which 0.9 ha is hard standing) in the north-eastern corner of the park. The reasons for this 'local hotspot' and the uneven distribution across the park generally remain unclear (Gurnell *et al.* 2018).



Distribution of individuals Autumn 2015-Autumn 2016 The critical change in the distribution of hedgehogs occurred at the time as the population downturn in 2015-2016 (Figures 2 and 4). To follow the changing distribution during this period more closely, the centres of capture locations of individuals in the autumn of 2015, and the spring and autumn of 2016 are shown in Figure 5. In autumn 2015, individuals were widely spaced across the park. By spring 2016, just two animals were found in Zone 5 to the west, and one in Zone 1 in the south east – all females. Just two males were captured, in the centre and north east of the park. It is noticeable that the recovery in numbers by Autumn 2016 also occurred mostly in the centre (Zone 4) and east (Zone 2) of the park, with the west and the south doing poorly. This distribution has continued through to 2018 although unusually, there have been several captures along the northern part of Zone 3 in 2018 suggesting possibly some movement back towards the west (Figure 3).

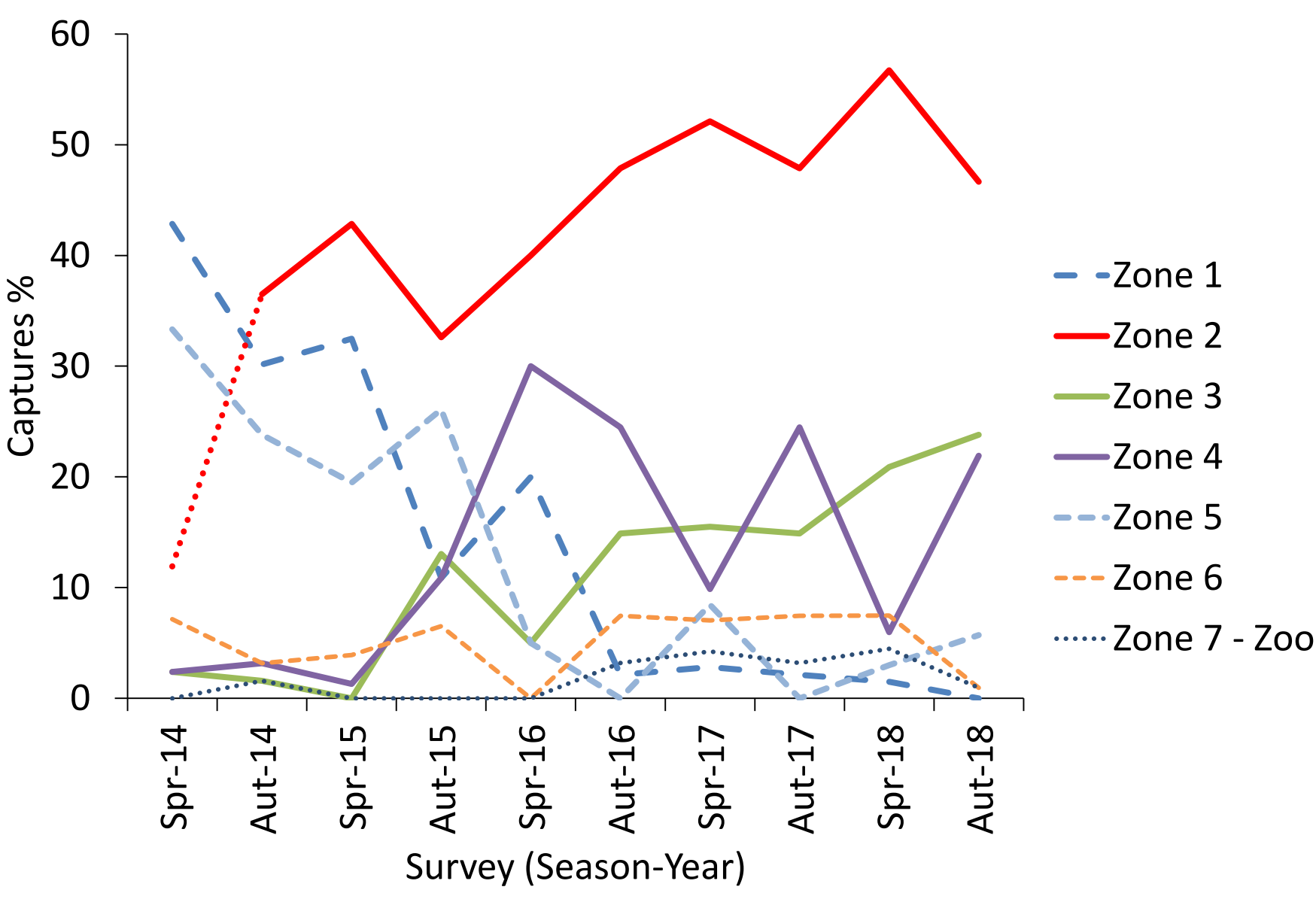


Fig. 5 Location of individuals captured Autumn 2015 to Autumn 2016

Fig. 4 Per cent captures in each zone. Zoo Car Park not surveyed in spring 2014 so numbers in Zone 2 are low for that survey.

Conclusion

- The marked decline in numbers in 2015 resulted in just 11 hedgehogs which were widely dispersed across the part in spring 2016. Only two adult males were captured in the centre and north east of the park (Figure 5). Noticeably, there were few or no animals in former 'hotspots' to the south and east, Zones 1 and 5 – effectively these 'local' populations had gone extinct.
- After the population low, numbers increased in the centre and north east of the park with a few scattered individuals elsewhere. This pattern has been maintained through to 2018, possibly with some recent evidence of movement back towards the west but not the south.
- Limited availability of mates in the south and west may partly explain why the recovery has not occurred throughout the park, although resource availability, fox predation and barriers to free movement (e.g. the lake, fencing, built structures) may also have been factors suppressing recovery in these areas.
- In the future, it will be interesting to see whether hedgehogs will recolonise all of the park, and if they do, how long it will take.
- These events clearly demonstrate the vulnerability of the population to demographic stochasticity and a patchy distribution.

Acknowledgements

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