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PREDATION OF THE SAND LIZARD *LACERTA AGILIS* BY THE DOMESTIC CAT *FELIS CATUS* ON THE SEFTON COAST

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ABSTRACT

The predation of the sand lizard *Lacerta agilis* by the domestic cat *Felis catus* is considered. Evidence to support the predation of the former by the latter was obtained from behavioural literature on the domestic cat; data derived from tracking radio-tagged cats and anecdotal information from questionnaires of cat owners. Radio-tagged cats were observed hunting in *L. agilis* colonies and potential habitat. Tracking showed that more than one cat hunts at the same *L. agilis* colony and that cats travelled significantly faster when moving outside colonies than within them and made more stops within colonies than outside them. Tagged cats also return to precise locations on their hunting routes. The degree of compactness of a *L. agilis* colony was considered in relation to the level of cat predation at that site, and showed that cats were more likely ($p<0.05$) to visit colonies with a compactness ratio of <0.675 (where 1 is a perfect circle), implying that lizards within such colonies were more susceptible to predation. Questionnaire data shows that 5.7 per cent of the cats surveyed at Hesketh are known to have caught lizards within the last year and that 67 per cent of the cats from the questionnaire were regular visitors to Hesketh golf course. There is a high proportion of cats of 'suitable' hunting age per number of households that live in close proximity to a known *L. agilis* colony or potential habitat. Cat outdoor activity strongly correlates with *L. agilis* activity. There are cats in the Hesketh locality of feral background and which are un-neutered. Behavioural literature suggests that despite being fed by their owners a cat's urge to hunt is not suppressed. Literature also suggests that cats can become specialist hunters potentially capable of depleting an entire prey population. The maps denoting the lizard colonies and the routes of the radio-tagged cats are not included for reasons of confidentiality. Management proposals are offered. A comprehensive reference list is provided for future workers.

Introduction

L. agilis belongs to the order Squamata, sub-order Lacertilia, family Lacertidae and genus *Lacerta* (Smith, 1951). It has been reported as the most threatened native species of reptile in Britain (Corbett, 1989). As a result of population decline over the last thirty years it acquired protection through the Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') of 1979. It is also protected by Schedule 5 of the Wildlife and Countryside Act 1981 and more, recently, through the European Union's Habitats and Species Directive of 1992, and the Conservation (Natural Habitats &c.) (Amendment) Regulations 1997. Continuing threats to *L. agilis* have warranted its inclusion in English Nature's Species Recovery Programme, which began in 1994.

Today the species only occurs naturally in scattered populations in Dorset, Surrey and Merseyside (English Nature, 1996). The principal reasons for *L. agilis* decline are documented as being habitat loss resulting from building developments and golf course construction (Stafford, 1989), habitat fragmentation through conifer afforestation with the increasing number of associated fires (Cooke, 1994) and a less favourable climate (Jackson, 1979). Consequently, today only an estimated 2100ha of dune survives of an area which once exceeded 3000ha (Doody, 1991). The Sefton Coast, 32km in length, lies between Southport and Seaforth, bordering the Irish Sea, and is home to the Merseyside *L. agilis* population in northwest England.

The Sefton Coast *L. agilis* population is at the northern limit of its natural range in Britain. It is of particular conservation value, partly due to its isolation by some 300km from the English south coast population. Consequently, this may have resulted in genotypic as well as phenotypic divergence (Beebee, 1978). Nicholson (1980) found that climatically the north west was no more suitable for *L. agilis* than other parts of England where it does not occur. This observation suggests that there are other factors influencing the survival of the northwest *L. agilis* population.

Prestt et al. (1974) discuss *L. agilis* populations in the north west before 1930; figures are estimated at 8000–10,000. Jackson and Yalden (1977) estimated that the population had declined to just a few hundred. More recent figures for *L. agilis* populations in northwest England are reported by Corbett (1994) as being 255 natural and 305 if including the reintroduced individuals. The Nature Conservancy Council (1986) state that 'In the 30 years up to 1974, 92 per cent of the known *L. agilis* colonies in the area have been lost' (NCC, 1986, 169).

Although Jackson (1979) acknowledges the human causes of the decline of this species she also points out that the species has disappeared from many areas still supporting a dune habitat. This suggests that there may be other factors responsible for decline, such as predation, potential inbreeding depression resulting in lower fecundity, eggshell thinning and proliferation of recessive alleles. Predation of *L. agilis* by ground beetles has also been suggested. There is also the issue of diseases and parasites, as mentioned by Smith (1951), which may be contributing to the decline of the species. In addition, predatory birds such as the kestrel *Falco tinnunculus* and the magpie *Pica pica* are potential predators of *L. agilis*. Simms (1966) talks of adult *L. agilis* being major predators on their young. The increasingly stable sand dune habitat is also an important constraint on sand lizard survival.

Losses also occur during hibernation. The Nature Conservancy Council (1986) report that figures for one Lancashire site show that for both Lacertid species, roughly one third of juveniles failed to survive hibernation, while another third of survivors had died by early summer.

However, in the light of the literature and the findings of this study, it appears that the potential threat of predation by domestic cats is very strong. Fox, a British predation biologist, reports (1997) that domestic cats slay 210 million birds and animals a year – almost 80 per cent of all wildlife killed – and maim a further 42 million. He also states that domestic cats are driven to catch prey, no matter how well fed they are. Llewellyn Smith (1997) notes that, on small islands, cats have wiped out entire species.

The relationship between the decline of *L. agilis* on the Sefton Coast and the introduction of *F. catus* has, until recently, been overlooked by the scientific community. Corbett (1994) in his 'Pilot study for sand lizard species recovery programme' was one of the first to acknowledge that cat predation may be a cause of decline. English Nature (1992) also mention cat predation from urban fringes but there is no evidence cited. McDonald (1997) conducted a preliminary investigation into the potential threat to *L. agilis* of predation by domestic cats, concluding that there was indeed a potential threat of predation. Our study aimed to determine further whether the accelerating decline of *L. agilis* is a consequence of predation by the domestic cat (*Felis catus*), by radio-tagging the cats to determine their foraging excursions, and to see whether these foraging excursions encroached on known and potential *L. agilis* colonies. Finally, an assessment of the demography of the cat populations adjacent to the *L. agilis* colonies was conducted using questionnaires, to make inferences about the scale of the potential threat the resident cats posed.

Leyhausen (1979), Laundre (1977) and Liberg (1980) have observed hunting grounds, which cats regularly use within their home ranges, implying a degree of permanency. Bradshaw (1992) states that home ranges of adult males are usually much larger than those of adult females.

Turner and Meister (1988) discuss how cats hunt in areas that are different from the surrounding habitat. These include clearings, for example, where there may be increased chances of finding prey. They mention that a cat may travel directly to such a place. Numerous studies have shown that domestic cats can become specialized predators (Heidemann and Vauk, 1970; Lups, 1972; Tabor, 1986). However, Turner and Meister (1988) write that they are unaware of any field data demonstrating the existence of prey specialization. Experimental studies on captive cats have indicated that early experiences with a particular prey type or diet influence later behaviour and preferences (Caro, 1980). Turner and Meister (1988) believe that the prey brought to kittens by their mothers may influence prey specialism. They state that cats have an excellent memory for locality and will often return to the precise location of an earlier capture days or weeks later. This implies that a cat may potentially exhaust an entire prey population.

Inselman and Flynn (1973) found that folliculin increased the readiness of female cats to catch prey in the laboratory while other sex hormones inhibited it. Leyhausen (1979) reports that cats catch considerably more prey when they have young. Turner and Meister (1988) briefly discuss the effects of neutering on the hunting behaviour of both male and female cats. They report that neutered cats do catch, eat and bring home prey, but point out that as far as they are aware, no field study has compared hunting activity of cats of either sex before and after neutering.

Predatory behaviour in domestic cats is reported by Bradshaw (1992) and Leyhausen (1979) to be disconnected from hunger. Turner and Meister (1988), however, report that well-fed house cats may typically hunt for up to a quarter of each day, while feral (un-fed) cats can spend twelve out of every 24 hours searching for food. Similarly, Biben (1979) showed that although cats engage in some predatory behaviour whether hungry or not, the tendency to kill increases with hunger. Although the intensity of hunting may vary, therefore, there is no doubt that cats will engage in at least some hunting irrespective of hunger.

Coleman et al. (1997) report that extensive studies of the feeding habits of free-ranging domestic cats over 50 years and four continents indicate that small mammals comprise approximately 70 per cent of cats' prey while birds make up 20 per cent. They also found that the diets of free-ranging cat populations reflect the food locally available. Brooker (1977) recorded 78 of the small dragon lizard *Tympanocryptis lineata* and 24 other reptiles in just 9 cats from the Nullarbor Plain in Australia. Brooker also recorded a larger proportion of reptiles than mammals in the guts of cats. Clearly domestic cats are predators to lizard species in areas of the world such as Australia and North America. The literature reviewed so far implies that the domestic cat is a likely predator to the Sefton Coast *L. agilis*.

Method

In order to investigate the Hesketh cat population, it was necessary to distribute questionnaires to those houses surrounding the golf course. The design of the questionnaire is explained in Table 1.

Radiotracking

As Kenward (1993) states, 'biologists use animal radio tags for two main purposes: to locate study animals in the field, and to transmit information about the physiology or behaviour of wild or captive animals'. Custom-built, collar-mounted radio tags were fitted to suitable domestic cats, i.e. those living near to suitable *L. agilis* habitat. The tag comprises a single-stage transmitter, powered by a TW3.5 AA battery (3.5 volts),

Table 1. Explanation of questionnaire design

Required information	Questions to be used
Whether the household owns a cat or not	Do you own a cat? If so, how many?
The sex of the cat (as research has indicated that females are more avid hunters)	Is it male or female?
The age of the cat (research suggests that younger cats are more active predators than older cats)	What is its age?
Whether the cat is likely to be breeding	Is it neutered?
Approximate times when the cat will not be hunting, and whether the cat is used to a routine	What time(s) of day is your cat fed?
Times when the cat is most active, and whether this time coincides with expected *L. agilis* activity	How much time does your cat spend outdoors?
Whether the cat is a specialist hunter or not	Has your cat ever brought lizards back? If so, how often? Are catches concentrated within one season?
The likely foraging route of the cat: does this encroach potential or known *L. agilis* habitat?	Do you know where your cat goes when out of the boundaries of your home?
Whether the owner is willing for their cat to be radiotracked	Would you be prepared to allow your cat to be radiotracked?

with a magnetic on/off switch supplied by Biotrack Ltd. The tag transmits pulsed signals at a frequency of 150 MHz, which are detected by a portable M-57 (Marinar radar) receiver, attached to a 1m, three-element Yagi antenna.

Tracking took place between May and the end of September to cover the period of greatest activity of *L. agilis*. Tracking was conducted on warm dry days as both cats and *L. agilis* are known to be less active during rainy, cold periods, and also in unusually hot conditions. Tracking in the dune habitat proved difficult because of signal reflection and diffraction and typical triangulation methods for identifying the tagged cats' positions were not always applicable. Non-triangulation methods proved more successful and involved obtaining positional data by following the transmitted signal's increasing strength until the instrumented cat was actually observed. The only disadvantage of this 'homing' technique was its time-consuming nature. The cat's location was then marked on a 1:2,500 map of the area. To overcome problems of locating the animal's position on the map a Garam hand-held Global Positioning System was used. Locational readings were taken every five minutes. Caution was required when following the cat as it was desirable that the cat was unaware that it was being observed, and thus behaved naturally.

Big Balls Hill at Ainsdale was the focus of tracking between May and mid-August. Hesketh golf course cats were tracked in September. Tracking was attempted 3 times per week over a period of 24 weeks. This amounted to 72 tracking attempts. Of these, 22 attempts were abandoned due to unsuitable weather conditions, e.g. rain or intense sunshine, and 11 due to the fact that the tagged cats were locked in their homes. In addition, the data from a further 8 tracking attempts were omitted because the tagged cat's signal was lost for two or more consecutive readings (or a period of ten minutes). Other circumstances accounted for the failure of a further 6 tracking sessions. On these bases, of the 72 attempts, only 25 were successful, a success rate of 34.72 per cent.

These data were digitized using MapInfo Professional. The maps created combined aerial photographs that depicted individual cat-owning houses with *L. agilis* colony information and the radiotracking data. It was then possible to calculate cat journey distance and approximate time spent within each *L. agilis* site.

The area and perimeter of the *L. agilis* colonies/potential habitats were measured to provide patch characteristics. Forman (1995) shows that an elongated patch is less effective in conserving its internal resources than a compact patch. This is because an elongated boundary provides a greater probability per unit area of movements across the boundary, in one or both directions. Further, in an elongated patch the ratio of the perimeter to the area is greater. Therefore, the edge is proximately closer to the 'centre' and so individuals in the 'centre' are more vulnerable to predation. Patch shape was investigated by examining the compactness ratio (c-ratio) using the software IDRISI program (after Eastman, 1992). The formula for this is:

$$C = \sqrt{\left(\frac{Ap}{Ac}\right)}$$

Where C = the compactness ratio (C-ratio)

Ap is the area of the colony

Ac is the area of a circle having the same perimeter as the polygon under consideration

Ac is derived using πr^2

A value of 1.0 indicates perfect compactness – a circle

The lower the value the greater the ratio of edge to area

The compactness of a specific colony is often more informative than measuring its area and is simply a ratio of a polygon's area and perimeter. Indeed, due to extreme topographical variability within and between colonies it would be erroneous to make comparisons between colonies based solely on their respective areas, without incorporating some measure of their topographical attributes.

Results

Questionnaire

Of the 120 households surveyed in Hesketh, 27 (22.5 per cent) were cat owners. It is important to notice that there were 36 cats to 120 houses. These cats are all housed adjacent to Hesketh golf course, and thus present a likely threat to the *L. agilis* population.

Based on information from conversations with cats' owners it was assumed that a domestic cat is likely to be hunting most actively between the ages of 2 and 12 years old. In accordance with this, the 33.3 per cent of the known Hesketh cat population which fell into the age category 3–10 years were targeted for radiotracking.

With regard to the daily activity of the sampled cats, 55.5 per cent were active outdoors in the morning, and 27 per cent were active outdoors in the afternoon. These findings coincide with *L. agilis* activity as the NCC (1983) have pointed out that *L. agilis* bask on warm sunny days, mainly in the mornings after emergence and during late afternoons. Furthermore, literature suggests that *L. agilis* become more active at higher temperatures, yet avoid intense heat (Langton, 1989; Stafford, 1989). Interestingly, tagged cats stayed indoors during periods of hot sunshine. Bradshaw (1992) mentions that cats can be flexible in timing their hunting, usually to coincide with the main activity periods of the most readily available prey. The implications from these similarities in behaviour indicate the potential threat to *L. agilis* by domestic cats.

Approximately 60 per cent of surveyed cats were fed early in the morning, even though, as mentioned above, 55.5 per cent were also active outdoors. This reiterates Bradshaw's (1992) findings that cats will start out on a hunting expedition immediately after consuming a meal provided by their owner. Therefore the regular feeding of domestic cats is no insurance against their predatory behaviour, emphasizing that *L. agilis* are just as much at threat despite cats being fed by their owners. Fewer cats are fed during the afternoon.

The percentage of cats known to visit Hesketh golf course regularly is approximately 67 per cent, and although data were not available for 23 per cent of the cat population in the survey, the close proximity of their homes to the golf course suggests that they too may utilize the site.

5.7 per cent of the surveyed cats have been known to catch lizards. It should not be assumed that the caught lizards were *L. agilis*. However, the cats' close proximity to the known *L. agilis* colony at the golf course suggests that there is a strong likelihood of the lizards being *L. agilis*, as opposed to common lizards, *L. vivipara*.

Data from interviews showed that cats at Hesketh frequently brought lizards back to the house. Cats were observed eating the lizards head-first and then omitting to eat the lizards' stomach and tail. Questionnaire data from Big Balls Hill, compiled by McDonald (1997), showed one particular cat to be a confirmed predator of *L. agilis*.

Behavioural observations of this cat support this view. It is most active outdoors during the morning and early evening (4–7 pm); it regularly catches lizards, identified as *L. agilis* (approximately 2–3 per week), and finally, its home location is adjacent to a *L. agilis* colony. Considering that cats can become specialized predators, as noted above, the potential threat to this colony is clear.

Radiotracking

The sensitive nature of the mapped data containing the *L. agilis* colonies and potential habitat, and the foraging routes of the radio-tagged cats, prohibits their inclusion in this book. However, Table 2 summarizes statistics from 25 tracking sessions, conducted on 5 cats.

The mean values are probably the most useful with regard to predicting the foraging behaviour of the tagged cats. During a typical foraging excursion, cats will cover a mean distance of 307.6m but only travel to a mean maximum distance from their home of 113.5m. This suggests that they actually take a sinuous outward or homeward route and thus cover a larger area. However, it may also indicate that *L. agilis* colonies further than the mean maximum distance from a cat's home will experience a lower rate of visitation. Surprisingly, during a mean foraging journey of 98 minutes, cats only stop 4.16 times.

One tagged cat was recorded travelling 760.6m during a foraging excursion over a 135-minute duration. The cat revisited the same location (at the boundary of a *L. agilis* colony) twice during this session and behaved in a manner typical of a hunting cat, i.e. taking cover in the grass, remaining motionless and then pouncing. The return of a cat to an exact location was also found by Turner and Meister (1988) and implies that the cat may have made a successful catch here in the past. As the cat owner has observed many lizards being brought home by the cat, this return to an exact locality suggests that the cat regularly hunts *L. agilis*.

Table 2. Summary statistics of foraging route characteristics for radio-tagged cats

	Distance of journey (metres)	**Duration of journey (minutes)**	**Maximum distance to furthest point (metres)**	**Number of times when stationary**
Total	7689.30	2300.0	2837.7	104.00
Minimum	79.50	25.0	40.0	0.00
Maximum	832.50	165.0	305.7	12.00
Mean	307.60	92.0	113.5	4.16
S.D.	228.70	52.3	79.4	4.70
Median	347.25	137.5	134.2	3.00

Table 3. The mean relative travel velocities of cats foraging within and outside L. agilis *colonies and suitable habitat*

	Within colony/ suitable habitat	Outside colony/ suitable habitat
Distance travelled (metres)	3025	5657
Duration (minutes)	1301 (<22 hours)	1149 (>19 hours)
Mean relative velocity (metres/hour)	135.5	295.4

Based on the measure of distance covered per unit time, the mean relative travel velocities of foraging cats were significantly higher when recorded moving outside than within *L. agilis* colonies/potential habitat (Table 3). Turner and Meister (1988) observed cats moving directly to known food sources, thus supporting this.

However, this may be an arbitrary measure when considering factors such as the degree of topographical undulation. It is apparent that the terrain outside the colonies is considerably flatter, comprising road networks, railway tracks, footpaths etc. Furthermore, not only do such features tend to be less undulating than habitat within the colonies, they are also often surfaced and are thus easier to negotiate.

Characteristics of *L. agilis* colonies and cat visitation

There are a number of attributes that each colony possesses which may make them more susceptible to predation. These include their proximity to local predators, their area, their perimeter and finally their compactness. The level of compactness (or circularity) of a sand lizard colony was investigated to see if it influenced the likelihood of visitation by a foraging cat. Assuming substrate and habitat homogeneity, a compact patch should theoretically be less susceptible to predation, due to the proximity of its perimeter to the 'centre'.

At Hesketh, the patches exemplifying least compactness include *L. agilis* sites 2, 3 and 7 (Table 4). Site 3 experienced particularly high levels of visitation. It is important to notice that the known *L. agilis* colony at site 4 has a higher compactness ratio (c = 0.721) than the least compact colonies at Big Balls Hill. Based on our knowledge of the hunting preference of cats for uncompact territories it may therefore be less susceptible to predation. The elongated nature of *L. agilis* sites 2, 3 and 7 implies that a strong 'edge effect' may be taking place. Raptors, cats, canines and other predators often focus their foraging on edges (Forman, 1995) and one would predict high levels of predation.

It was found that *L. agilis* sites 2–4 and 7–12 were the most compact at Big Balls Hill (Table 5). Therefore it could be suggested that *L. agilis* at these sites have a greater chance of survival than those at the less compact *L. agilis* sites in the area. For example, as *L. agilis* site 12 is the most compact of the sites at Big Balls Hill (c = 0.832), the *L. agilis* survival rate would be expected to be higher than at *L. agilis* site 6 (c = 0.447). Despite its small area (256.9m^2), it is 236.7m from the nearest cat-owning house and

Table 4. L. agilis *colony/potential habitat characteristics and cat visitation. Hesketh*

Colony number	Area (m^2) Ap	Perimeter (metres)	Compactness ratio $C = \sqrt{\left(\frac{Ap}{Ac}\right)}$	Distance to centre of colony from nearest cat house (metres)	Cumulative residence time of cats within each area (minutes)
1	1141	127.6	0.776	48.02	125
2	2741	268.1	0.705	72.52	45
3	3517	357.5	0.675	126.90	183
4	1998	230.1	0.721	127.40	116
5	4286	256.5	0.715	80.77	51
6	1895	184.6	0.742	232.50	10
7	2531	244.6	0.710	84.45	137

Table 5. L. agilis *colony/potential habitat characteristics and cat visitation. Big Balls Hill*

Colony number	Area (m^2) Ap	Perimeter (metres)	Compactness ratio $C = \sqrt{\left(\frac{Ap}{Ac}\right)}$	Distance to centre of colony from nearest cat house (metres)	Cumulative residence time of cats within each area (minutes)
1	12,280.0	549.10	0.664	67.25	189
2	808.9	129.80	0.794	169.50	25
3	339.0	72.94	0.822	207.10	0
4	1193.0	171.30	0.776	223.20	26
5	24,300.0	977.10	0.532	115.20	172
6	42,820.0	1584.00	0.447	230.60	156
7	8015.0	107.20	0.806	191.30	18
8	326.3	71.25	0.827	225.20	0
9	354.7	75.59	0.822	99.99	3
10	548.6	90.84	0.815	166.60	0
11	599.9	93.88	0.817	233.50	0
12	256.9	64.53	0.832	236.70	0

so survival rate at this colony may also be further enhanced. Interestingly, sites 3, 8 and 10–12 experienced no visitation by cats despite their proximity to cat-owning houses. Possibly, due to their relatively small areas of <600m^2 they may remain undetected by foraging cats. The least compact colonies include *L. agilis* sites 1, 5 and 6. The radiotracked cat hunted in all of these colonies. Their respective compactness ratios of c = 0.664, c = 0.532 and c = 0.447 imply that there may be a relationship between the degree of compactness of patch shape and cat visitation.

Indeed, analysis showed that cats spent significantly longer ($U = 4$; $p<0.05$) within the least compact colonies and close to their boundaries (Tables 3 and 4). However, potential *L. agilis* site 1 is a particularly compact site (c = 0.776), and radiotracked cats did visit this site almost as frequently as they did the others. Although this seems to contradict the previous finding, the close proximity to the cat's home offers an explanation for the cat focusing on the site, rather than the compactness of the site being the main influence. Furthermore, this site was also visited en route to other colonies. It may suggest that this potential habitat does indeed support a *L. agilis* population on which the cats are preying.

In summary, analysis of the length of time foraging cats hunted along the edges of potential colonies of varying compactness showed a significant preference for hunting along the least compact colonies. This may have important implications for the long-term management of these fragmented colonies, where relocation may prove to be the only option for the conservation of the species. However, cats also hunted at known colony sites with relatively high compactness ratios. This was a factor of the proximity of the colonies to the cats' respective homes. The focus of cat foraging at certain potential habitat sites may indeed indicate the presence of lizards at that site. Cats also made significantly more 'stops' within colonies than outside of them and travelled at significantly higher velocities outside than within colonies. Both observations suggest that the cats were foraging within the colonies.

Management proposals

Corbett and Moulton (1994–95) reported on management techniques to improve habitat for British *L. agilis*. They investigated the possibilities of linking the *L. agilis* colonies of Birkdale and Hillside, which has now been completed (Corbett and Moulton, 1995–96). Other possibilities include:

- The relocation of *L. agilis* from colonies that are most under threat of predation by cats. These threatened sites include Hesketh, Birkdale, and Ainsdale principally.
- Restrictions could be put on cats' freedom by keeping them indoors to eliminate unwanted reproduction, predation on wild animals and the spread of disease.
- De-clawing is an effective reducer of hunting success.
- Limitations on cat ownership could be introduced.
- *L. agilis* could be radio-tagged to monitor their daily activity, as well as to investigate their fates.

Summary

It is evident from the findings of this study that domestic cats do hunt in known *L. agilis* colonies and also hunt at sites that have been classed as potential habitat for *L. agilis*. It is also evident that cats return to precise locations within the *L. agilis* colony, behaviour that may indicate that a previous capture has been made there. Although it is likely that previous prey catches have included *L. agilis*, particularly as specific cats have been seen eating lizards by their owners, there is still no documented evidence that these lizards were *L. agilis* despite wardens having identified some lizards killed by cats at another site as *L. agilis*. Both field data and anecdotal evidence have shown that the domestic cat is a predator of lizards and there are many reasons cited and proposed that suggest these lizards are indeed *L. agilis*. Furthermore, the almost simultaneous decline of the *L. agilis* population on the Sefton Coast in conjunction with the growth of the human population (accompanied by an increased cat population) also supports this conclusion. However, despite the likely threat of predation imposed by the resident cat population, surely it is the loss of the dune habitat on which the lizards depend, which has been caused by the increased human population, that will ultimately lead to their demise.

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A comprehensive reference list is provided for future workers.

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