Damage to Longworth live-traps by shrews

Wim H.M. van Boekel

de Westerd 12, NL-9321 AK Peize, the Netherlands, e-mail: wvanboekel@home.nl

Abstract: New Longworth live-traps were used for monitoring the small mammal population in the Dutch De Onlanden Nature Reserve. In the last two years of this monitoring programme large numbers of common shrews (*Sorex araneus*) and water shrews (*Neomys fodiens*) were captured. It was found that these shrews caused extensive damage to the trap doors and to the hole in the side-wall of the tunnel-part of the traps. The damage was the result of shrews gnawing at the metal. Both shrew species caused such damage, although the larger water shrew most likely caused more damage than the common shrew. The lifespan of Longworth live-traps is greatly reduced when used in field situations with high shrew densities.

Keywords: Longworth live-trap, common shrew, *Sorex araneus*, water shrew, *Neomys fodiens*, damage to live-traps.

Longworth live-traps are widely used for capturing small mammals in field situations. The traps are known to be reliable, easy to use and durable. In De Onlanden Nature Reserve, in the northern part of the Netherlands, Longworth live-traps are used for monitoring the small mammal population (van Boekel 2013). In 2012 and 2013 large numbers of shrews were caught in these traps and it became apparent that these shrews were able to cause serious damage to the traps. Here this damage is described.

The monitoring of the small mammal population of De Onlanden started in 2009 and is ongoing. Each year, during the spring-summer season (May-September), 60 Longworth live-traps are used to capture small mammals throughout the study area. The same traps are used every year and are not used for field work elsewhere. The traps were new at the start of the study. The traps are filled with hay and food (carrot and mealworm larvae), and are always checked every twelve hours during three nights of trapping at each field location (van Boekel 2013). Each year, nine or ten field locations are sampled, so each trap is used for 27 to 30 nights per year.

In 2012 the biotope of the study area changed within a few months from a relatively dry environment dominated by grassland into a marshland. This was due to De Onlanden being transformed into a water containment area. During the 2009-2011 period, before the biotope change, a total number of 930 small mammals (including recaptures) were captured in the Longworth live-traps. In the two years after the biotope change, 945 small mammals were captured. Figure 1 shows that after the biotope change shrews made up a higher proportion (87.3% of the total) of the mammals captured in the Longworth live-traps, than in the period before the change (43.9% of the total). This increase was mainly due to far larger numbers of water shrew (*Neomys fodiens*) being captured in the latter period. After the biotope change, there was a strong decrease in the numbers of voles and mice captured.

In the two year period after the biotope change, damage to the Longworth live-traps as a result of them being gnawed by the inhab-

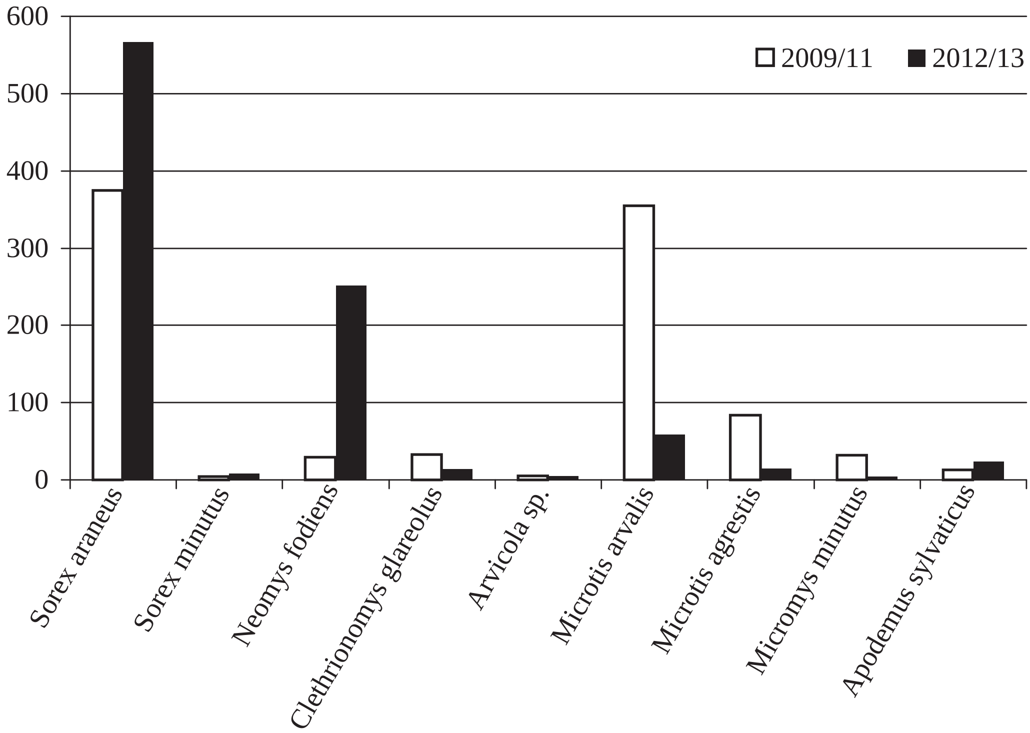

Figure 1. Numbers of small mammals captured in the Longworth live-traps before (2009-2011) and after (2012-2013) the biotope change in De Onlanden Nature Reserve; data include recaptures.

itants became apparent. Close inspection revealed that all the traps showed clear signs of gnawing. The damage occurred mainly on the trapdoors that had been gnawed at on all edges, sometimes to the extent that holes were made in the door. The size and form of the markings in the metal of the door indicated that this damage was caused by shrews. Figure 2A shows the largest hole found in the trapdoors, before and after two common shrews (*Sorex araneus*) had spent time in captivity in this trap. Their gnawing enlarged this hole considerably. This clearly shows that this relatively small shrew species is able to do serious damage to the aluminium trapdoors. The larger and stronger water shrew will be able to cause even more damage. Figure 2B shows gnawing marks on all edges of the trapdoor. It also shows that the shrews used the protruding parts of the trapdoor mechanism as a hold for their gnawing activity. During the field work it was observed that common shrews used their lower front teeth for the actual gnawing, most probably hooking their upper front teeth behind the protruding parts of the trap to gain a hold. Damage from gnawing was also found on the edges of the opening in the side wall of the tunnel where the catch of the trapdoor mechanism is located (figure 2C). The small, parallel, rounded, tooth marks (figure 2D), found on the gnawed metal of all traps, clearly indicated that the damage was done by shrews rather than voles or mice, which both would leave larger and less rounded marks.

Damage to Longworth live-traps as a result of gnawing by small mammals has hardly ever been mentioned in the literature and no damage caused by shrews has been reported before. Lambin & McKinnon (1997) mention damage to Longworth live-traps by gnawing near the treadle, but it is not clear which captured mammal (vole or shrew) did this. Wood mice (*Apodemus sylvaticus*) and other mice species

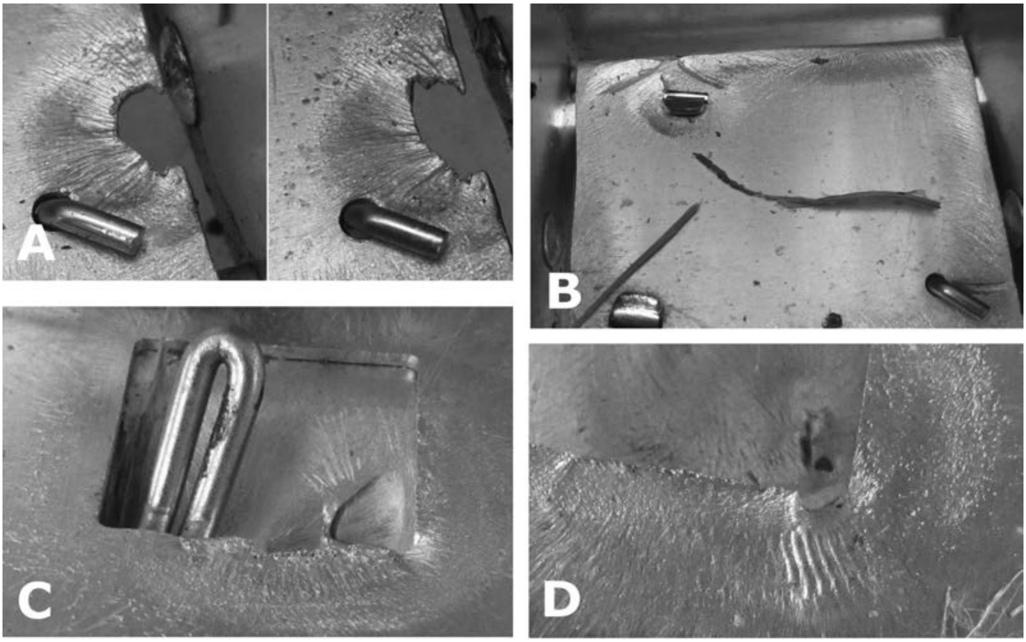

Figure 2. A. an already damaged trapdoor, seen from the inside, before (left) and after (right) two common shrews (*Sorex araneus*) were captured in this trap. The enlargement of the hole as a result of gnawing by these shrews during their captivity is clearly visible; B. example of tooth marks left by gnawing shrews on all the inner edges of the trapdoor. In this case, the most damage was done to the upper left corner of the door where the protruding metal was used as a hold by the shrew while gnawing; C. example of the damage and tooth marks left by shrews gnawing at the opening in the side wall of the trap tunnel; D. example of the larger tooth marks that indicate that a water shrew (*Neomys fodiens*) had been gnawing at the metal. *Photos: W. van Boekel.*

are known for causing much damage to the opening in the sidewall of the tunnel of Longworth live-traps, but they do not seriously damage the trapdoors (R. Koelman and M. van den Hoogenhoff, personal communication).

The teeth of the common shrew and the water shrew have red tips that contain extra iron which hardens the enamel (Strait & Smith 2006). Even though these teeth can wear down rapidly when consuming prey that contains hard materials, such as the exoskeletons of beetles or grit in earthworms (Saarikko 1989), they are clearly robust enough to cause serious damage to the aluminium of Longworth live-traps. The different sizes of the tooth marks on the metal show that both common shrew and water shrew were responsible for the damage, although the effect of gnawing by the larger and stronger water shrews was probably greater. No clear damage to the traps was noticed before 2012, but it is likely that the shrews that were captured in this period (mainly common shrews) also gnawed at the trapdoors. During this period the damage was not large enough to be noticed, probably because of the relatively low numbers of water shrews that were captured in the traps.

The holes that wood mice make in the sidewalls of the tunnel of Longworth live-traps can be repaired by gluing a piece of aluminium sheet over the damaged part (M. van den Hoogenhoff, personal communication). This repair method is much more difficult to apply to holes in the trapdoor, due to the protruding parts of the trapdoor mechanism in the door. In addition the trapdoor mechanism may not function properly with glued-on parts.

Longworth live-traps are known to be durable, with a life span of up to 30 years. In field situations where large numbers of shrews are caught, the lifespan of Longworth live-traps can be greatly reduced due to the damage the shrews cause to them. At the present monitoring frequency in De Onlanden (25-30 trap nights per year) and with the shrew densities that are currently found in the nature reserve, the traps, especially the tunnel-part, may not even last as long as 5 to 10 years. High densities of water shrews will particularly reduce the lifespan. It is not clear whether other types of trap, such as the Sherman live-trap or the Ugglan live-trap, are less susceptible to gnawing by shrews. Churchfield & Rychlik (2006) used home-made wooden traps to catch shrews, but do not mention their durability. The first results of a test with a live-trap produced by Heslinga in the Netherlands (www.heslingatraps.nl) indicate that this trap may be less susceptible to gnawing by shrews, but until now only one trap of this type has been tested during one field-work season (W. van Boekel, unpublished data). The Heslinga live-trap is much like the Longworth live-trap, but it is made of thicker aluminium sheet metal and it has a somewhat different trapping mechanism. The opening between the trapdoor and the sidewall is smaller, making it more difficult for shrews to gnaw at the edges of the door. The Heslinga trap also has no opening in the sidewall of the tunnel part of that can be damaged by gnawing. The author recommends a thorough comparison of the susceptibility of Heslinga live-traps and Longworth live-traps to gnawing by the inhabitants.

Acknowledgements: An anonymous referee contributed some valuable suggestions to the manuscript. This study was made possible by a grant from the Meester Prikkebeenfonds, part of the Prins Bernard Cultuurfonds in the Netherlands.

References

Churchfield, S. & L. Rychlik 2006. Diets and coexistence in *Neomys* and *Sorex* shrews in Białowieża forest in eastern Poland. Journal of Zoology 269: 381-390.

Lambin, X. & J. MacKinnon 1997. The relative efficiency of two commercial live-traps for small mammals. Journal of Zoology 242: 400-404.

Saarikko, J. 1989. Foraging behaviour of shrews. Annales Zoologici Fennici 26: 411-423.

Strait, S.G. & S.C. Smith 2006. Elemental analysis of soricine enamel: pigmentation variation and distribution in molars of *Blarina brevicauda*. Journal of Mammalogy 87: 700-705.

van Boekel, W.H.M. 2013. Reducing shrew mortality in Longworth live-traps. Lutra 56: 121-127.

Samenvatting

Schade aan Longworth inloopvallen veroorzaakt door spitsmuizen

In natuurgebied De Onlanden wordt sinds 2009 onderzoek gedaan aan de muizenpopulatie met behulp van Longworth inloopvallen. Na de herinrichting van het gebied in 2012 tot waterberging en doorstroommoeras veranderde de samenstelling van de muizenpopulatie drastisch. Woelmuizen verdwenen grotendeels en spitsmuizen, met name waterspitsmuizen (*Neomys fodiens*), namen flink in aantal toe. De grote aantallen spitsmuizen die na 2012 in de vallen verbleven, bleken flinke knaagschade aan de vallen te veroorzaken. Vooral de valdeur had het daarbij te verduren. Soms ontstonden er zelfs gaten in een deur. Ook de opening in de tunnelwand werd soms flink beschadigd. De grotere en sterkere waterspitsmuis zal waarschijnlijk verantwoordelijk zijn voor de grootste schade. De levensduur van Longworth inloopvallen kan, bij gebruik in biotopen waarin veel spitsmuizen worden gevangen, aanzienlijk worden bekort. Vooralsnog is er geen duurzame oplossing of een dito alternatief beschikbaar.

Received: 18 August 2014
Accepted: 15 September 2014