



Leibniz Institute for Zoo
and Wildlife Research
IN THE FORSCHUNGSVERBUND BERLIN E.V.

Member of the

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Why do we need hedgehog dummies?

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IZW-mission: Research for species conservation

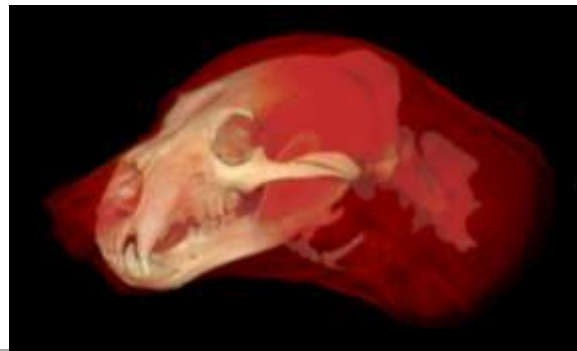
Nature conservation needs reliable forecasts, thus we...

- Identify threats to biodiversity in advance
- Improve the design of nature and species conservation measures
- Assess the impact of planned measures (impact assessment)



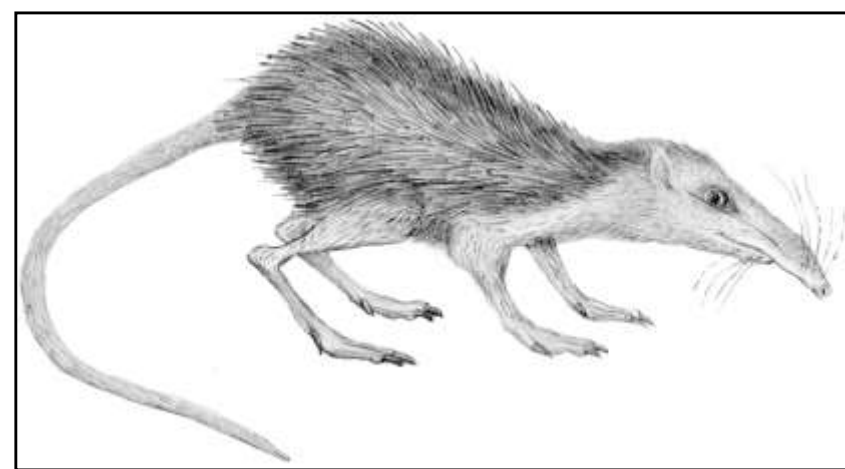
Project samples:

- create embryos of northern white rhino (Biorescue)
- lead poisoning of white-tailed eagles by lead monition
- causes of death of wolves in Germany
- bat migration and wind turbines
- effects of artificial light at night on wildlife
- recognising poaching in Africa (GAIA)....

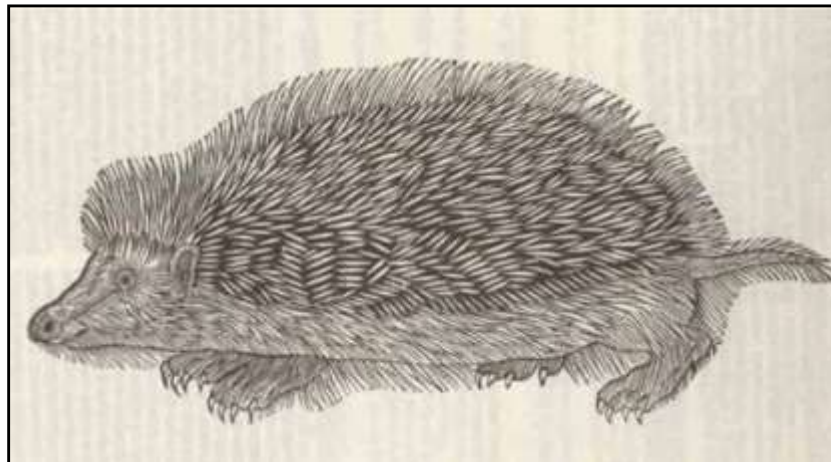


The European hedgehog

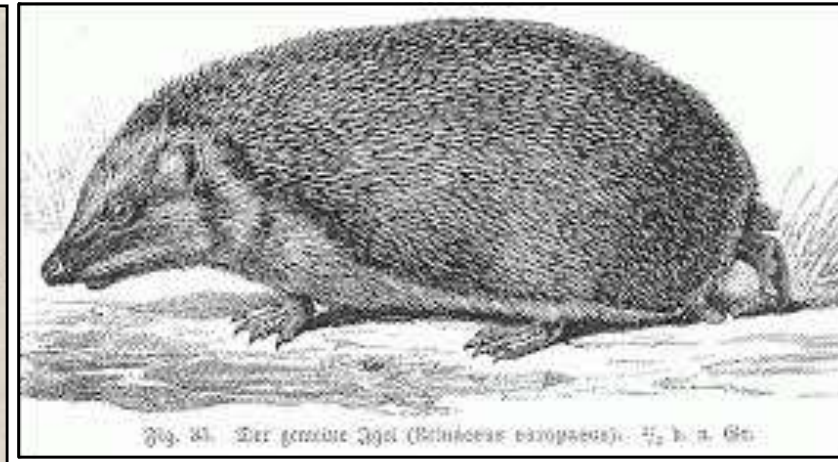
- solitary, nocturnal, insectivorous, hibernating small mammal with a unique protective behaviour (curling up and waiting)
- Great adaptability: It is one of the oldest mammal still in existence. They have had their current appearance (and way of life) for around 15 million years.
- Great popularity: Hedgehogs are among the most popular native wildlife with the closest contact to humans.
- Nevertheless, their populations are declining dramatically due to human influences (including lack of food, habitat loss & fragmentation,...)



Rekonstruktion eines *Macrocranion* aus dem Eozän (vor 38-56 Mio. Jahren)



„Der Igel“, Thierbuch von Johann Gesner, 1669



„Der gemeine Igel“, Leitfaden der Zoologie für höhere Lehranstalten 1896

National protection and endangered status

- According to the Federal Nature Conservation Act: specially protected species
- Red List category: endangered until 2009, on the early warning list since 2020
- Current population situation: Common
- Long-term population trend: Decline, extent unknown
- Short-term population trend: moderate decline (15-30%)
- Reason for categorisation change: real changes in the threat situation and increase in knowledge
- Comment on endangerment: The European hedgehog used to be abundant everywhere. Long-term counts of roadkill hedgehogs in Bavaria over a period of almost 40 years (Reichholf 2015, LBV 2018) show a steady decline in finds to around a fifth of the numbers present in 1976. It is not certain whether this trend applies to the whole of Germany, as comparable counts are not available.

Hedgehogs are being injured more frequently due to the increasing use of robotic mowers.

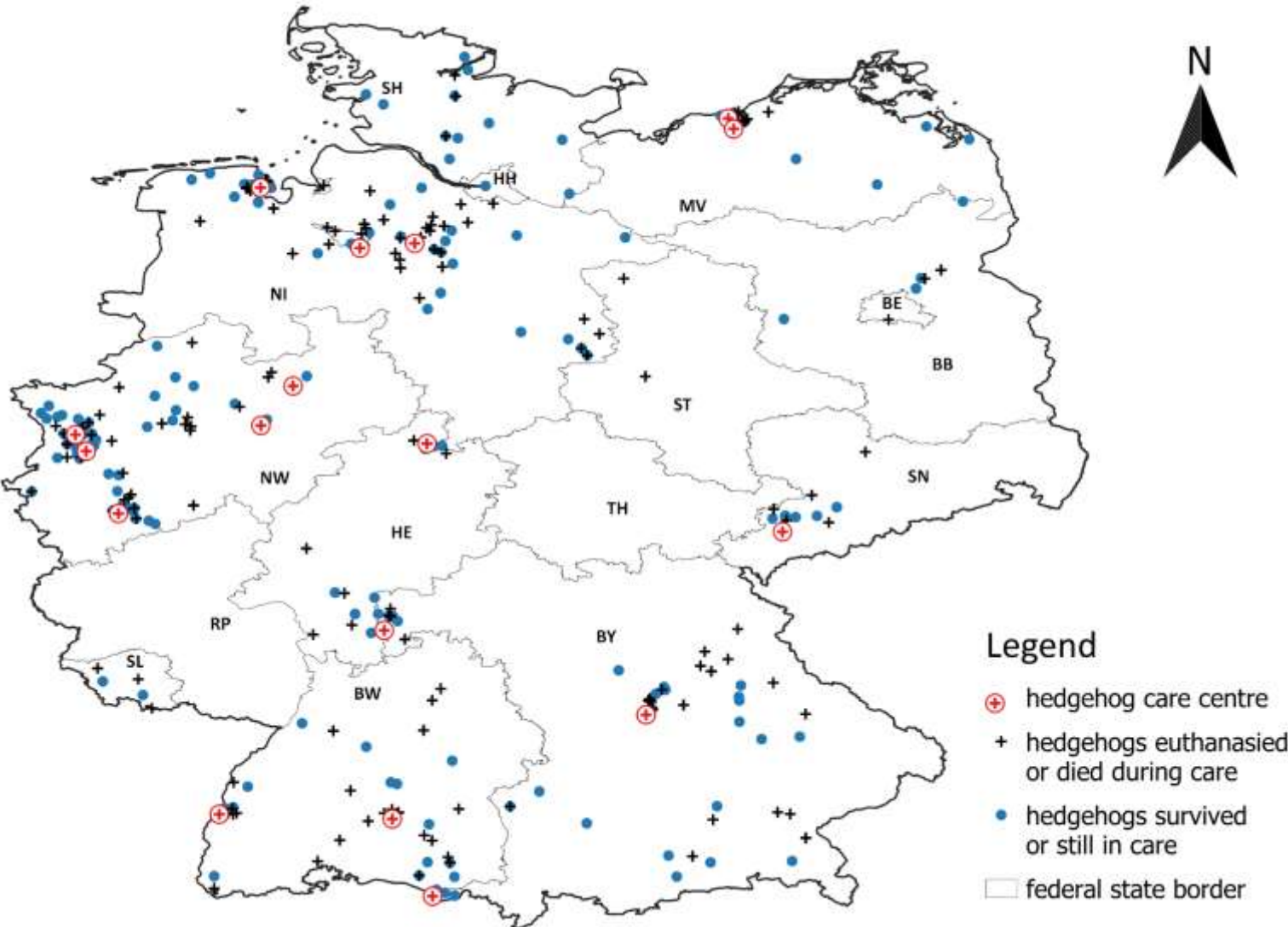
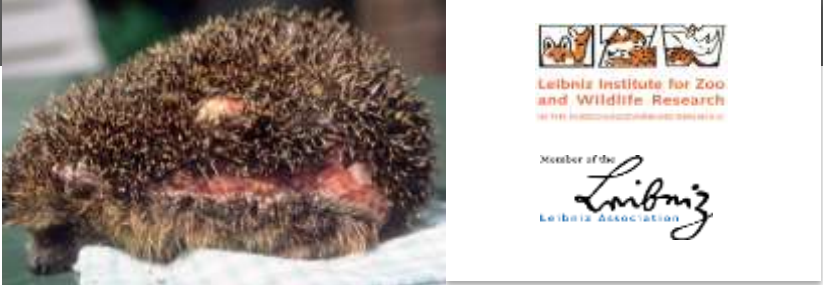
National protection and endangered status

- Every year, more and more hedgehogs with various cut injuries are admitted to hedgehog rehabilitation centres or veterinarians.
- Some injuries are consistent with known other risks to hedgehogs in the form of garden strimmers or dog bites.
- However, although not rigorously quantified or documented, a concern has arisen that an increasing number of cases may have been caused by robotic lawn mowers.

It was about time to investigate this scientifically and get the proper documentation for or against the claim, which had previously been lacking



Occurrence of cut injuries in Hedgehogs



Federal state	Federal state abbreviation	Number of reported hedgehogs	Number of reporting care centres
Baden-Württemberg	BW	42	3
Bavaria	BY	54	2
Berlin	BE	1	0
Brandenburg	BB	8	0
Bremen	HB	5	1
Hamburg	HH	2	0
Hesse	HE	14	1
Mecklenburg-West Pomerania	MV	24	2
Lower Saxony	NI	80	2
Northrhine-Westphalia	NW	107	5
Rhineland Palatinate	RP	0	0
Saarland	SL	5	0
Saxony	SN	12	1
Saxony Anhalt	ST	2	0
Schleswig Holstein	SH	14	0
Thuringia	TH	0	0

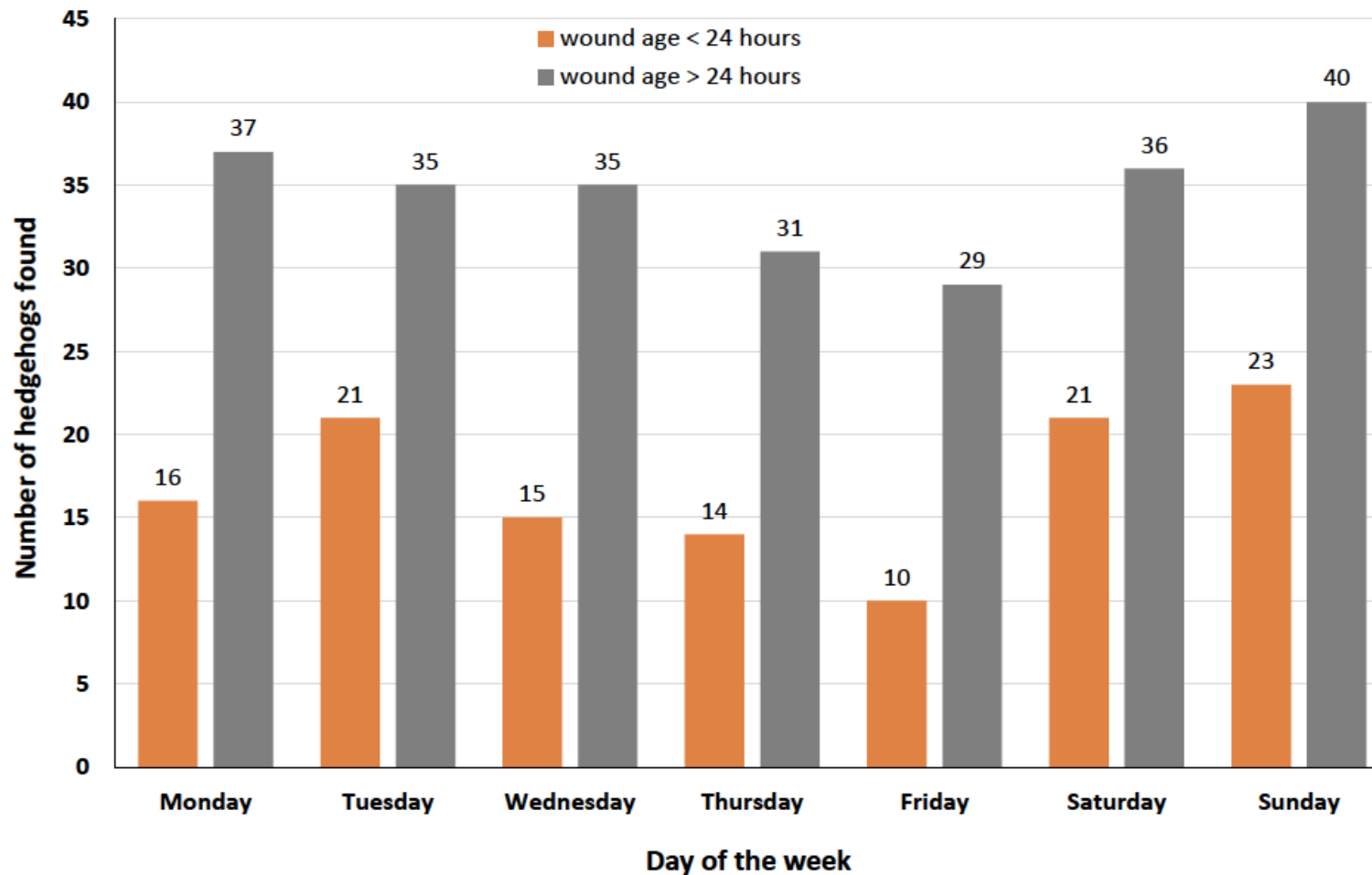
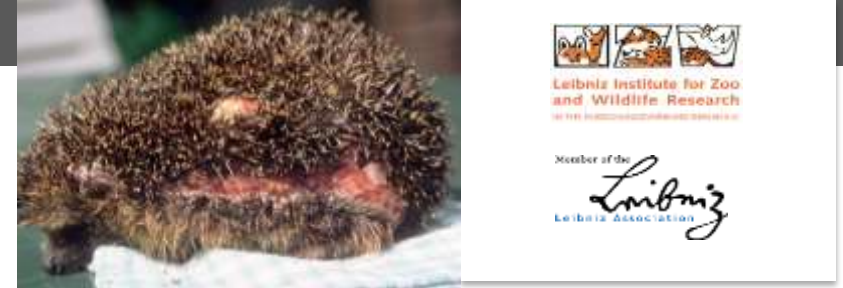
open access

Article

Occurrence and Characteristics of Cut Injuries in Hedgehogs in Germany: A Collection of Individual Cases

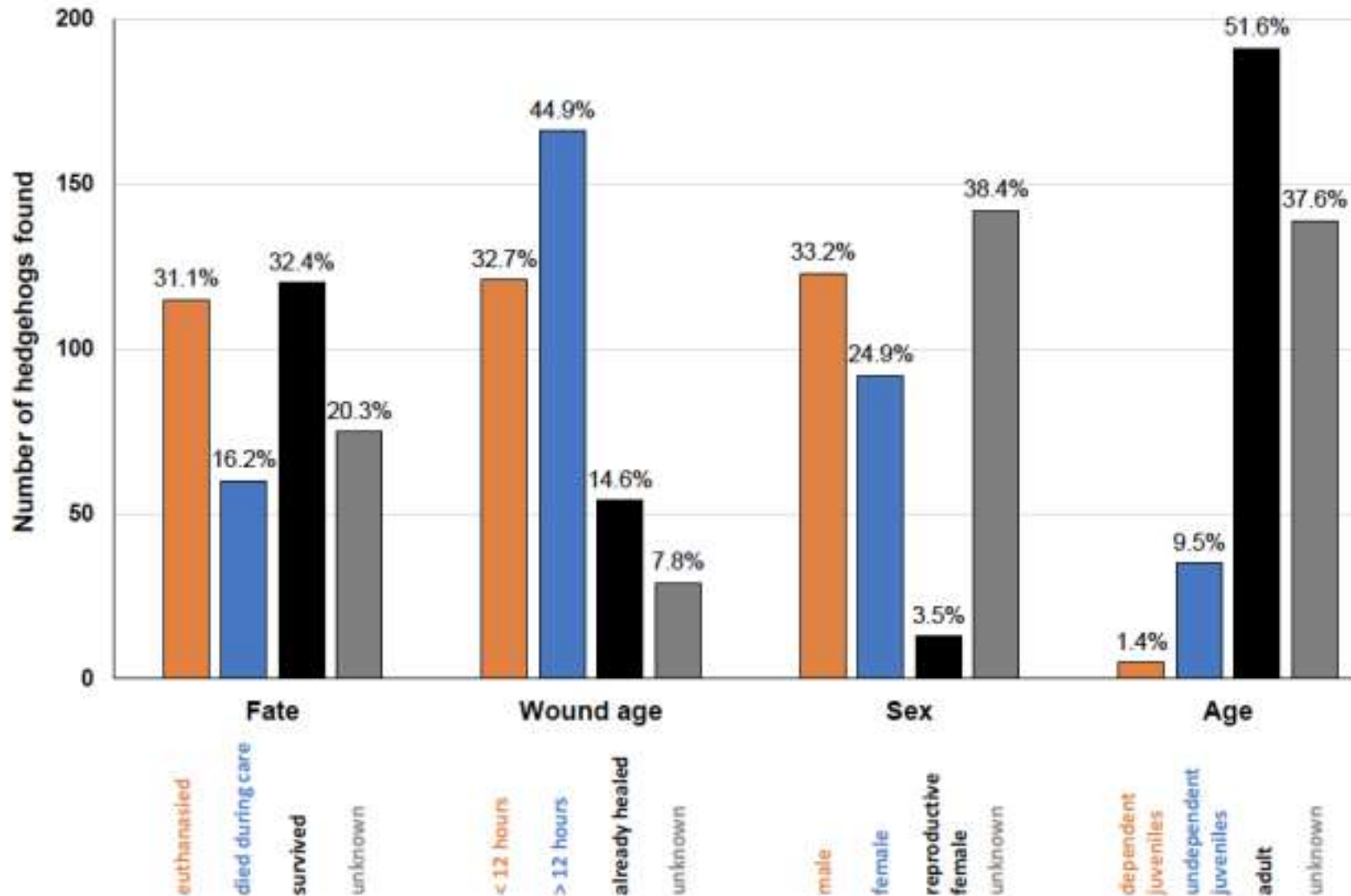
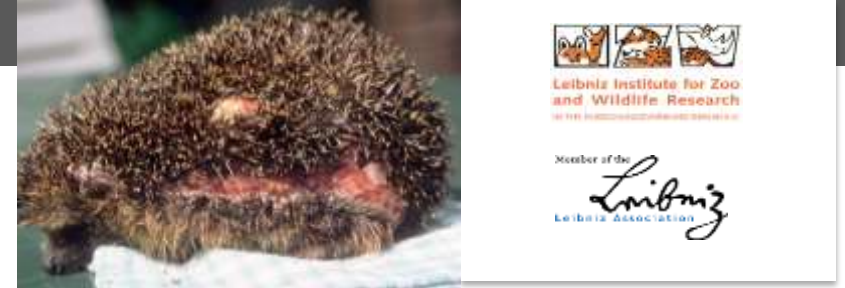
Anne Berger

Occurrence of cut injuries in Hedgehogs



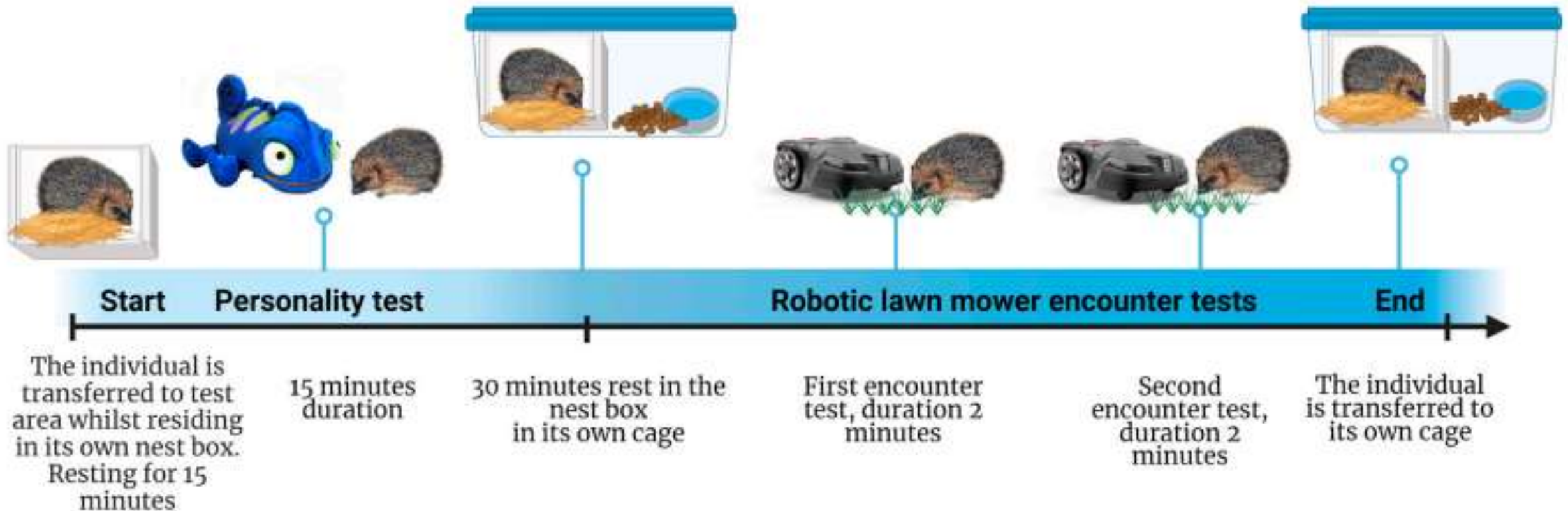
- Hundreds to thousands of cases per year
- Equally distributed across all days of the week (only robotic mowers are allowed to be used on Sundays)

Occurrence of cut injuries in Hedgehogs



- Hundreds to thousands of cases per year
- Equally distributed across all days of the week (only robotic mowers are allowed to be used on Sundays)
- Severe wounds and high mortality rate (47%)
- Majority of wounds already hours to days old

Reactions of hedgehogs towards robotic lawn mowers



Reactions of hedgehogs towards robotic lawn mowers

In testing the reactions of hedgehogs towards an approaching (disarmed) robotic lawn mower, we conclude that that





- personality did not appear to affect the outcome
- that adult and, thereby, more experienced hedgehogs tended to react in a more timid manner
- that the hedgehogs generally acted less boldly during their second encounter with the robotic lawn mower



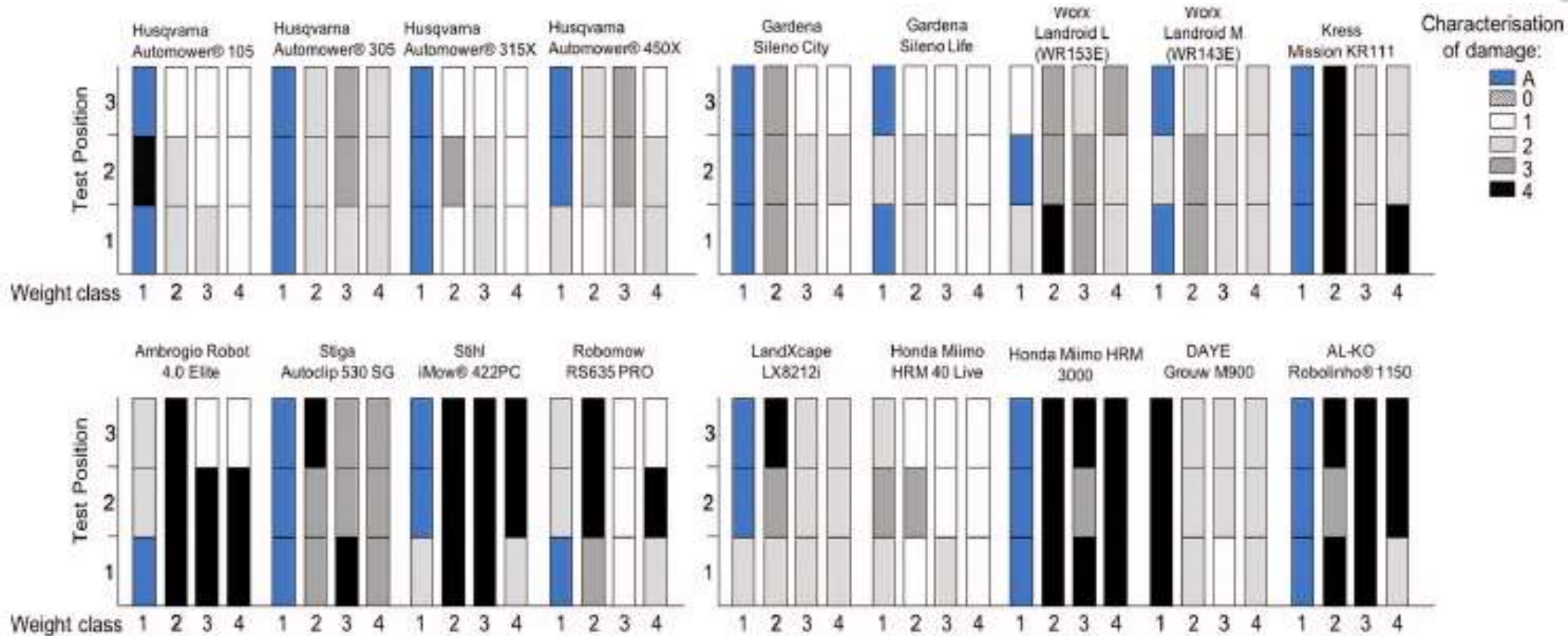
Effect of different lawn mowers on hedgehogs

Test Number	Brand	Model	Blades	Collision Sensor	WMCC Detection	Wheels	Front/Rear Wheel Drive	Skid Plate	Headlights	Ultrasonic Sensors	Camera Vision
1	Husqvarna	Automower® 105	Pivoting	Yes		3	Front	Yes			
2	Husqvarna	Automower® 305	Pivoting		Yes	4	Rear	Yes			
3	Husqvarna	Automower® 315X	Pivoting	Yes		4	Rear	Yes	Yes		
4	Husqvarna	Automower® 450X	Pivoting	Yes		4	Rear	Yes	Yes	Yes	
5	Gardena	Sileno City	Pivoting		Yes	3	Front				
6	Gardena	Sileno Life	Pivoting		Yes	4	Front				
7	Worx	Landroid L (WR153E)	Pivoting		Yes	4	Rear				
8	Worx	Landroid M (WR143E)	Pivoting		Yes	4	Rear			Yes	
9	Kress	Mission KR111	Pivoting	Yes		4	Rear			Yes	
10	LandXcape	LX8212i	Pivoting		Yes	3	Rear			Yes	
11	Honda	Miimo HRM 40 Live	Pivoting		Yes	4	Rear				
12	Honda	Miimo HRM 3000	Pivoting	Yes		4	Rear				
13	Robomow	RS635 PRO	Fixed		Yes	3	Rear				Yes
14	AL-KO	Robolinho® 1150	Fixed		Yes	4	Rear				
15	Ambrogio Robot	4.0 Elite	Fixed	Yes		4	Rear				
16	Stiga	Autoclip 530 SG	Fixed		Yes	4	Rear				
17	Stihl	iMow® 422PC	Fixed	Yes		4	Rear				
18	DAYE	Grouw M900	Pivoting	Yes		4	Rear				

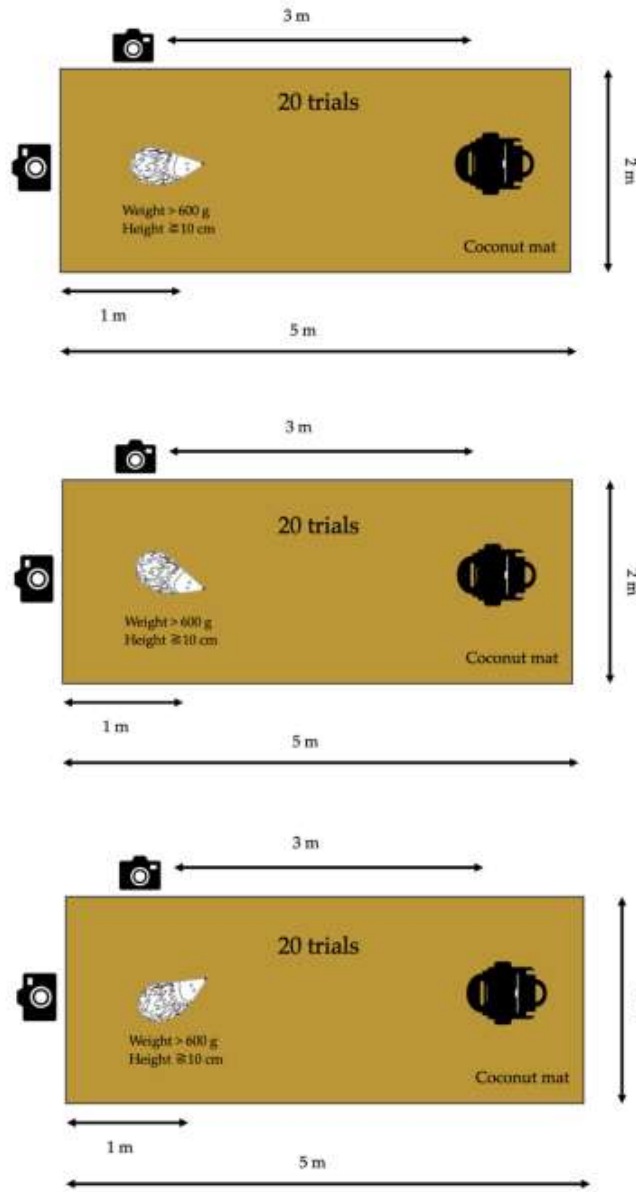
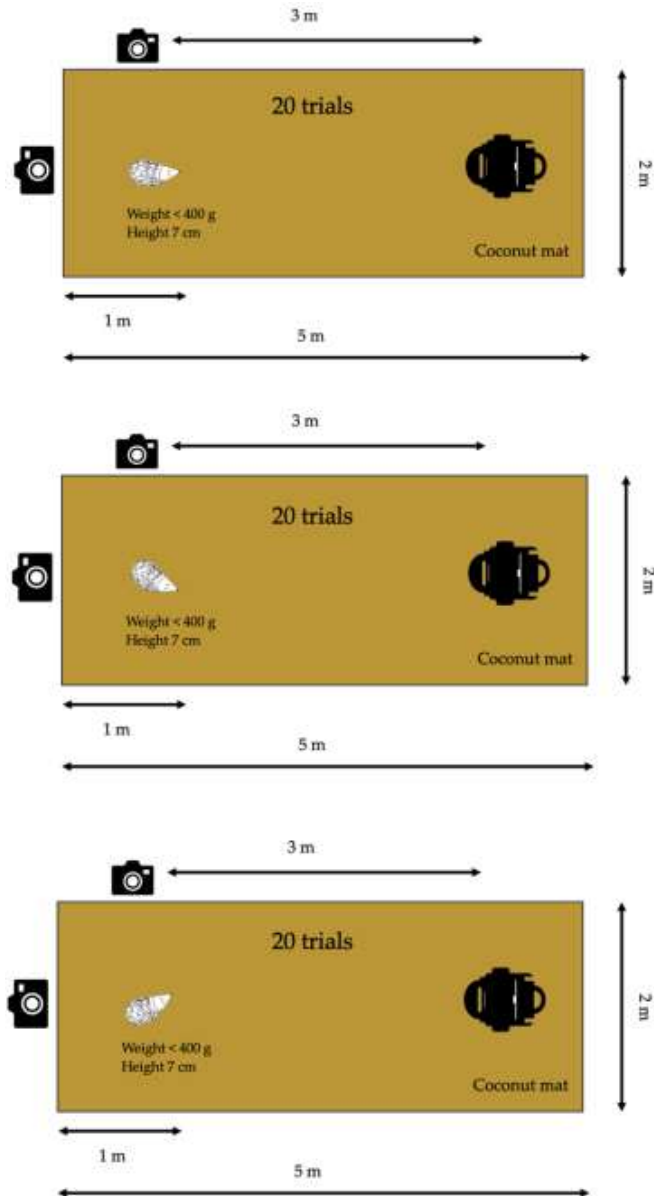
Effect of different lawn mowers on hedgehogs

Weight class	Weight (g)	No. of individuals	Total no. of individuals per weight class	Stages of life	Representation
1	Up to 199	22	22	Dependent juveniles	 <p>Weight 46 g Length 7.5 cm</p>
2	200	3	21	Independent juveniles	 <p>Weight 530 g Length 19.5 cm</p>
	300	3			
	400	9			
	500	6			
3	600	8	20	Adults	 <p>Weight 860 g Length 23 cm</p>
	700	8			
	800	4			
4	900	4	7	Large adults	 <p>Weight 1080 g Length 25 cm</p>
	1000	2			
	1100	1			

Effect of different lawn mowers on hedgehogs



future crash test design for lawn mowers



We developed a fixed crash test scenario (number of trials, distances, position of the hedgehogs in relation to the robot, size of the hedgehogs...)

The proposed standardised test will hopefully be implemented in the European Committee for Electrotechnical Standardization (CENELEC) protocol, indicating whether a robotic lawn mower is safe for hedgehogs.

Further measures

- Ban on the use of robotic lawnmowers at night (technical or political)
- Development of a hedgehog-recognising, cross-model robot mower attachment

