

Mus musculus ✖ ✖ ✖

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Rodentia	Muridae

Common name raton casero (English, Dominican Republic), Hausmaus (German), biganuelo (English, Dominican Republic), house mouse (English), souris commune (French), wood mouse (English), field mouse (English), kiore-iti (Maori)

Synonym

Similar species

Summary

The house mouse (*Mus musculus*) probably has a world distribution more extensive than any mammal, apart from humans. Its geographic spread has been facilitated by its commensal relationship with humans which extends back at least 8,000 years. They cause considerable damage to human activities by destroying crops and consuming and/or contaminating food supplies intended for human consumption. They are prolific breeders, sometimes erupting and reaching plague proportions. They have also been implicated in the extinction of indigenous species in ecosystems they have invaded and colonised. An important factor in the success of *M. musculus* is its behavioural plasticity brought about by the decoupling of genetics and behaviour. This enables *M. musculus* to adapt quickly and to survive and prosper in new environments.



[view this species on IUCN Red List](#)

Species Description

A long tail (60-105mm - approximately equal to its head and body length of 65-95mm), large prominent black eyes, round ears and a pointed muzzle with long whiskers. Adults 12-30 g. Wild mice are commonly light brown to black; belly fur white, brown, or grey. Colour of tail also lighter below than above.

Notes

The taxonomy of the genus *Mus* is still not entirely clear and the last 30 years have seen a continuing reduction in the number of species recognised and a rearrangement of the phylogenetic tree. The confusion arises because of the gross morphological similarity of many *Mus* species, many of which are only (relatively) distantly related and the phenotypic plasticity within the various species themselves. It is now accepted that the genus *Mus* is actually comprised of 4 subgenera - *Pyromys*, *Coelomys*, *Mus*, and *Nannomys* - containing, in total, approximately 40 species plus an unknown number of subspecies (Nowak, 1991).

Silver (1995), drawing on detailed genetic analysis, lists 8 true species in the *Mus* subgenus plus 4 morphologically and biochemically distinct *Mus musculus* subspecies that together form an *M. musculus* species group. These are *Mus mus musculus*, *M. m. domesticus*, *M. m. castaneus*, and *M. m. bactrianus*. He relegates *M. m. molossinus*, found throughout Japan, to *faux*-species status as it has been found to be a hybrid between *M. m. musculus* and *M. m. castaneus*. Furthermore, the genetic evidence supports the Indian subcontinent as the centre of radiation for the *M. musculus* species group, *M. m. bactrianus* being the founder population. The members of the *M. musculus* group would have occupied non-overlapping ranges within the Indian subcontinent until Neolithic human population expansion and migration approximately 10,000 yrs BP facilitated their dispersal.

The two species found in Europe - *M. m. musculus* and *M. m. domesticus* - accompanied humans migrating into the area approximately 4,000 yrs BP. It is predominantly these two species that have become invasive throughout the world, primarily aided by past European colonial expansion. Recently genetic methods have been used to trace the colonisation history on mice in New Zealand and the United Kingdom (Searle *et al.* 2008a, 2008b).

It has been estimated that in the USA seven mice are transported per 100 tonnes of grain and 70 per 100 tonnes of hay or straw. In one year 550,000 tonnes of hay and straw were exported from the USA potentially containing many thousands of house mice (Baker 1994 cited in Pocock *et al.* 2005).

Lifecycle Stages

Depending on prevailing environmental conditions, house mice occur alone, in pairs, in small family parties, or several families co-exist at very high densities (Pillay, N., pers. comm., 2004). Breeding takes place throughout the year in laboratory, most commensal, and some wild populations. The oestrus cycle is 4-6 days, with oestrus lasting less than one day. The oestrus cycle stops during lactation except for one oestrus 12-20 hours postpartum. Gestation period is 19-21 days, although this may be extended by several days if the female is lactating. There are usually 5-10 litters per year, depending on conditions, but up to 14 may be produced. Litters range from 3-12, but usually consist of 5-6, young. Newborn mice weigh around 1 g, are naked except for short vibrissae, and their eyes and ears are closed. They are fully furred after 10 days and by 14 days old their eyes and ears are open, and their incisor teeth have erupted. The young are weaned and start to leave the nest at 20-23 days old, weighing around 6 g, and can reach sexual maturity at 5-7 weeks. In the wild mice rarely live longer than 18 months. Captive mice live 2 years on average although there are records of some individuals living up to 6 years.

Habitat Description

As commensal animals, house mice live in close association with man — in houses, outbuildings, stores and other structures. Mice are not limited to commensal situations and feral house mice are found in many different habitats in a number of regions of the world. Mice are found throughout New Zealand in habitats ranging from rank coastal grasslands and dunes to sub-alpine tussock. They can reach very high densities in some habitats, particularly those with dense ground cover. In Australia mice are commonly found in arable crop fields and can reach enormous densities in these areas. Mice are also found on a number of sub-Antarctic islands where they have become a major conservation concern.

Reproduction

Placental. Sexual. Endogenous reproductive cycle most likely modulated by nutrition and, possibly, population density.

15-150+ young per female adult per year, depending on conditions. Females as young as 5 weeks can breed. The pre-independence mortality rate is typically 60-70%. Population densities range from 10 per sq metre for commensal populations to 1 per 100 sq metres in feral populations. Given ideal conditions populations can erupt spectacularly and numbers can exceed 200,000 per hectare.

While favourable conditions (e.g. nutrition) determine reproduction in commensal populations, free-living (feral) populations are seasonal breeders, and reproduction is probably influenced by a combination of day length and nutrition (Pillay, N., pers. comm., 2004).

Nutrition

Wild mice eat many kinds of vegetable matter, such as, fleshy roots, leaves, and stems. Insects and some meat may be eaten when available. Commensal mice feed on any human food that is accessible, as well as paste, glue, soap, and other household materials. Cereals are preferred to foods containing higher proportions of fat or protein. A large part of the water requirement of mice is met by the moisture content of their food as they have the ability to concentrate their urine and this has enabled them to colonise semi-desert areas. Mice on a seed diet of 12% protein can survive without free water, but above this level of protein require 3-13 g water per day.

General Impacts

House mice are major economic pests, consuming and despoiling crops and human foodstuffs, and they are host to a range of diseases and parasites infectious to humans, the most serious being bubonic plague (*Yersinia pestis*) and salmonella (*Salmonella* spp.). However, mice are considered relatively unimportant as vectors for their transmission to humans.

Mice have also been implicated in extirpations and/or extinctions of indigenous species in ecosystems they have invaded and colonised which are outside their natural range. Angel *et al* (2009) reviewed mouse impacts on islands in the Southern Ocean and found that mice had negative impacts on plants, invertebrates, land birds and sea birds. An important finding of this review is that when mice are the only introduced species on an island their behaviour is more similar to that of rats and has a much larger impact on the native ecosystem. When mice are part of a complex of invasive species their densities are suppressed and their impacts are not as great. On Juan de Nova Island in the Mozambique Channel cats have a major impact on the sooty tern (*Sterna fuscata*) colonies through predation. Peck *et al* (2008) found that introduced mice and rats supported the cat population through the tern non-breeding season meaning the cat population was large throughout the year. This effect is known as hyperpredation and the authors suggest removing mice and rats may help preserve the tern colony.

Recent research and video evidence from Gough Island in the South Atlantic Ocean, has shown conclusively that mice are responsible for widespread breeding failures and that predation of seabird chicks by mice occurs at levels that are probably driving population decreases. Please follow this link to view the video [Wanless mouse attack on albatross chick](#) recorded by Ross Wanless and Andrea Angel on Gough Island (Viewer discretion is advised).

Please follow this link for [terms and conditions](#) of use of the video.

Species affected on Gough Island include the 'Critically endangered (CR)' Tristan albatross (see *Diomedea dabbenena*) and the 'Endangered (EN)' Atlantic petrel (see *Pterodroma incerta*). Other species believed to be subject to mouse predation include the two winter breeders - the 'Near Threatened (NT)' grey petrel (see *Procellaria cinerea*) and the great-winged petrels (see *Pterodroma macroptera*) (Wanless *et al*. 2007). *M. musculus* may pose the greatest present threat to the 'Critically endangered (CR)' Gough bunting (see *Rowettia goughensis*) through competition and predation (Birdlife International, 2004).

A study of seed predation by mice in a New Zealand forest found that mice were able to consume almost the entire seed crop of some species therefore having important implications for tree population dynamics (Wilson *et al* 2007). Another study in New Zealand found that mice were preying upon lizards and that adults were more susceptible than juveniles (Newman 1994).



Management Info

House mice are controlled by poisoning, fumigation, trapping and repellents. Thirty eight percent of mouse eradication attempts on islands worldwide have failed (17 out of 45 attempts), but there doesn't seem to be a consistent simple operational explanation for these failures. Eradications should be attempted provided sufficient planning and preparation has taken place to rule out failure due to operational errors or factors that can be controlled for. Factors to consider in order to maximise the likelihood of success include:

- o Will the chosen poisoning method allow every mouse on the island access to poison?
- o Take genetic samples prior to the eradication attempt. This allows the distinction to be made between eradication failure and a re invasion and also can be used to determine sub-species.
- o Consider the effects of other mammals. Will they prevent mice accessing poison?
- o Will the mice eat the bait? Consider bait trials to check for poison palatability and cereal aversion.
- o Are there areas which may require extra poison? Dense grassland can support very high numbers of mice and may require more poison than forest areas (MacKay *et al.*, 2007).

Preventative measures: House mice are able to stow away in very small spaces so there is a constant threat of invasion or reinvasion. Visitors to areas that are at risk of mouse invasion should be encouraged to check all baggage and pockets for mice before heading to such places. Mouse free areas that are considered at risk of invasion should implement a programme of regular monitoring to identify mouse invasions early.

Chemical: House mice have been successfully eradicated from 28 islands worldwide. In all these cases some form of anticoagulant poison was used (MacKay *et al.* 2007). Brodifacoum was the most commonly used poison, other successful attempts used pindone, warfarin, bromodiolone and floccoumafen. Brodifacoum is a very widely used toxin but there are some concerns about it building up in ecosystems (Hoare and Hare, 2006). Fisher (2005) discusses the susceptibility of mice to a variety of anticoagulant poisons; Morriss *et al.* (2008) updates this study by investigating factors that affect the palatability of different baits to house mice and rat species.

Biological: Virally vectored immunocontraception using a modified murine cytomegalovirus (MCMV) has been investigated in Australia to control mouse plagues in the grain growing regions but results are not promising. Viral transmission rates are too slow to effectively control fertility on the population (Arthur *et al.* 2009). A review of fertility control in rodents is available (Jacob *et al.* 2010).

Integrated management: The abundance of *M. musculus* will increase dramatically where a significant number of rats are removed from an area, perhaps due to an improved food supply or a release from predation pressure (Caut *et al.* 2007, Witmer *et al.* 2007). It is important to attempt to remove mice at the same time as rats to prevent large populations of mice appearing following rat removal.

Pathway

Principal source:

Compiler: Jamie MacKay, School of Biological Sciences, University of Auckland, New Zealand & IUCN/SSC Invasive Species Specialist Group (ISSG)

Updates with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

Review: Prof. Neville Pillay\ School of Animal, Plant & Environmental Sciences\ University of the Witwatersrand South Africa.

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ALIEN RANGE

[1] AFRICA

[2] AUSTRALIA

[1] BERMUDA

[1] ANGUILLA

[2] BAHAMAS

[1] BRAZIL

[1] CANADA	[3] CAYMAN ISLANDS
[2] COOK ISLANDS	[1] CURACAO
[1] DOMINICA	[1] DOMINICAN REPUBLIC
[1] FALKLAND ISLANDS (MALVINAS)	[3] FIJI
[1] FRANCE	[3] FRENCH POLYNESIA
[6] FRENCH SOUTHERN TERRITORIES	[1] GUADELOUPE
[1] GUAM	[1] HAITI
[1] ISLE OF MAN	[2] KIRIBATI
[3] MARSHALL ISLANDS	[1] MARTINIQUE
[3] MAURITIUS	[1] MAYOTTE
[1] MEXICO	[2] MICRONESIA, FEDERATED STATES OF
[1] NAURU	[5] NEW CALEDONIA
[11] NEW ZEALAND	[2] NORTHERN MARIANA ISLANDS
[3] PALAU	[1] PERU
[1] PITCAIRN	[1] REUNION
[3] SAINT HELENA	[1] SAINT LUCIA
[1] SAO TOME AND PRINCIPE	[1] SOLOMON ISLANDS
[1] SOUTH AFRICA	[1] SOUTHERN AFRICA
[1] SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS	[1] TONGA
[1] TRINIDAD AND TOBAGO	[1] TUVALU
[13] UNITED STATES	[4] UNITED STATES MINOR OUTLYING ISLANDS
[3] VANUATU	[1] VIRGIN ISLANDS, BRITISH

Red List assessed species 26: CR = 6; EN = 7; VU = 9; NT = 3; LC = 1;

Aegialomys galapagoensis VU	Afroablepharus africana VU
Alectryon macrococcus CR	Aphrastura masafuerae CR
Bettongia lesueur NT	Charadrius sanctaehelenae CR
Crociodura canariensis EN	Cyanoramphus unicolor VU
Diomedea dabbenena CR	Eudyptes moseleyi EN
Labidura herculeana CR	Lagostrophus fasciatus EN
Lewinia muelleri VU	Nesofregatta fuliginosa EN
Nesoryzomys fernandinae VU	Nesoryzomys narboroughi VU
Nesoryzomys swarthi VU	Oligosoma acrinasum NT
Oligosoma otagense EN	Parantechinus apicalis EN
Procellaria cinerea NT	Pterodroma incerta EN
Pterodroma longirostris VU	Pterodroma macroptera LC
Rowettia goughensis CR	Xenicus gilviventris VU

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Summary: This report reviews available information on the adverse effects of 14 alien vertebrates considered to be significant invasive species on islands of the South Pacific and Hawaii, supplementing the authors' experience with that of other workers.

Bell, B.D. 2002. The eradication of alien mammals from five offshore islands, Mauritius, Indian Ocean. In *Turning the tide: the eradication of invasive species: 40-45*. IUCN SSC Invasive Species Specialist Group. IUCN. Gland, Switzerland and Cambridge, UK.

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[Cossios E. Daniel, 2010. Vertebrados naturalizados en el Perú: historia y estado del conocimiento \(Naturalised vertebrates in Peru: history and state of knowledge\) Rev. peru. biol. 17\(2\): 179 - 189 \(Agosto 2010\)](#)

Summary: Available from: <http://sisbib.unmsm.edu.pe/BVrevistas/biologia/v17n2/pdf/a07v17n2.pdf> [Accessed 23 February 2011]

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Summary: A Guide To The Identification And Collection Of New Zealand Rodents, information on trapping methods.

[Department of Conservation \(DOC\) 13th June 2007 Media release Mice eradication to make Abel Tasman islands predator-free](#)

Summary: Available from: <http://www.doc.govt.nz/templates/news.aspx?id=44096> [Accessed 19 June 2007]

[Fisher, P. and A.T. Airey., 2009. Factors affecting 1080 pellet bait acceptance by house mice \(*Mus musculus*\). DOC Research & Development Series 306. 22 p.](#)

Summary: Abstract: Avoidance of 1080 (sodium fluoroacetate) could be one of the main reasons why multi-species control operations sometimes do not produce high reductions in wild house mouse (*Mus musculus*) populations in New Zealand. This study investigated how the concentration of 1080 in pellet bait affects acceptance by mice; whether pre-feeding with non-toxic bait mitigates mouse avoidance of bait containing 1080; and whether a non-toxic bait containing a masking agent is acceptable to mice. Wild-caught mice demonstrated very low acceptance of, and subsequent low mortality (25%) from, baits containing 0.08% 1080 in a two-choice laboratory test. In a second test, mice ate comparatively more pellets containing 0.001% 1080, but there was no resulting mortality and the non-toxic alternative pellets were still significantly favoured. Pre-feeding for 3 days with non-toxic pellets did not improve the low acceptance of 0.15% 1080 pellet baits by mice. In two of the three two-choice tests, the intake of all food by mice was significantly reduced for 2 days following the introduction of 1080-treated food. This 'drop feed' effect was followed by an increase, mostly of non-toxic food, in daily intake over the next 3 days, to return to eating similar amounts to those measured before the introduction of 1080 (and to daily food intakes of control mice). Non-toxic bait was strongly preferred over two different types of non-toxic bait containing a masking agent. We suggest that avoidance of 1080 by mice is mediated by conditioned taste aversion. However, masking the taste of 1080 may not be effective if mice are micro-sampling and learning to associate sublethal poisoning effects with any distinctive taste. Improvement of bait efficacy may involve developing baits that delay the onset of symptoms of 1080 poisoning; or pre-feeding with baits containing a non-toxic substance with similar taste and/or odour to 1080.

Guide to the Identification and Distribution of New Zealand Rodents. By D.M. Cunningham and P.J. Moors.

Summary: Detailed information on identification and trapping methods. Identification And Collection Of New Zealand Rodents

IDENTIFICATION AND COLLECTION OF NEW ZEALAND RODENTS

Hoare, J.M. & Hare, K.M., 2006. The impact of brodifacoum on non-target wildlife: gaps in knowledge. *New Zealand Journal of Ecology* 30, 157-167.

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Summary: The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on taxa that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). The IUCN Red List also includes information on taxa that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e. are Data Deficient); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e. are Near Threatened).

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[IUCN/SSC Invasive Species Specialist Group \(ISSG\), 2010. A Compilation of Information Sources for Conservation Managers.](#)

Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.

Lorvelec, O., Delloue, X., Pascal, M., & mege, S. 2004. Impacts des mammifères allochtones sur quelques espèces autochtones de l'Isle Fajou (Reserve Naturelle du Grand Cul-de-sac Marin, Guadeloupe), établis a l'issue d'une tentative d'eradication. *Revue D'Ecologie - La Terre et La Vie* 59(1-2): 293-307.

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Summary: Cet article présente la situation actuelle et les impacts des populations introduites de mammifères dans les îles subantarctiques françaises. Les moyens de contrôle en place ou planifiés sont également présentés.

[CONABIO. 2008. Sistema de información sobre especies invasoras en México. Especies invasoras - Mamíferos. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.](#)

Summary: English:

The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), under the section Novedades for information on updates.

Invasive species - mammals is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Mam%C3%ADferos [Accessed 30 July 2008]

Spanish:

La lista de especies del Sistema de información sobre especies invasoras de México cuenta actualmente con información acerca de nombre científico, familia, grupo y nombre común, así como hábitat, estado de la invasión en México, rutas de introducción y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la página de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualización, por favor consulte la portada (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), en la sección novedades, para conocer los cambios.

Especies invasoras - Mamíferos is available from:

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