

Rattus rattus  [简体中文](#) [正體中文](#)

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Rodentia	Muridae

Common name Hausratte (German), European house rat (English), bush rat (English), blue rat (English), ship rat (English), roof rat (English), black rat (English)

Synonym *Mus rattus* , Linnaeus, 1758
Mus alexandrinus , Geoffroy, 1803
Musculus frugivorus , Rafinesque, 1814
Mus novaezelandiae , Buller, 1870

Similar species *Rattus norvegicus*

Summary A native of the Indian sub-continent, the ship rat (*Rattus rattus*) has now spread throughout the world. It is widespread in forest and woodlands as well as being able to live in and around buildings. It will feed on and damage almost any edible thing. The ship rat is most frequently identified with catastrophic declines of birds on islands. It is very agile and often frequents tree tops searching for food and nesting there in bunches of leaves and twigs.



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

Species Description

A slender rat with large hairless ears, the ship rat (*Rattus rattus*) may be grey-brown on the back with either a similarly coloured or creamish-white belly, or it may be black all over. The uniformly-coloured tail is always longer than the head and body length combined. Its body weight is usually between 120 and 160 g but it can exceed 200 g.

The work of Yosida (1980) and his co-workers has shown that there are two forms of *R. rattus* that differ in chromosome number. The more widespread Oceanic form has 38 chromosomes and is the ship rat of Europe, the Mediterranean region, America, Australia and New Zealand. Present indications are that it is the Oceanic form that has reached islands in the South Pacific, but studies are needed to confirm this. The Asian form has probably reached some islands north of the equator, e.g. the Caroline Islands. On the basis of colour variation in rats on Ponape and Koror Islands, described by Johnson (1962) as *Rattus rattus mansorius*, we suspect that these rats may be the Asian form of *R. rattus* (SPREP, 2000).

Notes

Ship rats can be widespread, utilising most habitat types, but they show a preference for drier habitats. They generally avoid swimming.

Lifecycle Stages

Rattus rattus: gestation 20-22 days; weaning 21-28 days; sexual maturity 3-4 months; total life may not exceed two years.

Habitat Description

Ship rats can be widespread, utilising most habitat types, but they show a preference for drier habitats. They generally avoid swimming. Ship rats in a New Zealand study (Hooker and Innes, 1995; in Innes, 2001) were mostly arboreal, but were also frequently recorded on the ground. The mean range length for females was 103m, and 194m for males. Another study (Dowding and Murphy, 1994; in Innes, 2001) found that rats generally used 3-4 dens each throughout their range. In the Mediterranean region *R. rattus* is most common in forests and shrublands up to 1080m in elevation (Martin *et al.*, 2000).

Reproduction

A placental mammal with dependent young. Litter size 3-10 (average 5-8), with frequency of litters dependent on season and food supply. The interval between litters may be as little as 27 days.

Nutrition

Ship rats are omnivorous generalists, yet can be very selective feeders. They eat both plant and animal matter all year round.

A Japanese study showed that *R. rattus* is primarily herbivorous, but can change its food habits when it is thirsty, or when food is in short supply (Yabe, 2004).

General Impacts

The ship rat has directly caused or contributed to the extinction of many species of wildlife including birds, small mammals, reptiles, invertebrates, and plants, especially on islands. Ship rats are omnivorous and capable of eating a wide range of plant and animal foods. These include native snails, beetles, spiders, moths, stick insects and cicadas and the fruit of many different plants (Innes 1990). They also prey on the eggs and young of forest birds (Innes *et al.*, 1999). In the recovery programme for the endangered Rarotonga flycatcher or kakerori (see [Pomarea dimidiata in the IUCN Red List of Threatened Species](#)), Robertson *et al.* (1994) identified ship rats as the most important predator affecting the breeding success of this bird. Several cases are known where predation on seabirds can be reliably attributed to ship rats. These include sooty terns (see [Sterna fuscata in IUCN Red List of Threatened Species](#)) in the Seychelles Islands (Feare, 1979), Bonin petrels (see [Pterodroma hypoleuca in IUCN Red List of Threatened Species](#)) in Hawai'i (Grant *et al.*, 1981), Galapagos dark-rumped petrels (see [Pterodroma phaeopygia in IUCN Red List of Threatened Species](#)) in the Galapagos Islands (Harris, 1970), and white-tailed tropicbirds (see [Phaethon lepturus in IUCN Red List of Threatened Species](#)) in Bermuda (Gross, 1912).

The ship rat is most frequently identified with catastrophic declines of birds on islands. The best documented examples in the Pacific region are Midway Island in the Leeward Islands of Hawai'i (Johnson, 1945; Fisher and Baldwin, 1946), Lord Howe Island (Hindwood, 1940; Recher and Clark, 1974) and Big South Cape Island, New Zealand (Atkinson and Bell, 1973). Atkinson (1977) brought together circumstantial evidence suggesting that ship rats, rather than disease, were responsible for the decline of many species of Hawai'ian native birds during the 19th century.

There are few indications of rat-induced declines in native birds on islands nearer the equator (latitude 15°N to 20°S). This zone coincides with the distribution of native land crabs, animals that also prey on birds and their eggs. The long co-existence between land crabs and some island birds may have resulted in the development of behaviours among the birds that gives them a degree of protection against rats. Atkinson (1985) suggested that this might be the reason why rat-induced catastrophes are less apparent within the equatorial zone, but this hypothesis has never been tested (SPREP, 2000).

Species of weight similar to or smaller than that of rats appear to be the most vulnerable to predation. Impacts also appear to be more severe on smaller islands, where rat densities tend to be higher and do not fluctuate. Constant predation pressure results in a reduction in colony size on these islands (Martin *et al.*, 2000).

Both *R. rattus* and *R. norvegicus* transmit the plague bacterium (*Yersinia pestis*) via fleas in certain areas of the world. There have been a series of recent outbreaks in Madagascar in recent years (Boiser *et al.* 2002).

Management Info

Preventative measures: Research has shown that it can often be difficult to eradicate rats from islands in the early stages of invasion, hence it is better to prevent rodents arriving on islands in the first place. Eliminating a single invading rat can be disproportionately difficult because of atypical behaviour by the rat in the absence of conspecifics, and because bait can be less effective in the absence of competition for food ([Russell et al., 2005](#)). [Weihong et al. \(1999\)](#) provide useful information regarding the detection of rodent species using different trapping methods and bait.

Physical: The use of poison baits is the only proven way to remove rodents from large islands. Trapping generally fails to remove all individuals, as trap-shy animals can survive and repopulate the island (DOC, 2004). **Chemical:** *Rattus rattus* can be eradicated from small areas or seasonally controlled using proprietary rat poison products in an appropriate manner. The largest island to date from which ship rats have been eradicated is Barrow Island (23 000 ha, Western Australia) (Morris, 2002).

Second-generation anticoagulant poisons are used widely for ship rat control, but possible consequences of any ongoing control should always be considered. These consequences include primary or secondary poisoning of species we are aiming to protect or other non-target species, secondary poisoning of other vertebrate pests such as cats, and development of resistance to these poisons by ship rats. It is not known whether their tree-climbing habits will make eradication more difficult (SPREP, 2000).

Fisher et al. (2004) suggest that diphacinone especially, and also coumatetralyl and warfarin, should be evaluated in field studies as alternative rodenticides in New Zealand. Brodifacoum, the most widely used rodenticide in New Zealand currently, can acquire persistent residues in non-target wildlife. [Mineau et al. \(2004\)](#) presented a risk assessment of second generation rodenticides at the 2nd National Invasive Rodent Summit. [O'Connor and Eason \(2000\)](#) discusses the variety of baits which are available for use on offshore islands in New Zealand.

An investigation [Spurr et al. \(2007\)](#) was carried out to assess the behavioural response of ship rats to four different bait station types. Yellow plastic pipe, wooden box ('rat motel'), and wooden tunnel bait stations were found all suitable for surveillance of ship rats and the first two at least for Norway rats (all were readily entered and had a similar amount of bait eaten from them).

Biological: Contraceptive methods of control are currently experimental, but the potential for effective control using contraceptive methods is promising. National Wildlife Research Center (USA) scientists are working on several possible formulations that may make effective oral immunisation possible (Nash and Miller, 2004).

Integrated management: [Guidelines for the Eradication of Rats From Islands Within the Falklands Group](#) offers guidelines for the eradication of rats from islands, based on the experiences in eradicating rats from the Falklands group. This paper offers guidelines for the eradication of rats from islands, based on the experiences in eradicating rats from the Falklands group.

Pathway

Rattus rattus usually stow away in freight carried within the hull, holds and living spaces of ships

Principal source:

Compiler: IUCN SSC Invasive Species Specialist Group

Review: Dick Veitch, Auckland, New Zealand.

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ALIEN RANGE

[1] AMERICAN SAMOA
[5] ANTIGUA AND BARBUDA
[2] BAHAMAS
[1] BERMUDA

[1] ANGUILLA
[20] AUSTRALIA
[1] BARBADOS
[3] BRITISH INDIAN OCEAN TERRITORY

[3] CANADA	[4] CAYMAN ISLANDS
[3] COOK ISLANDS	[1] CURACAO
[1] DOMINICA	[1] DOMINICAN REPUBLIC
[7] ECUADOR	[1] FALKLAND ISLANDS (MALVINAS)
[11] FIJI	[4] FRANCE
[12] FRENCH POLYNESIA	[6] FRENCH SOUTHERN TERRITORIES
[1] GREECE	[2] GUADELOUPE
[1] GUAM	[1] INDONESIA
[4] ITALY	[1] JAMAICA
[8] KIRIBATI	[2] MALTA
[9] MARSHALL ISLANDS	[5] MARTINIQUE
[4] MAURITIUS	[1] MAYOTTE
[4] MEXICO	[8] MICRONESIA, FEDERATED STATES OF
[1] MONTSERRAT	[1] NAURU
[7] NEW CALEDONIA	[64] NEW ZEALAND
[1] NIUE	[4] NORTHERN MARIANA ISLANDS
[5] PALAU	[6] PAPUA NEW GUINEA
[1] PERU	[1] PORTUGAL
[1] PUERTO RICO	[1] REUNION
[1] SAINT BARTHELEMY	[3] SAINT HELENA
[1] SAINT LUCIA	[1] SAINT MARTIN (FRENCH PART)
[1] SAMOA	[1] SAO TOME AND PRINCIPE
[6] SEYCHELLES	[10] SOLOMON ISLANDS
[2] SPAIN	[1] TANZANIA, UNITED REPUBLIC OF
[3] TONGA	[1] TRINIDAD AND TOBAGO
[1] TURKS AND CAICOS ISLANDS	[3] TUVALU
[1] UNITED KINGDOM	[19] UNITED STATES
[3] UNITED STATES MINOR OUTLYING ISLANDS	[6] VANUATU
[2] VIRGIN ISLANDS, BRITISH	[1] VIRGIN ISLANDS, U.S.
[2] WALLIS AND FUTUNA	

Red List assessed species 222: EX = 21; EW = 1; CR = 43; EN = 53; VU = 57; NT = 24; DD = 4; LC = 19;

Acomys nesiotus DD	Acrocephalus aequinoctialis EN
Acrocephalus caffer EN	Acrocephalus kerearako NT
Acrocephalus rimatarae VU	Acrocephalus rodericanus EN
Acrocephalus taiti VU	Aegialomys galapagoensis VU
Afroablepharus africana VU	Alectroenas rodericana EX
Alectryon macrococcus CR	Alsophis antiquae CR
Amaurocichla bocagei VU	Anisomys imitator LC
Aphrastura masafuerae CR	Aplonis cinerascens VU
Aplonis fusca EX	Aplonis pelzelni CR
Atlantisia rogersi VU	Bostrychia bocagei CR
Branta sandvicensis VU	Bulweria bulwerii LC
Callaeas cinereus EN	Camarhynchus heliobates CR
Camarhynchus pauper CR	Cettia haddeni NT
Charmosyna amabilis CR	Chasiempis ibidis EN
Chelonia mydas EN	Clytorhynchus sanctaecrucis EN
Columba bollii LC	Columba junoniae NT
Columba trocaz LC	Coracina newtoni CR
Coracina typica VU	Corvus hawaiiensis EW
Cyanolimnas cerverai CR	Cyanoramphus auriceps NT
Cyanoramphus cookii EN	Cyanoramphus saisseti VU
Dendrocygna arborea VU	Ducula aurorae EN

[Ducula galeata](#) EN
[Eleutherodactylus orcutti](#) CR
[Epicrates monensis](#) EN
[Eudytes schlegeli](#) VU
[Eunymphicus cornutus](#) VU
[Falco eleonorae](#) LC
[Ferminia cerverai](#) EN
[Foudia rubra](#) EN
[Fregata aquila](#) VU
[Gallicolumba erythroptera](#) CR
[Gallinula nesiotis](#) VU
[Gerygone modesta](#) VU
[Haematopus chathamensis](#) EN
[Hemiphaga novaeseelandiae](#) NT
[Hypsipetes olivaceus](#) VU
[Lanius newtoni](#) CR
[Larus audouinii](#) NT
[Larus fuliginosus](#) VU
[Leiopelma hochstetteri](#) VU
[Leptodactylus fallax](#) CR
[Megalurulus mariei](#) LC
[Melamprosops phaeosoma](#) CR
[Mesembriomys macrurus](#) LC
[Mesocapromys auritus](#) EN
[Mesocapromys sanfelipensis](#) CR
[Mimus melanotis](#) EN
[Moho bishopi](#) EX
[Mohoua ochrocephala](#) EN
[Myadestes palmeri](#) CR
[Mystacina robusta](#) CR
[Neospiza concolor](#) CR
[Nesofregatta fuliginosa](#) EN
[Nesoryzomys darwini](#) EX
[Nesoryzomys indefessus](#) EX
[Nesoryzomys swarthi](#) VU
[Notiomystis cincta](#) VU
[Oligoryzomys victus](#) EX
[Oreomystis bairdi](#) CR
[Oryzomys gorgasi](#) EN
[Otus capnodes](#) CR
[Pachycephala jacquinoti](#) NT
[Palmeria dolei](#) CR
[Phalacrocorax aristotelis](#) LC
[Phalacrocorax harrisi](#) VU
[Phoboscincus bocourti](#) EN
[Phoebastria irrorata](#) CR
[Pomarea dimidiata](#) EN
[Pomarea iphis](#) VU
[Pomarea nigra](#) CR
[Pomarea whitneyi](#) CR
[Porzana palmeri](#) EX
[Procellaria cinerea](#) NT
[Procellaria parkinsoni](#) VU
[Progne modesta](#) VU
[Eleutherodactylus cooki](#) VU
[Emberiza socotrana](#) VU
[Eretmochelys imbricata](#) CR
[Eumeces longirostris](#) CR
[Eunymphicus uvaeensis](#) EN
[Falco punctatus](#) VU
[Foudia flavicans](#) VU
[Foudia sechellarum](#) NT
[Fulica alai](#) VU
[Gallicolumba kubaryi](#) VU
[Gerygone insularis](#) EX
[Gymnuromys roberti](#) LC
[Haematopus meadewaldoi](#) EX
[Hydromys chrysogaster](#) LC
[Isodon auratus](#) VU
[Lariscus obscurus](#) NT
[Larus cachinnans](#) LC
[Leiopelma hamiltoni](#) EN
[Leiopelma pakeka](#) VU
[Loxioides bailleui](#) CR
[Megapodius laperouse](#) EN
[Melomys fraterculus](#) CR
[Mesocapromys angelcabrerai](#) EN
[Mesocapromys nanus](#) CR
[Mimus macdonaldi](#) VU
[Mimus trifasciatus](#) CR
[Moho braccatus](#) EX
[Mundia elpenor](#) EX
[Mysateles meridionalis](#) CR
[Myzomela chermesina](#) VU
[Nesocichla eremita](#) NT
[Nesoromys ceramicus](#) EN
[Nesoryzomys fernandinae](#) VU
[Nesoryzomys narboroughi](#) VU
[Nestor meridionalis](#) EN
[Oceanodroma homochroa](#) EN
[Oligosoma acrinasum](#) NT
[Oreomystis mana](#) EN
[Oryzomys nelsoni](#) EX
[Otus insularis](#) EN
[Pachyptila vittata](#) LC
[Peromyscus madrensis](#) EN
[Phalacrocorax featherstoni](#) EN
[Philesturnus carunculatus](#) NT
[Phoebastria albatrus](#) VU
[Phoebetria fusca](#) EN
[Pomarea fluxa](#) EX
[Pomarea mira](#) EX
[Pomarea nukuhiuae](#) EX
[Porzana atra](#) VU
[Procellaria aequinoctialis](#) VU
[Procellaria conspicillata](#) VU
[Procellaria westlandica](#) VU
[Prosobonia cancellata](#) EN

Pseudobulweria rostrata NT	Psittacula eques EN
Psittirostra psittacea CR	Pterodroma alba EN
Pterodroma cahow EN	Pterodroma cookii VU
Pterodroma hasitata EN	Pterodroma hypoleuca LC
Pterodroma inexpectata NT	Pterodroma leucoptera VU
Pterodroma madeira EN	Pterodroma magentae CR
Pterodroma phaeopygia CR	Pterodroma sandwichensis VU
Pterodroma solandri VU	Ptilinopus chalcurus VU
Ptilinopus coralensis NT	Ptilinopus insularis VU
Ptilinopus rarotongensis VU	Puffinus auricularis CR
Puffinus bulleri VU	Puffinus griseus NT
Puffinus mauretanicus CR	Puffinus newelli EN
Puffinus pacificus LC	Puffinus yelkouan NT
Rallus longirostris LC	Rattus adustus DD
Rattus bontanus DD	Rattus elaphinus NT
Rattus enganus DD	Rattus feliceus NT
Rattus hainaldi EN	Rattus jobiensis NT
Rattus lugens EN	Rattus macleari EX
Rattus nativitatis EX	Rattus simalurensis EN
Rattus tunneyi LC	Rhynchotos jubatus EN
Rowettia goughensis CR	Sabal bermudana EN
Saxicola dacotiae NT	Spheniscus humboldti VU
Spheniscus mendiculus EN	Sterna dougalii LC
Sterna hirundo LC	Sylvilagus graysoni EN
Synthliboramphus craveri VU	Synthliboramphus hypoleucus VU
Synthliboramphus wumizusume VU	Terpsiphone corvina CR
Todiramphus gambieri CR	Todiramphus godeffroyi CR
Todiramphus ruficollaris VU	Tokudaia osimensis EN
Trichocichla rufa EN	Troglodytes cobbi VU
Turnagra capensis EX	Turnagra tanagra EX
Vini kuhlii EN	Vini peruviana VU
Vini ultramarina EN	Xenicus longipes EX
Xerocrassa caroli LC	Xerocrassa ebusitana NT
Zoothera margaretae NT	Zosterops albogularis CR
Zosterops chloronothus CR	Zosterops modestus EN
Zosterops strenuus EX	Zosterops tenuirostris EN

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Summary: Abstract: The association between capture success of stoats (*Mustela erminea*) and ship rats (*Rattus rattus*) and landscape-scale environmental predictors was explored using trapping data from three stoat control areas located in podocarp/broadleaved forest in New Zealand. Stoat capture success was higher at trap sites where a rat was also captured at the same trap or a stoat was captured at a neighbouring trap. Drier trap sites with good soil drainage and increased proximity to the operational trapping boundary were also associated with increased stoat capture. Rat capture success was higher at trap sites where a rat had been captured at a neighbouring trap, and at trap sites that were on steeper ground, more easterly facing and within forest habitat. Trap sites with generally poor soil conditions, i.e. sites with lower soil calcium levels and wetter sites with poor drainage, and increasing distance from the forest edge were also associated with increased rat capture. There were highly variable relationships between rat and stoat capture and landscape-scale environmental predictors between the three stoat control areas. This could be due to differing topography, but also to the highly correlated nature of many of the topographic, climate and habitat predictors. Further research specifically designed to separate these effects should focus on the variables identified as common between all stoat control areas in this study. Additional investigations of whether rats captured in double trap sets act as additional bait for stoats would have practical benefits for stoat control areas. The variability of the results emphasises the importance of ensuring that traps are abundant and widespread in stoat control operations.

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[Invasive Species Specialist Group. 2003. Takitimu Conservation Area \(Cook Islands\) - Landowning clans in charge of the Kakerori Recovery Programmes. In: Aliens 17. Invasive Species Specialist Group of the IUCN Species Survival Commission](http://www.issg.org/pdf/aliens_newsletters/A17.pdf)

Summary: Available from: http://www.issg.org/pdf/aliens_newsletters/A17.pdf [Accessed 12 March 2010]



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Rattus rattus*

[IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4.](#)

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).

Available from: <http://www.iucnredlist.org/> [Accessed 25 May 2011]

IUCN South-Eastern European e-Bulletin December 2006. Issue 11: Rats exterminated in important colony of Eleonora's falcon

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).

Available from: <http://www.iucnredlist.org/> [Accessed 25 May 2011]

[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.

[James, R.E., and M.N. Clout, 1996. Nesting success of New Zealand pigeons \(*Hemiphaga novaeseelandiae*\) in response to a rat \(*Rattus rattus*\) poisoning programme at Wenderholm Regional Park. *New Zealand Journal of Ecology* 20\(1\): 45-51. New Zealand Ecological Society](#)

Summary: Available from: http://www.newzealandecology.org/nzje/free_issues/NZJcol20_1_45.pdf [Accessed December 11 2007]

Johnson, M. S. 1945. Rodent control on Midway Islands. *US Naval Medical Bulletin* 45: 384-398.

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

Summary: French language. Information about impacts, eradication methodology, results and discussion in French.

[Lovegrove, T. G., C. H. Zeiler, B. S. Greene, B. W. Green, R. Gaastra, and A. D. MacArthur., 2002. Alien plant and animal control and aspects of ecological restoration in a small mainland island : Wenderholm Regional Park, New Zealand. In *Turning the tide: the eradication of invasive species* : 155-163. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

Summary: Eradication case study in *Turning the tide: the eradication of invasive species*.

[MacKay, J. W. B.; Russell, J. C. 2005. Ship rat *Rattus rattus* eradication by trapping and poison-baiting on Goat Island, New Zealand. *Conservation Evidence*, 2, 142-144.](#)

Summary: Available from: <http://www.conservationevidence.com/Attachments/PDF242.pdf> [Accessed 12 March 2010]

[Marine Turtle Newsletter No. 106, 2004](#)

Summary: Describes the rat eradication on Sangalaki Is. as part of a green turtle (*Chelonia mydas*) conservation programme.

Available from: <http://www.seaturtle.org/mtn/archives/mtn106/> [Accessed 19 February 2008]

[McClelland, P.J., 2002. Eradication of Pacific rats \(*Rattus exulans*\) from Whenua Hou Nature Reserve \(Codfish Island\), Putauhinu and Rarotoka Islands, New Zealand. In *Turning the tide: the eradication of invasive species*: 173-181. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

Summary: Eradication case study in *Turning the tide: the eradication of invasive species*.

Megapode Newsletter Vol. 18, nr. 1 October 2004. *BirdLife/WPA/SSC Megapode Specialist Group*

Summary: Describes observations and conservation through rat eradication.

[Meier, G., 2003. InGrip-Report No.1, prepared for Turtle Foundation by InGrip-Consulting & Animal Control. Hauptstr. 1 - 82541 Ammerland, Germany.](#)

Summary: This report describes a successful rat eradication project on Sangalaki Island, East-Kalimantan in detail.

[Merton, D. G., Climo, V. Laboudallon, S. Robert, and C. Mander., 2002. Alien mammal eradication and quarantine on inhabited islands in the Seychelles. In *Turning the tide: the eradication of invasive species*: 182-198. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

Summary: Eradication case study in *Turning the tide: the eradication of invasive species*.

[Micol and Jouvantin, 2002. Eradication of rats and rabbits from Saint-Paul Island. In *Turning the tide: the eradication of invasive species*: 199-205. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

Summary: Eradication case study in *Turning the tide: the eradication of invasive species*.

[Mineau, Pierre; Richard, F. Shore; Robert, C. Hosea and ward, B. Stone., 2004. Towards a Risk Assessment of Second Generation Rodenticides: Do We have Enough Information to Proceed? *Wildlife Damage Management, Internet Center for USDA National Wildlife Research Center -Staff Publications. 2nd National Invasive Rodent Summit.*](#)

Summary: Available from: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1730&context=icwdm_usdanwrc [Accessed 19 February 2008]

Moors, P. J., Atkinson, I. A. E. and Sherley, G. H. 1992. Reducing the rat threat to island birds. *Bird Conservation International* 2: 93-114.

Morris, 2002. The eradication of the black rat (*Rattus rattus*) on Barrow and adjacent islands off the north-west coast of Western Australia. In *Turning the tide: the eradication of invasive species* : 219-225. Veitch, C.R. and Clout, M.N.(eds). IUCN SSC Invasive Species Specialist Group. IUCN. Gland, Switzerland and Cambridge, UK.

Summary: Eradication case study in Turning the tide: the eradication of invasive species.

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Summary: Available from: <http://www.doc.govt.nz/upload/documents/science-and-technical/sfc150.pdf> [Accessed 19 February 2008]


Pacific Invasives Initiative (PII), 2006. Eradicating invasive species from Kayangel Atoll, Palau

Summary: Available from: <http://www.issg.org/cii/PII/demo/kayangel.html> [Accessed 12 March 2010]

Pacific Invasives Initiative (PII), 2006. Mont Pani  Mammal Control  Proof-of-Concept  Project

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Recher, H. F. and Clark, S. S. 1974. A biological survey of Lord Howe Island with recommendations for conservation of the island's wildlife. *Biological Conservation* 6: 263  273.

Robertson, H.A., 2000. Conservation of kakerori (*Pomarea dimidiata*), Rarotonga. Conservation Advisory Science Notes No. 272, Department of Conservation, Wellington.

Summary: Available from: <http://www.doc.govt.nz/upload/documents/science-and-technical/casn272.pdf> [Accessed 2 September 2008]

Robertson, H. A. Hay, J. R., Saul, E. K and McCormack, G.V. 1994. Recovery of the Kakerori: An Endangered Forest Bird of the Cook Islands, *Conservation Biology* 8 (4): 1078-1086.

Robertson, H.A.; Saul, E.K. 2004: Conservation of kakerori (*Pomarea dimidiata*) on the Cook Islands in 2002/03. DOC Science Internal Series 167. Department of Conservation, Wellington. 16 p.

Summary: Available from: <http://www.doc.govt.nz/upload/documents/science-and-technical/dsis167.pdf> [Accessed 2 September 2008]

Robertson, H.A.; Saul, E.K. 2005: Conservation of kakerori (*Pomarea dimidiata*) in the Cook Islands in 2003/04. DOC Research & Development Series 207. Department of Conservation, Wellington. 16 p.

Summary: Available from: <http://www.doc.govt.nz/upload/documents/science-and-technical/drds207.pdf> [Accessed 2 September 2008]

Robertson, H.A.; Saul, E.K. 2006: Conservation of kakerori (*Pomarea dimidiata*) in the Cook Islands in 2004/05. DOC Research & Development Series 246. Department of Conservation, Wellington. 18 p.

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Robertson, H.A.; Saul, E.K. 2007: Conservation of kakerori (*Pomarea dimidiata*) in the Cook Islands in 2005/06. DOC Research & Development Series 285. Department of Conservation, Wellington. 19 p.

Summary: Available from: <http://www.doc.govt.nz/upload/documents/science-and-technical/drds285.pdf> [Accessed 2 September 2008]

Robertson, H.A.; Saul, E.K. 2008: Conservation of kakerori (*Pomarea dimidiata*) in the Cook Islands in 2006/07. DOC Research & Development Series 296. Department of Conservation, Wellington. 19 p.

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Summary: Eradication case study in Turning the tide: the eradication of invasive species.

The Garry Oak Ecosystems Recovery Team (GOERT)., 2007. Exotic vertebrate species in Garry oak and associated ecosystems in British Columbia


Summary: Available from: http://www.goert.ca/pubs_invasive.php#vertebrate_species [Accessed 13 February 2008]

Varnham, K. 2006. Non-native species in UK Overseas Territories: a review. JNCC Report 372. Peterborough: United Kingdom.

Summary: This database compiles information on alien species from British Overseas Territories.


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Summary: Available from: [http://www.newzealandecology.org/nzje/free_issues/NZ\]Ecol23_1_45.pdf](http://www.newzealandecology.org/nzje/free_issues/NZ]Ecol23_1_45.pdf) [Accessed 19 February 2008]

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[BirdLife International 2004. *Sula leucogaster*. In: IUCN 2006. 2006 IUCN Red List of Threatened Species](#)

Summary: Available from: <http://www.iucnredlist.org/apps/redlist/details/144618/0> [Accessed 12 March 2010]

[BirdLife International 2006. *Pomarea dimidiata*. In: IUCN 2007. 2007 IUCN Red List of Threatened Species.](#)

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Chapuis, J., Bousset, P., & Barnaud, G. 1994. Alien mammals, impact and management in the French Subantarctic Islands. *Biological Conservation*, 67, 97-104.

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 el 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:

http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Mam%C3%ADferos [Accessed 30 July 2008]

[Donlan, C. J., Avila-Villegas, H., Ortega, D. B., Biavaschi, N., Bodorff, N., Boyer, R., Comendant, T., Croll, D. A., Cudney-Bueno, R., Galván de la Rosa, R., Howald, G. R., Lozano-Romón, L. F., Morales, C., Morales, O., Morales-Gonzalez, Z., Raimondi, P., Sanchez, J. A., Steller, D., Tershy, B. R., Turk-Boyer, 2002. Black Rat \(*Rattus rattus*\) Eradication from the San Jorge Islands, Mexico. Unpublished Report, Island Conservation and Ecology Group. ICEG Technical Report: March 2002](#)

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[Gargominy, O. \(Ed.\). 2003. Biodiversité et conservation dans les collectivités françaises d'outre-mer. Comité français pour l'IUCN, Paris.](#)

Summary: Synthèse sur la biodiversité des îles françaises d'outre-mer et les enjeux de conservation.

Available from: <http://www.uicn.fr/Biodiversite-outre-mer-2003.html> [Accessed 26 March 2008]

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Harris, M. P. 1970. The biology of an endangered species, the dark-rumped petrel (*Pterodroma phaeopygia*), in the Galapagos Islands. *Condor* 72: 76-84.

Hindwood, K. A. 1940. The birds of Lord Howe Island. *Emu* 40: 1-86.

Innes, J. G. 1990. Ship Rat. *The Handbook of New Zealand Mammals*. King, C. M. (ed.) Oxford University Press: 206-225.

Summary: A complete reference to the ship rat in New Zealand.

[ITIS \(Integrated Taxonomic Information System\), 2005. Online Database *Rattus rattus*](#)

Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.

Available from:

http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Rattus+rattus&p_format=&p_ifx=plgt&p_lang= [Accessed March 2005]

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- Langford, D. and Burbidge, A.A., 2001. Translocation of mala from the Tanami Desert, Northern Territory to Trimouille Island, Western Australia. Australian Mammalogy 23, 37-46.
- Lorvelec, O., Delloue, X., Pascal, M., & Mege, S. 2004. Impact des mammifères allochtones sur quelques espèces autochtones de l'île de Fajou (Réserve Naturelle du Grand Cul-de-Sac-Marin, Guadeloupe), établis à l'issue d'une tentative d'acclimatation. Revue d'Ecologie (La Terre et la Vie), 59, 293-307.
- Lorvelec, O. & Pascal, M. 2006. Les vertébrés de Clipperton soumis à un siècle et demi de bouleversements écologiques. Revue d'Ecologie (La terre et la Vie), 61, 2
- Lorvelec, O., Pascal, M., Delloue, X., Chapuis, J.L. 2007. Les mammifères terrestres non volants des Antilles françaises et l'introduction récente d'un prédateur. Rev.Ecol. (Terre Vie), 62, 295-314
- Summary:** Bilan des introductions des mammifères terrestres dans les Antilles françaises et analyse de leurs impacts.
- [Lorvelec, O., Pascal, M., & Pavis, C. 2001. Inventaire et statut des Mammifères des Antilles françaises \(hors Chiroptères et Cétacés\). In Rapport n° 27 de l'Association pour l'Etude et la Protection des Vertébrés et Végétaux des Petites Antilles, Petit-Bourg, Guadeloupe.](#)
- Summary:** Article de synthèse sur les mammifères (hors chiroptères et cétacés) des Antilles françaises. L'origine des espèces introduites et leurs impacts avérés ou potentiels sont discutés.
- Available from: http://www.fnh.org/francais/fnh/uicn/pdf/biodiv_mammiferes_antilles.pdf [Accessed 9 April 2008]
- Louette M. 1999. La Faune terrestre de Mayotte - Musée Royal de l'Afrique Centrale, 247 p.
- Summary:** Synthèse générale sur la faune terrestre de Mayotte
- [Meier, Guntram., 2004. New sightings of a small island specialist](#)
- Summary:** Available from: <http://www.birdlife.org/news/news/2004/07/imperial-pigeon.html> [Accessed 12 March 2010]
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- Summary:** Available from: http://inpn.mnhn.fr/isb/servlet/ISBServlet?action=Espece&typeAction=10&pageReturn=ficheEspeceDescription.jsp&numero_taxon=61587 [Accessed March 25 2008]
- Pascal, M., Barré, N., De Garine-Wichatitsky, Lorvelec, O., Frétey, T., Brescia, F., Jourdan, H. 2006. Les peuplements néo-calédoniens de vertébrés : invasions, disparitions. Pp 111-162, in M.-L. Beauvais et al., : Les espèces envahissantes dans l'archipel néo-calédonien, Paris, IRD éditions, 260 p.+ cd-rom
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- Pascal, M., Brithmer, R., Lorvelec, O., & Venumire, N. 2004a. Conséquences sur l'avifaune nicheuse de la réserve naturelle des îlets de Sainte-Anne (Martinique) de la récente invasion du rat noir (*Rattus rattus*), établis à l'issue d'une tentative d'acclimatation. Revue d'Ecologie (La Terre et la Vie), 59, 309-318.
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- Seto, Nanette W. H. and Sheila Conant., 1996. The Effects of Rat (*Rattus rattus*) Predation on the Reproductive Success of the Bonin Petrel (*Pterodroma hypoleuca*) on Midway Atoll. Colonial Waterbirds, Vol. 19, No. 2 (1996), pp. 171-185
- Summary:** Abstract: The breeding population of the Bonin Petrel (*Pterodroma hypoleuca*) on Midway Atoll has declined dramatically since the accidental introduction of the black rat (*Rattus rattus*). During 1993 and 1994, we examined the effects of rat predation on Bonin Petrel reproductive success by monitoring nesting petrels in six study sites, three of which were treated with rodenticide (treatment) and three that were not (control). Results indicate that the incubation stage of the petrels nesting cycle is most vulnerable to rat predation. Both unattended and incubated eggs were attacked by rats. Rat predation was not observed on petrel chicks in study nests. However, incidental observations of chick remains outside of burrows suggest that rat predation on chicks may occur, but at a low frequency. Sites with low burrow density suffered more from rat predation than sites with higher burrow density. The rodenticide Vengeance trademark appeared to successfully suppress the rat numbers in treated sites. The number of nests that failed due to rat predation was significantly lower in two of the three treatment sites when compared with their paired control sites. In addition, the indications of rat activity were lower at these two treatment sites than at the paired control sites. Therefore, this study provides some evidence that rodenticide application is successful in reducing the number of rats, which in turn reduces the amount of rat predation and is associated with an increase in the reproductive success of Bonin Petrels.
- Yosida, T. H. 1980. Cytogenetics of the Black Rat: karyotype evolution and species differentiation. University of Tokyo Press.