GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Rattus rattus***

Rattus rattus **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\r\nwooden 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\r\namount 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.

Pubblication date: 2011-01-11

ALIEN RANGE
[1] AMERICAN SAMOA
[1] ANGUILLA
[5] ANTIGUA AND BARBUDA
[20] AUSTRALIA
[2] BAHAMAS
[1] BARBADOS
[1] BERMUDA
[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 nesiotes **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 antiguae **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**
Eudyptes 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**
Nesofregetta 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**
Isoodon 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 nukuhivae **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**
Rhynochetos 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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