



Animal Pest Alert

Pacific Rat

NOT INDIGENOUS

The Pacific Rat (*Rattus exulans*) is also known as the Kiore, or Polynesian or Maori Rat. It is not indigenous to Australia but has established populations in the wild on islands here and elsewhere in Asia and the South Pacific. It is closely associated with human settlement and is often accidentally transported to new areas by people.

The Pacific rat poses an extreme threat to Australia. It has significant potential to establish more wild populations on islands and the mainland and become a pest.

It is very important that those travelling into Australian waters maintain quarantine measures against rats and immediately report any Pacific rats found here. Similarly, it is vital that persons visiting those Australian islands that currently support Pacific rat populations do not transport them to other islands or the mainland.



PHOTO: DICK VEITCH



Bush Rat

INDIGENOUS

PHOTO: JIRI LOCHMAN / LOCHMAN TRANSPARENCIES



Black Rat

NOT INDIGENOUS

PHOTO: JIRI LOCHMAN / LOCHMAN TRANSPARENCIES



Norway Rat

NOT INDIGENOUS

PHOTO: PIXTAL / AGE FOTOSTOCK

Please report any Pacific Rats seen in Australia – Freecall 1800 084 881

Pacific Rat



Figure 1. The distribution of the Pacific rat including natural (blue) and introduced (red) populations.



Description

The Pacific rat is a small mammal 8 to 14 cm in length (head and body) and 30 to 100 g in weight. The tail length is variable, often as long as or slightly longer than the body but it can also be shorter. The body fur is reddish-brown to grey-brown with translucent bristles buried in the fur and projecting black guard hairs on the back and sides; the fur feels somewhat harsh to touch. The belly fur is dark grey with white or pale grey tips (Figure 2). The thin, dark tail has short hairs on the upper surface and narrow rings of scales. The upper surface of each hind foot is marked with a triangle of dark reddish-brown hairs, extending from the ankle to part way down the foot. The toes are pale. The rat has a pointed nose and naked ears with dark grey skin.



Figure 2. The body fur of the Pacific rat is reddish-brown to grey-brown and the belly fur is dark grey with pale tips (photo: Department of Conservation Te Papa Atawhai).

Mistaken identity

In Australia, the Pacific rat may be mistaken for other rodents, but the table will help to distinguish adults from other species. Juvenile Pacific rats are similar to House Mice (*Mus musculus*) apart from the tail colour; the rat's tail is dark while the mouse's tail is grey-brown. The feet of a juvenile Pacific rat are proportionally longer and broader than those of an equivalent-sized mouse. Pacific rats also have an elongated fleshy pad on the under surface of the feet whereas the pad is round shaped on mice.

Distribution

The natural range of the Pacific rat was probably parts of Indochina but it is not well-defined because of its transportation by people throughout the Pacific region in prehistoric times. Its current range includes southern and south-eastern Asia from eastern Bangladesh, the Andaman Islands, Burma, Thailand, Vietnam, Taiwan, south to the Greater and Lesser Sunda Islands (Sumatra to West Papua), Papua New Guinea (including the Bismarck Archipelago), the Solomon Islands, the Philippines, New Zealand and many of the islands of Micronesia and Polynesia (Figure 1).

Name and status; Distribution	Ears	Body weight; Fur	Tail	Hind foot; No. of nipples
Pacific rat (<i>R. exulans</i>) Not indigenous On coastal islands in n. Australia. Associates with humans.	Smaller than black rat's, cover eyes if pulled forward.	30–100 g Reddish- to grey-brown. Belly fur dark grey with white/light grey tips. Dark hair patch on upper hind feet.	125–135 mm About the same as head/body length; thin and all dark.	24–31 mm 4 on each side of body; 2 on each side of lower abdomen.
Bush rat (<i>R. fuscipes</i>) Indigenous Coastal areas of sw. and e. Australia. Does not associate with humans.	Do not cover eyes if pulled forward.	40–225 g Variable-long soft grey, shaggy dark grey, short reddish brown (longer and softer than Norway rat's). Belly always grey or cream.	105–195 mm Slightly shorter than head/body length; shorter than black rat's; less scaly than Norway rat's.	23–40 mm 4–5 on each side of body; 3 on each side of lower abdomen.
Black or ship Rat (<i>R. rattus</i>) Not indigenous Coastal Australia and on Australian islands. Associates with humans.	Cover eyes if pulled forward.	95–340 g Grey-brown to reddish-brown. Belly fur grey, white or cream often tinged yellowish.	185–245 mm Variable, usually 10–30 mm more than head/body length; all dark.	30–40 mm 5–6 on each side of body; 3 on each side of lower abdomen.
Norway or brown rat (<i>R. norvegicus</i>) Not indigenous All areas except the NT. Associates with humans.	Do not cover eyes if pulled forward.	200–400 g Grey-brown on back. Appearing shaggy and bristly. Belly fur pale brown or grey. Black individuals occur.	150–215 mm Clearly shorter than head/body length; thick and usually with pale underside.	30–45 mm 6 on each side of body; 3 on each side of lower abdomen.



Figure 3. Pacific rats feeding on coconuts in an area of subsistence agriculture on Naqelevu Island (Fiji) (photo: Mike Bell).

Invasion pathways

Pacific rats were introduced to many Pacific islands including Hawaii and New Zealand by early Polynesian colonists, either as accidental stowaways or deliberately as a food source.

In recent times, accidental stowaways on vessels have been considered the source of new infestations in Australia.

The earliest records of the Pacific rat in Australia are from Adele Island (northern Western Australia) in 1891. The rat is believed to have been translocated on fishing vessels from Indonesia during the nineteenth century or earlier, and from Murray Island (east of the Torres Strait) in 1888–89 (probably introduced by early canoeists from Papua). Currently, the Pacific rat occurs on these two islands as well as Norfolk Island. It may also occur on Sunday Island (Western Australia) and Christmas Island (Commonwealth). Pacific rats have not been recorded on mainland Australia.

Habitat

In Asia the Pacific rat lives in close association with people around villages and in huts or houses, cultivated fields, rice paddies, coconut plantations and canefields. In Pacific island villages the Black Rat generally displaces the Pacific rat to the forests or, if the black rat occurs in high numbers, the Pacific rat may be absent. The Pacific rat also inhabits cleared areas with good cover, grassland, bush, scrub and secondary forest. On Adele Island it lives in spinifex hummock grassland completely away from human habitation.

Reproduction, food and behaviour

The Pacific rat breeds throughout the year with increased activity between October and June. In New Zealand, breeding is from September to March. Pacific rats usually have three litters per year, typically of four young, but litter size can vary from one to nine. The neat, spherical nest is usually built about 20 cm off the ground among debris, often at the base of trees, in and under logs and sometimes in trees and buildings. Nests can be suspended in 'tussock' grasses including rice plants and cane grass.

The Pacific rat is omnivorous, eating seeds, flowers, fruits and other plant parts, snails, insects and larvae, earthworms, lizards and birds, their eggs and

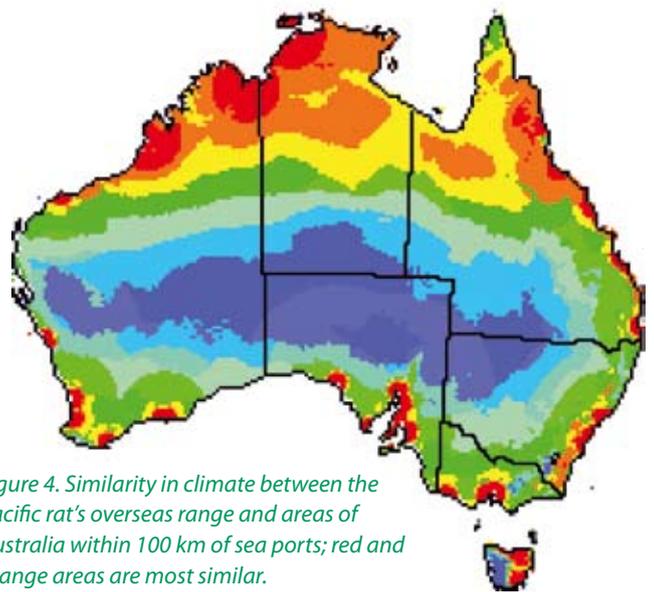


Figure 4. Similarity in climate between the Pacific rat's overseas range and areas of Australia within 100 km of sea ports; red and orange areas are most similar.

chicks. Pacific rats often carry food to small husking stations that provide shelter from predators, competitors and the elements during feeding.

The Pacific rat is nocturnal but when population density is high, activity begins just before dark and daytime activity has been observed on Pacific islands. It lives mainly on the ground but also climbs tall grasses, low trees and along village walls and roofs. Data from New Zealand indicates the Pacific rat is only able to swim an average of 65 m, while black rats average 300 m or greater and Norway Rats 600 m.

The life expectancy of the Pacific rat in the wild is less than one year.

Damage by the Pacific rat

The Pacific rat is considered a major pest of agriculture in some parts of mainland south-eastern Asia and its islands, Melanesia and throughout the Pacific region. Greatest damage is reported to rice and sugarcane crops and in Melanesia to tuber crops such as sweet potato. Other crops damaged include banana, cacao, coconut (Figure 3), maize, passionfruit, pawpaw, pineapple and root crops. A variety of damage occurs with flowers, pollen, fruit and seeds eaten, and stalks and other plant parts gnawed causing damage and increasing the plants' susceptibility to infection and disease.

The Pacific rat is considered a moderate environmental pest, competing with, and preying on, indigenous wildlife and adversely affecting native forests.

Species of ground-nesting birds (Figure 5), reptiles and large flightless invertebrates have declined on some New Zealand offshore islands since the arrival of the Pacific rat, and it is considered responsible for the extinction of the Greater Short-tailed Bat. On Norfolk Island the Pacific rat feeds on the eggs and nestlings of ground-nesting birds and it is likely that this contributed to the extinction of the burrow-nesting Providence Petrel and Pycroft's Petrel. On this island it is also likely that the rat contributed to the extinction of the Kaka Parrot, Norfolk Pigeon and Tasman Starling. On Henderson Island (Pitcairn Islands) intense predation of newly-hatched chicks by Pacific rats was observed during a one year study of three species of petrels. On Green Island (Hawaii), Pacific rats were observed feeding on nesting Laysan Albatrosses causing birds to die later from their injuries.

Droppings

6.4–9 mm
Blunt ended.

12 mm (est.)
One end pointed. Found at burrow entrances and on rat runways.

6.8–13.8 mm
Blunt ended. Deposited singly and scattered about.

13.4–19.1 mm
One end pointed. Usually in groups, corners and ledges.

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The Pacific rat also causes environmental damage to plants in New Zealand. Reduced recruitment of at least 11 tree species is reported and some have been made locally extinct due to rats eating plants, seeds and seedlings. Similarly, on Pacific islands the rat damages indigenous plants (including at least 15 threatened species) by eating plant parts and damaging bark.

On Viwa Island (Fiji), the Pacific rat enters homes, eats food and bites people while they sleep. The rat is also a significant public health risk in south-eastern Asia and the Pacific region as it is a vector of human diseases such as leptospirosis and scrub typhus, which can cause serious illness or death if not diagnosed and treated early.

Intensive eradication programs using toxic baits are used to remove Pacific rats from Australian, New Zealand and Pacific islands (Figure 6). In 2004, a program to eradicate rats from Adele Island was conducted by the state Department of Environment and Conservation and though it was unsuccessful, a follow up campaign is planned for 2011.



Figure 5. Pacific rat damage to an egg of the Kakapo (an endangered ground-nesting parrot in New Zealand) (photo: Department of Conservation Te Papa Atawhai).

Potential to be a pest in Australia

A scientific risk assessment of the Pacific rat was conducted by the Department of Agriculture and Food, Western Australia and endorsed by the national Vertebrate Pests Committee. It involved careful use of available information and application of the precautionary approach and indicates that the Pacific rat poses an extreme threat (the highest of four categories) to Australia. The risk assessment rated the rat as highly likely to establish further populations here as several areas of the country have climates similar to the rat's overseas range (Figure 4). The extreme threat category assigned to this species indicates that once established, it could become a pest of agriculture, the environment and the community.

Important Disclaimer

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.



Figure 6. Bait stations stocked with toxic baits are used to remove Pacific, black and Norway rats from Australian, New Zealand and Pacific islands (photo: Paul Meek).

It is therefore important that the Pacific rat does not establish further populations in the wild in Australia and that any found here are removed quickly.

Pacific rats inhabit ecological niches similar to those of some Australian rodents and marsupials and these would be potentially at risk from competition for food, nesting sites and suitable habitat. The diet of the Pacific rat could include a wide range of indigenous plants and animals, including animals larger than itself. For example, ground-nesting birds and their eggs and chicks could be at risk from predation. Agricultural crops that could be at risk include cereals, flowers, fruit (such as grapes, pineapples and passionfruit), legumes, nuts, oil seeds, sugarcane and vegetables.

The Pacific rat often lives in close association with humans so it could spread diseases such as leptospirosis. By damaging gardens, foodstuffs and electrical wiring it could also add to the nuisance already caused in urban areas by other pest rodents.

Pacific rats in the wild and risk management

The Pacific rat is prohibited from import into Australia but it could arrive here accidentally. To prevent the rat from establishing populations in the wild here and becoming a pest, it is essential that all those involved in importing cargo into Australia ensure that rodents do not board ships and transport barges at the point of departure. Any animals found on board should be eliminated to ensure they do not disembark here, and management strategies should be in place at likely entry points to detect, contain and eradicate rats.

Any Pacific rats detected should also be immediately reported to the nearest relevant government department or wildlife authority on Freecall 1800 084 881 so that appropriate action can be taken.

Acknowledgments

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