

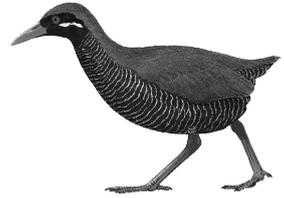
OKINAWA RAIL

Gallirallus okinawae

Critical —

Endangered B1+2a,b,c,e; C2b

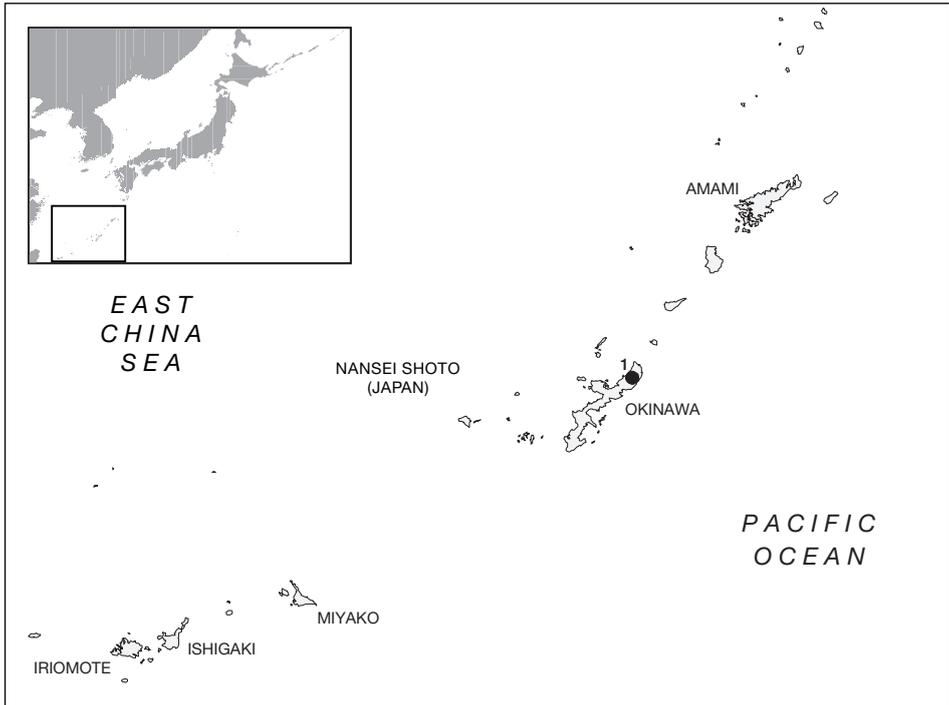
Vulnerable C1; D1



This species qualifies as Endangered because it has a single, very small, declining population with a very small range, as a result of loss of forest to logging, infrastructure development, agriculture and the construction of golf courses plus a major proposed helipad area; exotic predators may soon take a toll.

DISTRIBUTION The Okinawa Rail (see Remarks 1) is an apparently flightless endemic to the island of Okinawa in the Nansei Shoto (Ryukyu) islands of southern Japan, where it is confined to the northern quarter of the island to the north of Shioya, Henan and Taira (see map in Harato and Ozaki 1993), with records as follows:

■ **JAPAN** Okinawa island, **Kunigami-gun** (locally called Yambaru or Yanbaru), northern Okinawa, near Mt Fuenchiji and Mt Yonaha, birds observed in 1978–1980 and one found dead (the type) and two captured and released in June–July 1981 (Yamashina and Mano 1981, WBSJ 1993), with regular observations subsequently in the area, and several surveys and ecological studies completed (e.g. Ikenaga 1983, Brazil 1984b, 1985a,b, Hanawa and Morishita



The distribution of Okinawa Rail *Gallirallus okinawae*: (1) Kunigami-gun.

● Recent (1980–present)

1986, Harato and Ozaki 1993, Ikenaga and Gima 1993) such that its current range is now known to include Kunigami-son, Ohgimi-son and Higashi-son, and possibly Nago-shi and the Motobu peninsula (McWhirter *et al.* 1996; see Map 4 in *J. Yamashina Inst. Orn.* special 50th anniversary issue [1984]: 50; Figure 3 in Brazil 1984b; and Figure 2 in Harato and Ozaki 1993).

Isolated records on the Motobu peninsula in west-central Okinawa have been reported (although the authority for them has not been traced) and are likely to have referred to vagrant individuals or a relict population that is almost certainly now extinct (Brazil 1985b). It is, however, the case that the species's use of habitats adjacent to forest (see below) bestows on this species a larger extent of occurrence (put at 260 km² in Hanawa and Morishita 1986) than Yambaru's other endemic bird species, the Okinawa Woodpecker *Sapheopipo noguchii*, which is much more strictly tied to original forest (see relevant account).

POPULATION Brazil (1984a, 1985b), working with H. Ikenaga, found the Okinawa Rail to be reasonably common in its small range, and estimated a total population of at least 500 birds and probably 1,000–2,000. Soon afterwards, Hanawa and Morishita (1986) estimated the range size of this species to be c.260 km² (see Remarks 2) and its population to be c.900 pairs or 1,500–2,100 birds, deduced from the density of calling birds and the extent of suitable habitats available. Subsequently the population was put at 1,800 birds (Rose and Scott 1994) and, in a recent review, its population has been indicated as fewer than 10,000 individuals (Ito *et al.* 2000; see Remarks 3).

ECOLOGY *Habitat* This species occurs in a variety of habitats from sea-level to the highest part of Yambaru (500 m), chiefly primary and secondary subtropical broadleaf evergreen forest (dominated by "itajii" *Castanopsis cuspidata*; see Remarks 4 under Okinawa Woodpecker), often with a dense undergrowth of ferns, visiting damp areas and the margins of streams, pools or reservoirs, also penetrating stands of Ryukyu pine *Pinus luchuensis* and cultivated areas, scrub, meadows and grasslands close to forest, even occasionally populated areas, once being seen on a garden lawn (Brazil 1985b, 1991, Harato and Ozaki 1993, Research Center, WBSJ 1993). This species is almost, but not completely, flightless (see Kuroda 1993), and spends most of its time on the ground where it runs swiftly on long stout legs (Brazil 1991), although it can swim well (Ikenaga 1983, Brazil 1984b) and roosts in trees (the same site being repeatedly used), chiefly ones 6–16 m high growing at an angle (which thereby allows access on foot), on fairly stout open branches at 2–12 m, perhaps as an adaptation against snake predation (Harato and Ozaki 1993; also Brazil 1985a). Brazil (1985b) reported more than 80% of sightings within 4 km and 48% within 2 km of the coast, and 60% of sightings (which went up to 400 m) between sea-level and 200 m, but he expressed doubt that these were reliable findings of preference for lower-lying areas and thought they might simply reflect greater ease of observer access.

Food It is thought to be omnivorous, with small animals as its main food; captive birds have been fed on insects, frogs and earthworms (Hanawa *et al.* 1983). It has been seen feeding on the forest floor, taking land snails, insects (particularly locusts), amphibians and lizards, and it may also take some food from shallow water when it visits pools to bathe and drink (Brazil 1991).

Breeding Birds are monogamous, appear to form a strong pair-bond (duetting at dawn) and defend a territory (Ikenaga 1983, Brazil 1984a,b, 1985a, Ikenaga and Gima 1993). The breeding season is from May to July, when nests are made on the ground or possibly in a stump cavity, with dead leaves, grass and fern fronds, and the clutch consists of 2–4 eggs (Brazil 1991).

Migration The species is sedentary, but some birds (of unknown age) descend in winter to lower elevations and wander into areas just south of their core range (Brazil 1991, Harato and Ozaki 1993).

THREATS The Okinawa Rail is one of five threatened members of the suite of seven bird species that are entirely restricted to the “Nansei Shoto Endemic Bird Area”, threats and conservation measures in which are profiled by Stattersfield *et al.* (1998).

Habitat loss The range and population of this species must have contracted this century because of the clearance of its habitat, and there is substantial (particularly since 1945) and continuing deforestation in its small range (Brazil 1991). In the early 1980s forest was “disappearing rapidly”, and one observer recorded that in six visits over three years he had “seen many areas occupied by woodpeckers [Okinawa Woodpecker] disappear” (Brazil 1985b). Road building and farm development are further threats to the species, whittling away at wetland habitat at the edges of the forest (Brazil 1984b). It had been feared that reversion of Okinawa to Japanese control in May 1972 might have resulted in increased habitat loss at Yambaru, which was partly under US Army administration (Short 1973), but to the contrary in early 1975 wood-cutting had virtually ceased and human disturbance diminished, although feral pigs were then seriously damaging the woodpecker’s (and therefore presumably the as-yet undiscovered rail’s) potential ground-foraging sites (Bruce 1975a). Nevertheless, forest clearance soon began again, and in the years 1979–1991 24.5 km² of forest were cut down (Ito *et al.* 2000), and in the 1990s a further part of the remaining climax forest was destroyed by wide-scale clear-cutting by national and prefectural governments, and another 15 km² was seriously compromised, 1972–1992, by the rem subsidy through the “Natural Forest Improvement Project” (Azuma *et al.* 1997, Ito *et al.* 2000). Other activities that are have caused further habitat loss include dam construction (five since 1972) and associated road-building, agricultural development and golf course construction (Hanawa and Morishita 1986, Ishida 1989, Harato and Ozaki 1993, Ichida 1997, Miyagi undated).

A potentially calamitous new threat is a plan jointly agreed by the government of Japan and the US Army to move the latter’s existing base (retained after the island’s reversion to Japan in 1972) from the south of the island to an area near Nago adjacent to Yambaru, with a further intention to build several helicopter pads in the centre of Yambaru (Ito *et al.* 2000, N. Ichida verbally 2000). One effect of the helicopter pads will be the immense amount of fragmentation and opening up of forest by the roads that will be necessary to build and service the sites (Ito *et al.* 2000), and such roads will permit greater access by introduced predators, and lead to a greater number of casualties of vehicles amongst the rail population (see Taylor 1998).

Introduced mammals and snake Feral dogs and cats and the introduced Javan mongoose *Herpestes javanicus* (see Remarks 4) and weasel *Mustela itatsi* are possible predators of this species (cats were blamed for three cases of predation in 1992), and the weasel and mongoose were, in the early 1990s, reportedly spreading towards the rail’s habitat (Hanawa *et al.* 1983, Brazil 1985a, Harato and Ozaki 1993, Kuroda 1993, Abe 1994); as a flightless or near-flightless rail, this combination of threats appears to be daunting, given that flightless insular rallids are notorious for their high incidence of extinctions (see, e.g., Taylor 1998). In 1975 feral pigs were seriously damaging potential ground-foraging sites for the Okinawa Woodpecker (Bruce 1975a; see relevant account), and this would presumably have been having a similar deleterious effect on the Okinawa Rail and Ryukyu Woodcock *Scolopax mira* (see relevant account). The brown tree snake *Boiga irregularis*, which is responsible for the almost complete elimination of the native terrestrial avifauna of Guam (see under Mariana Islands in Stattersfield *et al.* 1998), including a close relative of the Okinawa Rail, the endemic flightless Guam Rail *Gallirallus owstoni* (Taylor 1998), has been observed on Okinawa (Taylor 1998).

MEASURES TAKEN Legislation Okinawa Rail has been designated as a special protected bird (Research Center, WBSJ 1993). It was designated as a Natural Monument on 18 December 1982 (Kato *et al.* 1995), and it has been protected as a National Endangered Species since 1993 (Environment Agency of Japan *in litt.* 1999).

Protected areas A small area of suitable habitat for this species is designated as a prefectural protection area at Mt Yonaha-dake (0.23 km²) (Brazil 1991), and small parts of Mt Ibu and Mt Nishime are also designated as protected areas by the government (Ichida 1997). The eastern part of Yambaru was designated as a US Army base, where entry was not allowed and rich forests remained, but the US government has recently agreed to return this area to Japan (Ichida 1997). WBSJ has been working for the promotion of the conservation of Yambaru since 1970, and has bought some sites on Mt Yonaha together with other conservation NGOs (using donations from members) to establish private wildlife reserves (Ichida 1997). In 1996, the Environment Agency of Japan decided to designate Yambaru as a national park, and WBSJ has been working to encourage this development (Ichida 1997).

Research Several surveys and ecological studies of this species have been completed (e.g. Ikenaga 1983, Brazil 1984b, 1985a, Hanawa and Morishita 1986, Harato and Ozaki 1993, Ikenaga and Gima 1993, etc.).

MEASURES PROPOSED **Habitat protection** The ultimate aim of lobbying activities is to create a major protected area embracing all remaining natural forest in Yambaru (see Measures Taken). Moreover, a resolution (CGR2.CNV005) of the World Conservation Congress, October 2000, mentioned the possibility of designating the forests of Yambaru a “Forest Ecosystems Protection Area and National Park” but noted that the recently proposed helicopter pads “will cause large-scale destruction of habitats in the most important remaining natural forest area”, and thus called on the government of Japan to “prepare a conservation plan for the area and consider nomination of the site... as a World Heritage Site” and on the government of the USA to “review and revise the plans for construction of military facilities and training plans to ensure conservation of the species in the area”. Some further considerations on forest management and conservation, perhaps outdated by the foregoing proposals, are outlined in the equivalent section under Okinawa Woodpecker.

Within any new protected area it has been suggested that there should be an “exclusive rail reserve”, ideally an area of water surrounded by forest, to which visitors could be brought in order to view the species without disturbing it (Brazil 1985b)—an idea which links with the proposal (below) to use the species in environmental awareness on the island.

Control of introduced predators Control of predators may prove to be essential for the survival of this species (and for several other threatened endemic species), including the introduced Javan mongoose and possibly also feral dogs and cats. Brazil (1985b) hinted that hunting organisations in the Nansei Shoto might be persuaded to assume responsibility for some of necessary control work.

Research The status of the population of this species should continue to be closely monitored, and ongoing ecological studies continued, particularly to determine whether introduced predators are adversely affecting its numbers. A ringing and radio-tracking programme would yield a great deal of information about survival and movements, and help to define territory sizes, breeding densities and therefore total population size.

Translocation The notion that birds might be moved to areas of unoccupied habitat was outlined by Harato and Ozaki (1993), although they did not indicate if or why such areas exist (if they are rail-free because of predation, then any translocation must be preceded by a rigorous predator eradication programme, which may be logistically and financially challenging).

Captive breeding The notion that captive breeding might be appropriate was recommended by Harato and Ozaki (1993), and clearly there is considerable merit in establishing a secure and healthy captive population as an insurance against the risks of catastrophic predation impact by the brown tree snake, the weasel and/or the mongoose. Done with flair and care, any such enterprise could be tied in closely with awareness campaigns to bring home to the people of Okinawa and their political leaders the immense biological value of Yambaru.

Local and international awareness Media and local interest in this colourful and characterful new rail was intense at the start of the 1980s, and many commercial enterprises were quick to adopt the bird for advertising, so that its image helped to sell various merchandise including beer and souvenirs (Brazil 1985b), and in 1986 a cartoon version was being used as the island logo at the main airport (NJC). Thus the species has a fund of goodwill and familiarity on which to build stronger environmental awareness. An education programme concerned with the conservation of the forests in Yambaru could adopt this species and Okinawa Woodpecker as flagships, emphasising their uniqueness and extreme vulnerability. Moreover, the biological values of the Yambaru area, outlined so forcefully in Ito *et al.* (2000; see Remarks 5), merit the strongest promotion among local and national politicians and the US military, and among US politicians and administrators with influence over overseas military affairs.

REMARKS (1) The discovery of this species in June 1978, after so much biological exploration of and study in northern Okinawa, was a noteworthy and widely reported event (see, e.g., Thiede 1982), and one which indicates the capability of skulking species to pass undetected for years even in relatively well-watched areas. (2) This figure fairly well matches the total of the very approximate figures provided by Y. Ito (*in litt.* 2001) for forest cover at Yambaru, namely 100 km² of *Castanopsis* forest over 30 years of age and 170 km² of secondary forest. It seems reasonable to assume from this that the Okinawa Rail is distributed throughout wooded habitats in Yambaru irrespective of age or condition; however, this is certainly not to indicate that it can breed with equal success in both forest types (as described above), and it may well be that its density and breeding success in secondary forest is far lower, the population there only being maintained by “overspill” from the more productive *Castanopsis* forest (for a proven example of this source/sink phenomenon on a small oceanic island, see Seychelles Kestrel *Falco araea* in Collar and Stuart 1985). (3) To indicate fewer than 10,000 is not to imply that the population is necessarily near this figure, but it is instructive to note how increasing familiarity with the species has led to increasing leaps in its estimated population size: according to Brazil (1985b, 1991), initial assessments suggested a population of as few as 30 or 50 birds. (4) Brazil (1985b), Harato and Ozaki (1993) and Taylor (1998) considered the animal to be Indian grey mongoose *H. edwardsii*, Kuroda (1993) *H. mungo*. (5) Yambaru is host to several species which are both (a) endemic exclusively to that area or to the Nansei Shoto, and (b) formally listed in Japan as threatened, namely Okinawa flying fox *Pteropus lochoensis*, Okinawa least horseshoe bat *Rhinolophus pumilis*, Yanbaru whiskered bat *Myotis yanbarensis*, Ryukyu tube-nosed bat *Murina ryukyuana*, Ryukyu bent-winged bat *Miniopterus fuscus*, Ryukyu spiny rat *Tokudaia osimensis*, Ryukyu long-haired rat *Diplothrix legata*, Japanese black-breasted leaf-turtle *Geoemyda japonica*, Barbour’s blue-tailed skink *Eumeces barbouri*, Anderson’s crocodile newt *Tylototriton andersoni*, Ryukyu tip-nosed frog *Rana narina*, Namie’s frog *R. namiyei*, Ishikawa’s frog *R. ishikawae*, Holst’s frog *Babina holsti* and the Giant long-armed beetle *Cheirotonus jambar* (Ito *et al.* 2000). If this list is extended to include endemic species and subspecies that are not regarded as threatened, and endemic subspecies that are regarded as threatened (some of the Ryukyu endemics above have subspecies endemic to Okinawa or Yambaru), it becomes very much longer (see Ito *et al.* 2000), underlining the irreducible importance of Yambaru and the extreme urgency with which it should be fully and finally protected.