The Micronesian megapode *Megapodius laperouse:* conservation and research needs

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Introduction

The Micronesian megapode *Megapodius laperouse*, one of the smallest megapode species, is endemic to the Mariana (*M. l. laperouse*) and Palau (*M. l. senex*) Islands in the western Pacific. We outline here the outlook for the species and aspects of their biology that need investigation. A more detailed account of the status and biology of *M. l. laperouse* in the Marianas is in preparation.

Status and distribution

The Micronesian megapode in the Marianas is now restricted to the remote volcanic islands north of Saipan, with the exception of a small remnant population on Aguijan and a reintroduced population on Saipan. In historic times, this species was found on the larger coral islands of Guam, Rota, Tinian, and Saipan, but was common only on Saipan. It went extinct on these islands in the 19th century, with the exception of Saipan, where it persisted into the 1930s though it was hunted and trapped incessantly (Baker, 1951). Generally a forest bird, it is found in both native limestone forests and dense coconut groves. Much of the forest of Saipan, Tinian, and Aguijan was lost to extensive clearing for sugar cane cultivation during the Japanese mandate (1914 - 1944). Megapodes were reintroduced to Saipan in the 1960s and 1970s by travellers from the more northern Mariana Islands, but their numbers are low and seem to be declining. Megapodes seem to have persisted on Aguijan, a nearby coral island of 7 km^2 and now uninhabited. Though only 9 km from Tinian, access is difficult and this may have allowed the birds to survive.

Megapodes occur or did occur on all of the nine northern volcanic islands of the archipelago, but are less abundant on inhabited islands probably due to poaching and domestic animals. The islands of Sarigan and Guguan support from a few hundred up to 2,000 megapodes respectively. Agrihan is reported to have had two nesting grounds where buckets of eggs were collected by residents. One of these nesting areas was destroyed by village construction during the Japanese period. The remaining nesting ground may still be subject to egging (Ludwig, 1979). The site has not

been revisited in recent years. Most of the remaining volcanic islands (Anatahan, Alamagan, Asuncion, Maug, and Farallon de Pajaros) are known to have small numbers of birds, but some have very limited forest habitat (Falanruw, 1975; Glass, 1988). The presence of megapodes on barren volcanic islands suggests that colonization events, either natural or man-assisted, are relatively frequent.

Incubation strategies of the Micronesian megapode

Different populations of the Micronesian megapode use different heat sources for the incubation of their eggs. The Palau subspecies *M. l. senex* builds mounds of forest litter, sometimes mixed with sand (G.J. Wiles pers. comm.). The importance of solar heat for these mounds is unknown. The Mariana subspecies *M. l. laperouse* is known to dig burrows in cinder soil heated geothermally or by the sun. Ludwig (1979) reported that on Agrihan it scrapes volcanic soil together into mounds three to four meter in diameter and 2/3 meter in height. Egg burrows were then dug into these mounds. The heat source for these mounds was unknown, but a closed canopy of coconuts discounted the sun as the primary source. Early Japanese literature also described mounds in the Marianas (Taka-Tsukasa, 1932), but it is not known with certainty if *M. l. laperouse* builds mounds. Recent records of immature birds and historical records from the larger coral islands suggest that this subspecies is also capable of using mounds and thus microbial decomposition to generate heat for incubation. Small mounds (two meter diameter, 0.5 m high) have been reported from Aguijan three times in recent years but they were not investigated further (Stinson, 1989). However, the species seems to be much more abundant where dark cinder fields or geothermal heat is available.

Research objectives

Although the species is not critically endangered, some island populations are near extirpation. Much basic research is needed on reproductive ecology and the factors limiting their populations. Microbial decomposition may provide the major heat source on coral islands. Dekker (1990) believes that mound-building was the first behaviour to evolve and burrow-nesting developed later. If this hypothesis is correct, have burrow-nesters lost the ability to build mounds? The small number of birds on Aguijan may be the only birds capable of survival on coral islands and represent a separate population. Further investigation of the birds on Sarigan and Agrihan may determine if, and how, they are using decompositional heat for incubation. The rate of recruitment using various heat-sources needs investigation.

Some details of morphology, distribution, and ecology also need further investigation. For example, the sexes are not obviously different, but for pairs seen together on Sarigan, the gular skin which is very sparsely feathered is a brighter red on the male. Further work should determine if this difference is found throughout the species and if it varies with season or behavioural state. Pairs on Saipan and Sarigan seem to defend a territory through at least a portion of the year (Glass in prep.), but it is not known if territories are maintained on islands with dense populations and

communal nesting-grounds. Reasons for the species limited distribution on some islands such as Agrihan are unknown. The magnitude of the impact of feral animals and monitor lizards on megapodes is not known.

The status and distribution of *M. l. senex* in Palau needs investigation to identify important sites before the recent wave of tourist development in Micronesia reaches there.

Conservation

The Saipan population may be doomed by low recruitment, introduced predators and loss of habitat to development. However, it may be possible to create a nesting-ground using cinder soil brought to Saipan, Rota, or any island with sufficent habitat. When the more basic questions are answered, then research should determine if a semi-artifical nesting-ground is necessary and feasible.

Besides monitor lizards, poaching, and feral animals, megapodes also face the additional threat of snakes becoming established as occurred on Guam, a major transhipment point for cargo in Micronesia (Savidge, 1987; Fritts, 1988). Predation by the introduced brown tree snake *Boiga irregularis* has already caused the extinction of Guam's forest birds.

Most of the uninhabited Mariana Islands are rather remote and do not have safe anchorage. Guguan, Asuncion, Maug, and Farallon de Pajaros are designated Wildlife Sanctuaries in the Constitution of the Commonwealth. Anatahan and Agrihan were recently evacuated due to increased seismic activity, but may be re-inhabited. The future of the Micronesian megapode on islands that remain uninhabited is relatively secure, but protection of habitat, predator control, and strict law enforcement will be essential on inhabited islands.

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