Australian Government

A survey of the terrestrial reptiles of Norfolk Island March 2005:

Report 4. Assessment of the suitability of potential gecko re-introduction sites on Norfolk's main island, and a review of threatening processes and the recovery actions proposed in the draft Recovery Plan

prepared for

the Department of the Environment and Heritage

by

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AMBS

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A survey of the native reptiles of islands in the Norfolk Island complex

Report 4: Assessment of the suitability of potential gecko re-introduction sites on Norfolk's main island and a review of threatening processes and the recovery actions proposed in the draft Recovery Plan

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1. Potential for the re-introduction of the native gecko (*Christinus guentheri*) to Norfolk's main island

Preamble: This project was undertaken during those periods spent on the main island when sea conditions precluded landing on the offshore islands. Days were spent visiting various locations on Norfolk Island to (a) search for the presence of either of the native lizards in suitable habitats and (b) search for suitable sites that might be exploited to create conditions for a successful reintroduction of *Christinus guentheri* to the main island. Given the relative scarcity of the skink *Oligosoma lichenigera* on Phillip Island (the only potential source of this species for any reintroduction programme) and its terrestrial habit, no effort was directed to assessing habitats on the main island for the introduction of this species.

Special attention was paid to those parts of the northern coastline where geckos occur naturally on many of the offshore rocks, some separated only by tens of metres from the main island and hence likely to be sources for the natural recolonisation of *Christinus guentheri* to the main island should any future predator-control programmes be successful. Special attention was also paid to locations within the existing park/reserve system on Norfolk Island as such locations would clearly avoid the complicating issues of land tenure.

No lizards of any kind were located at any of these main island localities.

A number of sites were identified as having potential for the successful reintroduction of the Norfolk Island Gecko *(Christinus guentheri)*. However it became evident that any such site would have to meet a number of criteria if a reintroduction was to be successful.

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These criteria include:

- The need and ability to enclose a selected site within a cat- and rat-proof fence.
- Relatively level topography.
- The presence of primary gecko habitat such as stands of white oak (*Lagunaria patersonia*).
- Predator-proof double-gate access for maintenance and monitoring.
- Absence of overhanging trees that might provide predator access to constructed enclosures.
- Some habitat reconstruction (e.g. rock piles) and plantings to provide floristic and structural diversity for the resident geckos.

There were many areas encountered where these criteria could be met, but many occurred on private grazing lands that retained small, isolated stands of native habitats. While the National Park contained the best and most extensive stands of native forest, and of suitable cliff-side and cliff-top habitats, these areas tended to have difficult topography for enclosure-construction and would also require clearing of valuable existing vegetation to provide sufficient space for fence construction and a clear buffer zone to remove overhanging vegetation.

Barriers to a successful gecko re-introduction

1. We regard the potential for a successful reintroduction of *Christinus guentheri* to the main island to be negligible without maintaining any founding population in a cat-free and rodent-free environment, i.e. it will be essential to establish such a population within an enclosure as described above.

2. An unresolvable problem is that it is virtually impossible to retain a population of introduced geckos within any enclosure that is not entirely screened by fine wire mesh, as *Christinus guentheri* is an able climber that would have no difficulty in climbing over or through virtually any wooden, steel or wire fence. However, to construct a fully-screened enclosure is likely to be prohibitively expensive, impractical to maintain, and counterproductive in that it would exclude a wide range of potential lizard prey species.

3. Any attempt to establish a gecko colony within an exclosure that is not fully enclosed would involve some level of leakage over time of the resident geckos into the surrounding area where there would be a high risk of succumbing to known predators. This potential loss would need to be monitored through an ongoing mark/recapture programme.

4. Since our survey was conducted in March 2005 the highly invasive exotic gecko *Hemidactylus frenatus* (fig. 1) has been recorded from a natural area near Cascade in December 2005. Mr Peter Davidson (*pers. comm*.)

has since advised that wild populations of this species have also been recorded from the town (Burnt Pine) area. The history of this invasive species in Australia (including the Cocos (Keeling) Islands and Christmas Island) and many Pacific islands would indicate a rapid expansion of this species into all urban and disturbed rural habitats, as well as the edges of primary forest and any roads or tracks that traverse such forests, and the displacement of any native geckos that previously occupied such habitats.

5. If this prediction eventuates (the introduction of this species to urban areas along the east coast of Australia has seen the species reach saturation levels within 5-10 years) then one could anticipate that any attempt to reintroduce the native gecko to the main island could be thwarted by its rapid displacement by *Hemidactylus* as the latter species expands throughout the main island. However, as this species has never yet been introduced to areas where *Christinus guentheri* occurs, such an outcome remains speculative. The best way to test such an interaction would be through a re-established colony on the main island, unless *Hemidactylus* becomes established on one or more offshore islands before a re-introduction is attempted.

Figure 1: The highly-invasive Asiatic House Gecko (*Hemidactylus frenatus*) that appears to have recently established a permanent population on Norfolk Island's main island. This species constitutes a major potential threat to the native gecko *Christinus guentheri* should it be allowed to reach any of Norfolk's offshore islands.

Recommendations:

Should a decision be made to attempt the reintroduction of *Christinus guentheri* to the main island, we would recommend that:

1. a single site be chosen on the northern side of Norfolk Island for a cat- and rodent-proof enclosure to be constructed around an area of suitable habitat, to include significant stands of semi-mature to mature white oak trees (*Lagunaria patersoni*). Further habitat enhancement should be made as recommended above.

2. While clearly there is no maximum size for such an enclosure, its size needs to be:
    a. large enough to maintain a viable (self-sustaining) population given leakage through emigration from the enclosure
    b. small enough to be practical in terms of construction and maintenance costs
    c. small enough to be able to effectively monitor the demographics of the resident gecko population.

    We therefore recommend that an initial enclosure be at least 0.5 ha in area with a preferred area of about one hectare.

3. That the enclosure be made cat- and rodent-free by trapping or baiting potential predators until such time as the enclosure can be considered predator-free.

4. That at least 50 ***adult*** *Christinus guentheri* be collected and removed from Phillip Island and released into the new enclosure at a time in late spring-early summer when white oak flowering is at its peak. The released geckos should have close to a 1:1 sex ratio.

5. All released geckos should be marked temporarily by paint spots and permanently by either the use of implanted PIT tags or Visible Implant Elastomer (VIE) (Kondo and Downes, 2004) for future monitoring purposes.

6. A monitoring programme should be developed that censuses the gecko population within the enclosure at least four times in the first year following introduction. The results of that census would be used to determine subsequent monitoring methods and frequency. This programme should also monitor for the presence of the invasive gecko *Hemidactylus frenatus* and its impact, if any, on the native species.

7. Should the house gecko (*Hemidactylus frenatus*) become established on either Nepean or Phillip Islands *prior to the reintroduction of the native gecko* to the main island, any re-introduction should be abandoned and resources invested in studies of the impact of the introduced gecko on populations of the native gecko on these offshore islands.

It was not appropriate to identify and recommend specific sites in the field, as the extent to which a site might meet the criteria identified above required more research on land tenure, floristics and logistical constraints than could be assessed in a few days.

2. Review of threatening processes

Preamble: In a draft *Recovery Plan for the native lizards of Norfolk and Lord Howe Islands*, Cogger (2004) identified the following major threatening processes with the potential to cause or continue to cause declines in the native lizards of Norfolk Island:

- past habitat loss and degradation, soil compaction and erosion caused by grazing and burrowing rabbits (Phillip Island) and invasive plants

- the increased risk of spreading exotic/invasive species of plants and animals to offshore islands through increased tourist visitation to those islands

- the increased threat of direct habitat damage to offshore islands through impacts of human traffic, including fire risk from camp fires

- direct loss of habitat through land clearing for homes, buildings, roads and other infrastructure (Norfolk main island)

Of these various threats, rabbits were finally eliminated from Phillip Island in 1986, but the dramatic defoliation and erosion, especially the loss of topsoil, caused by two centuries of their presence (and the early presence of goats and pigs), has been only slightly moderated by subsequent natural regeneration.

Cogger (2004) concluded that in 2004, *maintaining all off-shore islands as rodent-free areas is the single most important conservation measure that can be undertaken to ensure the survival of these species in the wild, but with special priority to be given to Blackburn and Roach Islands (Lord Howe group) and Nepean and Phillip Islands (Norfolk group).*

However, as indicated above, in late 2005 the first record was made of the ubiquitous tropical invasive house gecko *Hemidactylus frenatus* on Norfolk's main island, indicating that this species had become firmly established on the island. It is a species that thrives in disturbed environments, including human dwellings. It is a bisexual species that has successfully invaded most oceanic islands throughout the Pacific (as well as islands in the Indian Ocean and the Caribbean) where it has proved to be an extremely successful competitor that tends to displace native species throughout its range. It is common on many parts of the Australian mainland, including sites along the east coast that share Norfolk Island's latitude and climate.

Hemidactylus frenatus is a species notorious for traveling in personal equipment, freight and building materials, or laying its eggs in such sites. We have little doubt that this species, together with rodents, currently constitutes by far the greatest and most immediate threat to the big native gecko populations on Phillip and Nepean Islands.

However, it is important to stress that as these two species have never before been brought together in the wild, the likely outcome of their doing so is not entirely predictable. *Christinus guentheri* is a large, aggressive gecko living in a highly disturbed environment on Phillip Island, and although *Hemidactylus frenatus* has a long and virtually universal record of displacing native species in such habitats, it is possible that *Christinus* might predominate in such a situation. But given the Asiatic House Gecko's record elsewhere, it should be regarded as a potentially critical threat to the survival of Norfolk Island's native gecko.

Management issues: It is critical that managers, when confronted with any proposed action that is likely to, or has the potential to, impact adversely on Norfolk Island's two threatened native lizards, should immediately assess, or have assessed by a relevant specialist, the known impacts and risks associated with that action.

It has been shown above that the greatest deleterious impacts on populations of these threatened native species have, or will, almost certainly result from:

- loss or degradation of habitat *and*
- introduction of new, or uncontrolled expansion of existing, exotic plants and animals into the lizards' currently-occupied areas and habitats.

Actions that are most likely to increase or spread the impacts of these threatening processes are:

- Increased and/or inadequately-controlled human access to existing rodent- and *Hemidactylus*-free areas/islands. There is currently no known means of effectively controlling or eliminating *Hemidactylus* once it has become established in an area.
- Development of structures, tracks and roads within the species' habitat, especially fragile coastal zones.
- Inadequate quarantine provisions to ensure that visitors and returning residents do not inadvertently import to Norfolk Islands new species of plants, animals and pathogens, all of which should be treated as potential threats to the survival of the islands' native biota, including their threatened species. Once such a threat arrives on the main island, the probability of its introduction to offshore islands, especially those regularly visited by residents or visitors, is dramatically increased.

- Control of existing invasive plant species, especially paspalum and African Olives, on Phillip Island.

Consequently it must be emphasised that any action by statutory managers or owners of lands on which these two species of threatened lizards occur, that would degrade or remove habitat, or increase the risk of introduction of known predators/competitors, could result in a significant impact on these taxa and so would require approval of the Australian Minister for the Environment and Heritage under the Environmental Protection and Biodiversity Conservation Act 1999.

References cited

Cogger, H.G. (2004). *Draft Recovery Plan for the threatened lizards Christinus guentheri and Oligosoma lichenigera on the island complexes of Norfolk and Lord Howe Islands.* Department of the Environment and Heritage, Canberra. 58 pp.

Kondo,J. and Downes, S.(2004). *Using visible implant elastomer to individually mark geckos.* Herpetofauna, 34(1):19–22