Australian Government
Department of Agriculture, Water and the Environment

Consultation Document on Listing Eligibility

Emoia nativitatis (Christmas Island Forest Skink)

Image: 'Gump' was the last known *Emoia nativitatis* (Director of National Parks).

You are invited to provide your views and supporting reasons related to:

1) the eligibility of *Emoia nativitatis* (Christmas Island Forest Skink) for transfer within the EPBC Act threatened species list from the Critically Endangered to the Extinct category.

Evidence provided by experts, stakeholders and the general public are welcome. Responses can be provided by any interested person.

Anyone may nominate a native species, ecological community or threatening process for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or for a transfer of an item already on the list to a new listing category. The Threatened Species Scientific Committee (the Committee) undertakes the assessment of species to determine eligibility for inclusion in the list of threatened species and provides its recommendation to the Australian Government Minister for the Environment.

Responses are to be provided in writing either by email to:
species.consultation@environment.gov.au

or by mail to:

The Director
Species Information and Policy Section, Biodiversity Conservation Division
Department of Agriculture, Water and the Environment
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by 11 September 2020.

General background information about listing threatened species

Public nominations to list threatened species under the EPBC Act are received annually by the department. In order to determine if a species is eligible for listing as Extinct, under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing as Extinct.

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at:
http://www.environment.gov.au/biodiversity/threatened/nominations.html.

Privacy notice

The Department will collect, use, store and disclose the personal information you provide in a manner consistent with the Department's obligations under the Privacy Act 1988 (Cth) and the Department's Privacy Policy.

Any personal information that you provide within, or in addition to, your comments in the threatened species assessment process may be used by the Department for the purposes of its functions relating to threatened species assessments, including contacting you if we have any questions about your comments in the future.

Further, the Commonwealth, State and Territory governments have agreed to share threatened species assessment documentation (including comments) to ensure that all States and Territories have access to the same documentation when making a decision on the status of a potentially threatened species. This is also known as the 'common assessment method'. As a result, any personal information that you have provided in connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

The Department's Privacy Policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how the Department will deal with that complaint. A copy of the Department's Privacy Policy is available at: http://environment.gov.au/privacy-policy.

Information about this consultation process

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Australian Government Minister for the Environment.

In providing comments, please provide references to published data where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a 'personal communication' unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the department's website following the listing decision by the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act, the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

Emoia nativitatis

Christmas Island Forest Skink

Taxonomy

The species is conventionally accepted as *Emoia nativitatis* (Boulenger, 1887)

Sub-species Information

Description

Emoia nativitatis (Christmas Island Forest Skink) was a moderately robust (80 mm snout-vent length, 10 gram) skink. The species had a rich metallic-brown colour, paler on flanks, with numerous irregularly scattered paler and darker scales. It differed from *E. atrocostata* (coastal skink) in scalation and colour (the latter having silvery-grey ground colour and a diffuse dark lateral stripe) (Boulenger, 1887).

Distribution

This species was endemic to Christmas Island, an Australian Territory in the Indian Ocean.

Relevant Biology/Ecology

The Christmas Island Forest Skink was known to occur in the litter of the forest floor and also on low vegetation and amongst the buttress roots of rainforest trees, whilst foraging. The species appeared to be as abundant on the plateau as it was on the terraces and the low forest backing onto the rocky coastline (Cogger and Sadlier, 1981).

The Christmas Island Forest Skink was solitary, but historic records suggest that in suitable habitat (forest clearings and forest areas where the sunlight penetrates the canopy), it may have occurred locally in “large numbers” (Cogger and Sadlier, 1981). The species’ diet included a wide range of small terrestrial invertebrates (Cogger and Sadlier, 1981). The availability of food varied according to the season, with more food available in the wet season. In areas where yellow crazy ant (*Anoplolepis gracilipes*) super colonies existed, food availability for the Forest Skink was markedly reduced (TSSC 2014). The species was diurnal and actively foraged on the ground and in low vegetation (Director of National Parks, 2012).

The Christmas Island Forest Skink was readily distinguished from the other *Emoia* species occurring on Christmas Island however, it was not particularly conspicuous and was relatively hard to detect. During sunny periods there was a higher chance of detecting the Forest Skink (Director of National Parks, 2012). Although there is no reproductive information for the Forest Skink, a similar species, *E. atrocostata*, attains sexual maturity between nine and nine and a half months of age and lives for between 3 and 10 years (Alcala and Brown, 1967).

Extinction date

This species was last seen in the wild in August 2010 at Egeria Point, Christmas Island (Smith et al., 2012). The last known individual died in captivity on 31 May 2014 (Woinarski et al., 2014).

On 20 February 2017, the species was listed as Extinct on the IUCN Red List of Threatened Species (Cogger and Woinarski, 2017).

Likely Causes of Decline and Extinction

Initially, the rapid decline in population numbers of *E. nativitatis* was believed to be a result of direct and indirect impacts on the island's forest ecology of super colony development of the invasive Yellow Crazy Ant (*Anoplolepis gracilipes*) (Cogger and Woinarski, 2017). The rapidity of the decline in both this species and other endemic lizards suggested however that the threatening processes causing these declines were multiple and complex. Declines took place in most native lizard species on the island following the introduction of the Oriental Wolf Snake

(*Lycodon capucinus*) in the early 1980s (Andrew et al. 2016) and Wolf Snake predation is now believed to be the proximate cause of this skink's extinction (Cogger and Woinarski, 2017).

Due to mining on the island, there has been a loss of 25% of forest habitat, a possible contributing factor to the decline of the species (TSSC 2014). Despite the number of likely and actual threats identified as contributing to the decline and extinction of the Christmas Island Forest Skink, there is no quantitative evidence apportioning the relative impacts of threatening processes (Smith et al., 2012).

Likely causes of decline and extinction are from threats known to have occurred on the Island when the last known Forest Skink was extant (see Table 1.)

Table 1: Threats which likely led to the extinction of the Christmas Island Forest Skink.

Threat factor	**Threat type and status**	**Evidence base**
Invasive species		
Predation by Wolf Snakes (*Lycodon capucinus*)	Actual, past	The most substantial evidence of predation is from studies of wolf snakes' diets confirming predation on the Christmas Island Forest Skink (Rumpff, 1992; Donnellan et al., 2011).
Feral cats (*Felis catus*)	Actual, past	Several studies have confirmed cats as a major predator of the Christmas Island Forest Skink with specimens found in cat stomach contents (Tidemann et al., 1994; and Van der Lee (1997). Also identified by James (2007) as a significant threat to the last remaining populations of the Christmas Island Forest Skink (James 2007).
Predation by Giant Centipedes (*Scolopendra subspinipes*)	Likely, past	No direct evidence of predation to the Christmas Island Forest Skink but giant centipedes have been demonstrated to be a serious threat to the other two lizards in captive colonies on the island (Smith et al., 2012). There is substantial evidence of predation from dietary studies of centipedes that confirm predation on lizards (Rumpff, 1992; Donnellan et al., 2011).
Yellow Crazy Ant (*Anoplolepis gracilipes*)	Likely, past	Crazy ants were introduced sometime between 1915 and 1934. Since the 1990s they have formed high density, multi-queen super colonies at many places over the island (Director of National Parks, 2014) and as a result the Christmas Island Forest Skinks habitat underwent broad-scale ecological change associated with outbreaks of yellow crazy ants. These outbreaks caused a reduction in the Island's endemic red crab population, which resulted in an increase in the cover of understorey and ground litter, potentially leading to an increase in the abundance of some exotic species that predate on the Christmas Island Forest Skink and compete for food (Director of National Parks, 2012; 2014).
Mining and quarrying		
Habitat loss	Likely, past	Since the 1890s, land clearing for activities such as phosphate mining, development and road construction has caused the incremental loss of approximately 25 per cent of forest cover on Christmas Island. This clearing left substantially less suitable habitat available for the Christmas Island Forest Skink (Director of National Parks, 2012).

Assessment of available information in relation to the EPBC Act Criteria and Regulations

A native species is eligible to be included in the **Extinct** category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.

The Christmas Island Forest Skink was formerly reported to be generally common and abundant in rainforests on all Christmas Island landforms during 1979 (Cogger and Sadlier, 1981). Declines were first reported in 1998 (Cogger and Sadlier 1999) and understood to be extreme by 2005 (James 2004, Schulz and Barker 2008), only five years before the species was last recorded in the wild (Andrew et al. 2016).

Efforts to establish a captive breeding program for the species from August 2009 failed because only three individuals, all female, could be captured (Andrew et al., 2016). During the 2009 'Island Wide Survey' monitoring program by Christmas Island National Park staff, the species was not recorded at any of the 900 comprehensively distributed sample sites (Director of National Parks, 2012). The species was last seen in August 2010 as part of the Island wide systematic surveys in the southern section of Egeria Point. Figures 1-4 depict this and other historical locations of the Forest Skink and the Island wide reptile survey effort in 2009 and 2010 (taken from Smith et al 2012). Table 2 summarises the survey history and reported declines in the Christmas Island Forest Skink from initial surveys in 1979 until its Extinct listing under the IUCN Red Hot List in 2017.

With the extensive surveys and their findings outlined in Table 2 and Figures 1-4 for this species, including a long history of nil detections in the last 10 years and experts confirmation of the last known individual dying in captivity on 31 May 2014, this assessment concludes there is no reasonable doubt that the last individual has died and the species is eligible for listing as **Extinct**.

The purpose of this consultation document is however to elicit additional information to better understand the species' status. This conclusion should therefore be considered as tentative at this stage, as it may be changed as a result of responses to this consultation process.

Table 2. Summary of survey history and reported declines in the Christmas Island Forest Skink leading to the conclusion that it is extinct.

Year	Surveys and status reports	Reference
1979	The Christmas Island Forest Skink was reported to be the most abundant and widespread of the diurnal lizards on Christmas Island. The species was found to be present at 16 sites across the Island.	Cogger and Sadlier (1981).
1983	The Christmas Island Forest Skink was again reported to be generally common and abundant.	Cogger et al., (1983).
1998	The Christmas Island Forest Skink again reported common and abundant in June with more than 80 individuals seen basking and foraging on the trunk of a large tree, which had recently fallen across an access track south of Aldrich Hill.	Cogger and Sadlier (1999).
1999	The first reported declines in the Christmas Island Forest Skink.	Cogger and Saddlier (1999).
2001 - 2005	Island wide surveys were undertaken recording all reptiles on an ad-hoc basis only. Monitoring between 2003 and 2005, which sampled 320 sites across the Island, reported the Christmas Island Forest Skink to have “declined severely” and that it was likely to be confined to scattered, localised pockets in more remote areas of the coastal terraces and inland cliffs.	Director of National Parks, 2008); Director National Parks (2012); James (2004).
2005	Targeted monitoring for the Christmas Island Forest Skink started at long-term biodiversity monitoring sites each month by National Park officers following programs established by David James.	Director of National Parks (2012).
2007	The range of the Christmas Island Forest Skink had contracted to scattered populations on remote coastal terraces, of North West Point, Egeria Point and South Point having disappeared from its preferred inland rainforests.	James (2007); Director of National Parks (2012).
Mid 2007	An island-wide survey took place in which reptiles were recorded as present or absent at 900 sites spread equidistantly across the Island. Only a few native reptiles were recorded at sights already known.	Smith et al., (2012).
2008	Further declines in the Christmas Island Forest Skink reported. It had disappeared from North West Point and South Point between mid to late 2008 and early 2009. The Christmas Island Forest Skink was reported from only one of the 35 sites sampled in 2008. The total adult population size of the Christmas Island Forest Skink was considered in 2008 to be likely to be substantially fewer than 1000 individuals.	Schulz and Barker (2008); Director of National Parks (2012).

Year	Surveys and status reports	Reference
Early 2009	The Christmas Island Forest Skink was noticeably beginning to decline from the semi-deciduous closed forest at Egeria Point, and by mid to late 2009 they were mostly found in the Pandanus forest. The species then contracted in a southerly direction within the Pandanus forest.	Smith et al., (2012).
Late 2009	Island wide surveys by National Park staff did not record the Christmas Island Forest Skink at any of the 900 comprehensively distributed sample sites. In August 2009 a survey was undertaken to collect as many individuals of the Christmas Island Forest Skink as possible which amassed only three females. No male Christmas Island Forest Skink could be captured. These were housed in purpose-built facilities on Christmas Island.	Andrews et al., (2016); Director of National Parks (2012).
Early 2010	The Christmas Island Expert Working group reported to Federal Environment Minister that the Christmas Island Forest Skink is exceedingly difficult to find.	Beeton et al., (2010).
Late 2010	The last ever sighting of the Christmas Island Forest Skink was made in the southern section of Egeria Point.	Smith et al., (2012).
2011	Island wide surveys by National Park staff did not record the Christmas Island Forest Skink at any of the 900 comprehensively distributed sample sites.	Director of National Parks (2012).
2012	On the advice of the Christmas Island Reptile Advisory Panel, extensive diurnal and nocturnal surveys were planned and undertaken with the primary purpose of locating individual Christmas Island Forest Skinks to establish a captive breeding population on Christmas Island. Areas surveyed included historical sites where *E. nativitatis* had previously been found, as well as areas not previously surveyed, but with suitable habitat. No individuals were found.	Director National Parks (2012); TSSC (2014).
January 2014	The Christmas Island Forest Skink was listed as Critically Endangered on the EPBC Act.	(TSSC 2014).
May 2014	The last known individual of the Christmas Island Forest Skink died in captivity on 31 May 2014.	Woinarski et al., (2014).
February 2017	The Christmas Island Forest Skink was listed as Extinct on the IUCN Red List of Threatened Species.	Cogger and Woinarski (2017).
2017	The Lizard and Snake Action Plan assesses the Christmas Island Forest Skink as Extinct.	Chapple et al., (2019).

Figure 1. Historical records of the Christmas Island Forest Skink (top map) including the location of last known sightings of the species (bottom map) (Smith et al., 2012).

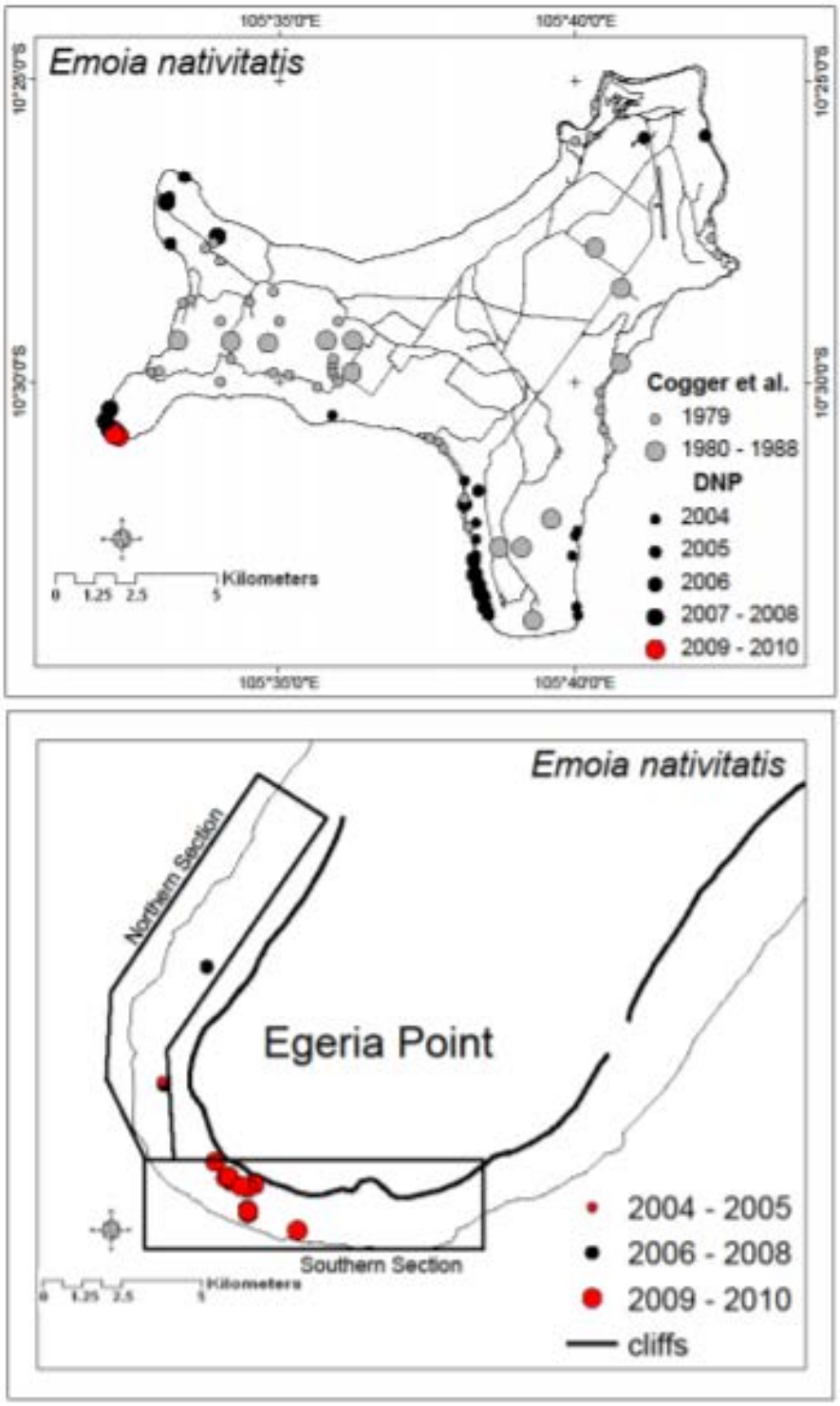

Figure 2. Sites sampled for reptiles on Christmas Island in 2009 and 2010 (Smith et al., 2012).

Figure 3. Survey effort for the Christmas Island Forest Skink at Egeria Point in 2009 and 2010 (Smith et al., 2012).

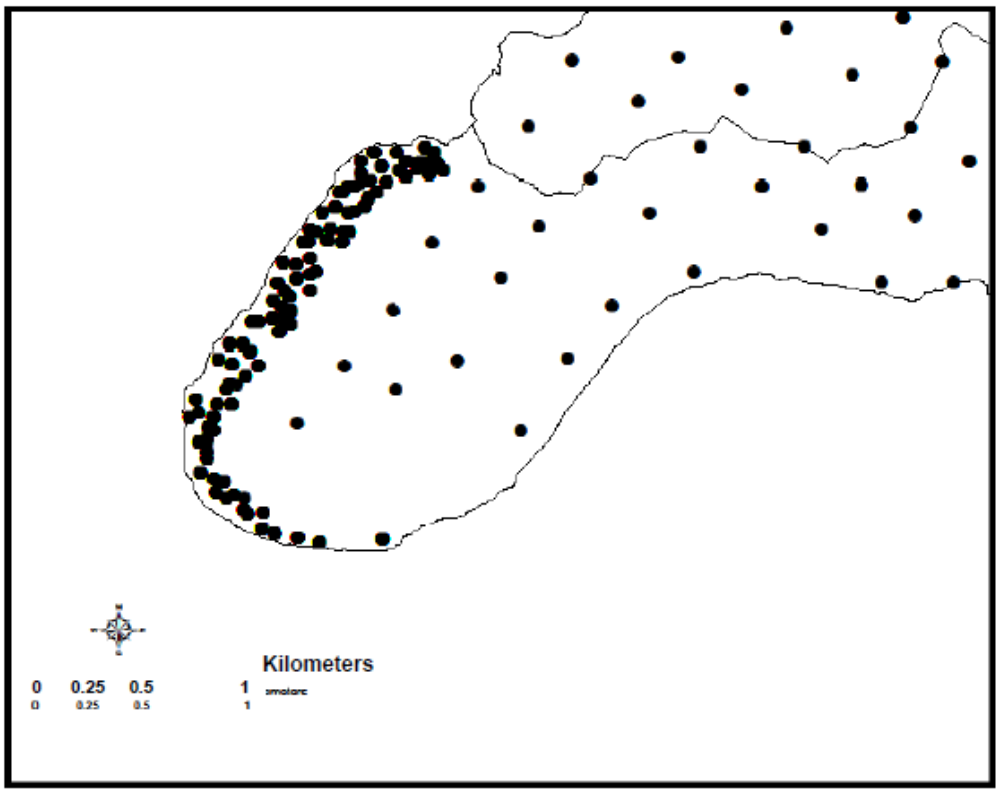

Figure 4. Outline of the survey effort conducted in the last intensive search for the Christmas Island Forest Skink at Egeria Point in 2012 where no individuals were detected (Taken from Smith et al., 2012).

Two teams to survey sights concurrently		
Site	**Team**	**Survey length**
Egeria A*	Team 1	5 days
Egeria B*	Team 2	3 days
Egeria C*	Team 2	3 days
South Point*	Team 1	5 days
NW Point & Tom's Ridge Crack	Team 2	3 days
Aldrich Hill	Team 2	2 days
* Teams will need to camp at these locations		
Proposed Survey Dates Egeria A ..... 1-5 October 2012 Egeria B & C: ..... 1-6 October 2012 South Point: ..... 8-12 October 2012 Aldrich Hill: ..... 8-12 October 2012 NW Point/Tom's Ridge Crack: ..... 8-12 October 2012		
• Surveys completed in two weeks • Four volunteer herpetologists required		
Teams Team 1: Two – Three CINP staff + 2 Team 2: Three - Four CINP staff + 1		

Collective list of questions – your views

1. Do you have any comments on matters relevant to the assessment of this species as **Extinct** under the *Environment Protection and Biodiversity Conservation Act 1999*?

References cited in the advice

Alcala AC and Brown WC (1967). Population ecology of the tropical scincid lizard, *Emoia atrocostata*, in the Philippines. Copeia 1967, 596-604.

Andrew, P., Cogger, H., Driscoll, D., Flakus, S., Harlow, P., Maple, D., Misso, M., Pink, C., Retallick, K., Rose, K., Tiernan, B., West, J. and Woinarski, J.C.Z. (2016). Somewhat saved: a captive breeding programme for two endemic Christmas Island lizard species, now extinct in the wild. Oryx: 1-4. doi:10.1017/S0030605316001071.

Beeton, B., Burbidge, A., Grigg, G., Harrison, P., How, R., Humphreys, B., McKenzie, N. and Woinarski, J. (2010). Final Report Christmas Island Expert Working Group to Minister for the Environment. Heritage and the Arts.

Boulenger GA (1887). Reptiles. Proceedings of the Zoological Society London 55, 515-517.

Cogger H and Sadlier R (1981). The terrestrial reptiles of Christmas Island, Indian Ocean. Unpublished report to Australian National Parks & Wildlife Service, Canberra (Australian Museum, Sydney).

Cogger H and Sadlier R (1999). The terrestrial reptiles of Christmas Island: a reappraisal of their status. Unpublished report to Parks Australia (Australian Museum, Sydney).

Cogger, H. & Woinarski, J. (2017). *Emoia nativitatis*. The IUCN Red List of Threatened Species 2017: Downloaded on 08 April 2020.

Cogger, H.G., Sadlier, R. & Cameron, E. (1983) The Terrestrial Reptiles of Australia's Island Territories. Australian National Parks and Wildlife Service, Canberra, Australia.

Director National Parks (2012). Dry Season Reptile Monitoring, Christmas Island National Park Natural Resources Management Team.

Donnellan S, Armstrong K and Potter S (2011). Christmas Island National Park centipede genetics. Report to Parks Australia (South Australian Museum, Adelaide).

James, D.J. (2004). Christmas Island biodiversity monitoring programme. Third Quarterly Report April-June 2004. Parks Australia North, Christmas Island, Australia.

James, D.J. (2007). Christmas Island Biodiversity Monitoring Programme: Summary Report, December 2003 to April 2006. Report to Department of Finance and Deregulation, and Department of the Environment , Water, Heritage and the Arts for Parks Australia North, Christmas Island Biodiversity Monitoring Programme, March 2007.

Chapple, D.G., Tingley, R., Mitchell, N.J., Macdonald, S.L., Keogh, J.S., Shea, G.M., Bowles, P., Cox, N.A. and Woinarski, J.C (2019). The Action Plan for Australian Lizards and Snakes 2017. CSIRO PUBLISHING.

Rumpff H. (1992). Distribution, population structure and ecological behaviour of the introduced south-east Asian wolf snake (*Lycodon aulicus capucinus*) on Christmas Island, Indian Ocean. Report to Australian National Parks and Wildlife Service, Canberra.

Schulz M and Barker C. (2008). A terrestrial reptile survey of Christmas Island, May-June 2008. Consultancy report for Parks Australia North, Christmas Island.

Smith MJ, Cogger H, Tiernan B, Maple D, Boland C, Napier F, Detto T and Smith P. (2012). An oceanic island reptile community under threat: The decline of reptiles on Christmas Island, Indian Ocean. Herpetological Conservation and Biology 7(2): 206–218.

Threatened Species Scientific Committee (TSSC). (2014). Conservation Advice for the Christmas Island Forest Skink *Emoia nativitatis*.

Tidemann, C.R., Yorkston, H.D. and Russack, A.J. (1994). The diet of cats, *Felis catus*, on Christmas Island, Indian ocean. Wildlife Research, 21(3), pp.279-285.

Van der Lee, G. (1997). The status of cats Felis catus and prospects for their control on Christmas Island. Unpublished report to Parks Australia North.

Woinarski J, Driscoll D and Cogger, H. (2014). Vale ‘Gump’, the last known Christmas Island Forest Skink. The Conversation, August 8, 2014.