Australian Freshwater Crocodile
Crocodylus johnstoni

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Common Names: Australian freshwater crocodile, freshie, Johnson's crocodile, Johnstone's crocodile, Johnston's crocodile

Range: mainland northern Australia

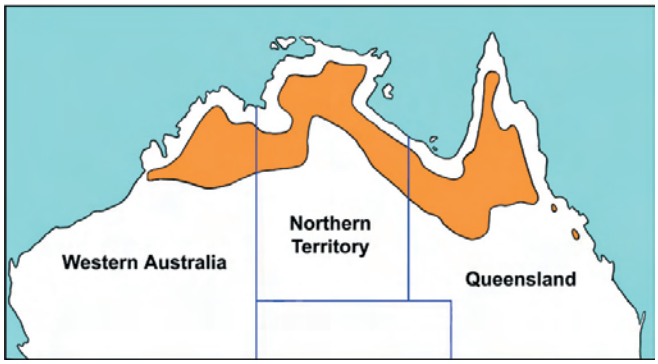

Figure 1. Distribution of *Crocodylus johnstoni*.

Conservation Overview

CITES: Appendix II

2009 IUCN Red List: LR1c (Lower Risk, least concern; IUCN 2009) (last assessed in 1996).

CSG Action Plan:
Availability of recent survey data: Low
Need for wild population recovery: Low
Potential for sustainable management: High

Principal threats: Invasive pests

General

The Australian Freshwater Crocodile was formally described as *Crocodylus johnsoni* (Krefft 1873). Krefft (1873) intended to name the species after Mr. Robert Johnstone, but mispelt the name as "Johnson". Cogger *et al*. (1983) reviewed the nomenclature and reinstated the name *Crocodylus johnstoni,* which is the name most commonly applied in the scientific and general literature, and in Australian State/Territory and Federal legislation. This correction was unnoticed by some (King and Burke 1989), so "*Crocodylus johnsoni*" still appears in some contexts (CITES and IUCN).

Ecology and Natural History

The Australian freshwater crocodile is a small to medium-sized crocodile restricted to tropical northern Australia (Western Australia, Northern Territory, Queensland). It has a very narrow snout, and can be readily distinguished from other freshwater species of crocodilians in the Asian region (eg *Crocodylus mindorensis, C. novaeguineae, C. siamensis, C. porosus*). It is much more similar in appearance to *C. cataphractus* from Africa and *C. intermedius* from the Orinoco River drainage of Venezuela and Colombia.

Maximum size of males exceeds 3 m, and females may exceed 2 m. Throughout its range, *C. johnstoni* is generally restricted to freshwater habitats upstream of tidal influence (Webb *et al*. 1987a). This includes almost any type of permanent freshwater habitat including rivers, creeks, swamps and floodplain lakes and lagoons ("billabongs) (eg see Webb *et al*. 1983c). In some rivers, *C. johnstoni* extends into tidal, saline waters, although they may be restricted from colonizing such areas by *C. porosus* (Messel *et al*. 1981). In some areas they are sympatric with *C. porosus* (Webb *et al*. 1983a). The historical distribution in Queensland has expanded, with "introduced" populations as far south as Rockhampton (Read *et al*. 2004; Charlie Manolis, pers. observ.).

Figure 2. *Crocodylus johnstoni*. Photograph: Grahame Webb

Webb, G.J.W. and Manolis, S.C. (2010). Australian Freshwater Crocodile *Crocodylus johnstoni*. Pp. 66-70 *in* Crocodiles. Status Survey and Conservation Action Plan. Third Edition, ed. by S.C. Manolis and C. Stevenson. Crocodile Specialist Group: Darwin.

Populations of *C. johnstoni* in upstream escarpment streams can be appreciably stunted in size, with adult males and females some 10% of the weight of counterparts in downstream areas. This stunting appears to be due to limited food resources. Individuals in one "stunted" population in Arnhem Land (Webb 1985) could be distinguished from "normal" freshwater crocodiles on the basis of morphometric attributes (Edwards 1983).

The diet of *C. johnstoni* includes a wide variety of invertebrates and small vertebrates, with prey size increasing as body size increases (Webb *et al*. 1983d). In the McKinlay River area of the Northern Territory, mean clutch size is 13 eggs, which are laid in a hole nest in sand bars exposed in the dry season (Webb *et al*. 1983b). Incubation normally lasts 75-85 days (Webb *et al*. 1983b; Webb and Smith 1984). Prior to colonization by cane toads (*Bufo marinus*), annual egg predation by monitor lizards (*Varanus* spp.) exceeded 90% in some areas (Smith and Webb 1985). The marked reduction in monitor lizards that has followed the spread of cane toads into the Northern Territory has decreased egg predation rates substantially. Annual hatching success at 7 *C. johnstoni* nest sites monitored before and after toad colonization increased from 4-8 nests (2002-2003) to 26-27 nests (2005-2006) respectively (Chibeba 2003; WMI, unpublished data) - a 342% increase in hatchling recruitment.

Since the late 1970s, extensive research has been undertaken on *C. johnstoni* in Queensland and the Northern Territory, and its basic biology is now well known (eg Cooper-Preston and Jenkins 1993; Kennett and Christian 1993; Smith and Webb 1985; Taplin *et al*. 1993; Tucker 1995; Tucker *et al*. 1993; Webb and Gans 1982; Webb and Manolis 1983; Webb and Smith 1984; Webb *et al*. 1983a-e; Whitehead *et al*. 1992).

Figure 3. The McKinlay River population of *C. johnstoni* has been extensively studied since 1978, providing important insights into the biology and population dynamics of the species. Photograph: Grahame Webb.

Conservation Status

Freshwater crocodiles were hunted for their skins from the late 1950s until protection in 1962 (Western Australia; Burbidge 1987), 1964 (Northern Territory; Webb *et al*. 1987a) and 1974 (Queensland; Taplin 1987). A ranching program based on hatchlings was established in the Northern Territory in 1982 (Webb and Smith 1985; Webb *et al*. 1987a), but by the early 1990s farming had largely ceased due to the relatively low commercial value of the skin. Harvesting of *C. johnstoni* is permitted in Western Australia and the Northern Territory through management programs (DEC 2009; PWCNT 2000). The Northern Territory is currently updating its *C. johnstoni* management program (Robyn Delaney, pers. comm., 2009). No use of the wild resource is permitted in Queensland. A limited pet market exists in some States and Territories whose legislation allows for the keeping of crocodiles.

Webb *et al*. (1987a) estimated the Northern Territory population of *C. johnstoni* to comprise 30,000-60,000 non-hatchlings. In Western Australia, the population in the Fitzroy and Ord Rivers and Lake Argyle and Lake Kununurra was estimated to be at least 47,000 individuals (McNamara and Wyre 1994). Population size in Queensland is unquantified (Read *et al*. 2004), but the species appears widespread and abundant (Miller 1993).

Crocodylus johnstoni is considered to be at low risk of extinction. The population is large and widely distributed, harvest rates are low/negligible and habitats are largely intact. Initially introduced in Queensland in 1935, cane toads have been spreading throughout the Northern Territory since the early 1980s (Letnic and Ward 2005), and reached Western Australia (Lake Argyle) in early 2009. Although significant localized population declines have been reported in some areas of the Northern Territory following colonization by cane toads (>70% within 12 months in the Victoria River area; Letnic *et al*. 2008), impacts appear to vary between regions and between habitats within catchments.

Lake Argyle and Lake Kununurra, in Western Australia, contain the largest *C. johnstoni* populations (estimated as >30,000 individuals in 1989; G. Webb Pty Ltd 1989), and concerns have been raised as to the potential impact of cane toads on those populations. Annual monitoring of both *C. johnstoni* (and *C. porosus*) in Cambridge Gulf, Lake Argyle and Lake Kununurra (see Mawson 2004) may allow the impact of toads over time to be quantified. That healthy *C.*

johnstoni populations remain in areas in Queensland exposed to cane toads for several decades suggests that extinction is not the prime issue of concern. Freshwater crocodiles are more sensitive to the cane toad toxin than *C. porosus* (Smith and Phillips 2006).

Most information on the impact of cane toads as they spread across the Northern Territory has been anecdotal, and limited to observations of mortality (dead animals). The McKinlay River population, which has been intensively studied since 1978 (eg Webb and Manolis 1983; Webb *et al*. 1983a-e), offers a unique opportunity to quantify precisely the impact of cane toads on population size, structure and dynamics. Studies on the impact of toads have been initiated in Western Australia (Sean Doody, pers. comm., 2009), including investigation of Conditioned Taste Aversion Learning as a means of minimizing impact (Ruchira Somaweera, pers. comm., 2009; see Dacey 2009). The establishment of populations of *C. porosus* in Lakes Kununurra and Argyle in Western Australia, through human mediated movements may reduce the *C. johnstoni* populations in the future. Studies on the impact of toads on "stunted" populations in marginal escarpment populations are ongoing in the Northern Territory and Western Australia (Adam Britton, pers. comm., 2009).

Figure 4. Typical *C. johnstoni* habitat now colonised by cane toads. Photograph: Grahame Webb.

There appear to be few other significant threats to *C. johnstoni*. Entanglement and drowning of *C. johnstoni* in fishing nets occurs in the catfish fishery in Lake Argyle, but its significance is unclear. Monitoring results indicate the *C. johnstoni* population in Lake Argyle, Lake Kununurra and the upstream Ord River has increased at a mean rate of increase of 3.8% per annum between 1996 and 2008 (Mawson 2004; WMI 2008) despite these losses. Loss of riparian habitat, erosion of nesting areas and water diversion for irrigation may require monitoring in some areas.

Freshwater crocodiles are not considered a threat to humans, and very few cases of unprovoked attacks have been reported (Lindner 2004; Caldicott *et al*. 2005; WMI, unpublished data). In the Northern Territory, *C. johnstoni*, particularly large individuals, are occasionally removed from recreational areas to alleviate public concerns about safety.

Figure 5. "Problem" *C. johnstoni* are occasionally removed from recreational areas. Photograph: Grahame Webb.

Figure 6. "Bounding" *C. johnstoni*. Photograph: Grahame Webb.

Priority Projects

<u>High priority</u>

1. **Assessment of population status**: No systematic monitoring of the Queensland population has been undertaken, and annual monitoring of a series of index rivers in the Northern Territory by spotlight and/or helicopter count surveys ceased in the mid-1990s. Data on *C. johnstoni* have continued to be collected during *C. porosus* surveys in two tidal rivers and in three freshwater river systems since the mid-1990s (Robyn Delaney, pers. comm.). In view of the potential impact of cane toads on *C. johnstoni* in the Northern Territory, a reassessment of population status is considered important.

<u>Medium priority</u>

2. **Impact of cane toads**: A more detailed understanding of how *C. johnstoni* populations have responded to the cane toad threat may assist management measures for the species.

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Peter Mawson (Western Australia), Adam Britton, Robyn Delaney (Northern Territory), Tony Tucker and Mark Read (Queensland) provided valuable input into this plan.

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