CHAPTER 12

The Management of Crocodiles in Western Australia

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In common with the rest of northern Australia the Kimberley Division of Western Australia includes in its fauna two species of crocodiles — the estuarine or saltwater crocodile *Crocodylus porosus* and the Australian freshwater crocodile *Crocodylus johnstoni*.

The Kimberley includes much rugged rocky country, especially in the higher rainfall area, and has a low human population. The 1981 Census revealed a total human population of 19,296 of which 7933 were Aboriginals. The four largest towns of Kununurra (2081), Wyndham (1509), Derby (2933) and Broome (3666) account for 53% of the population. Much of the region is virtually uninhabited.

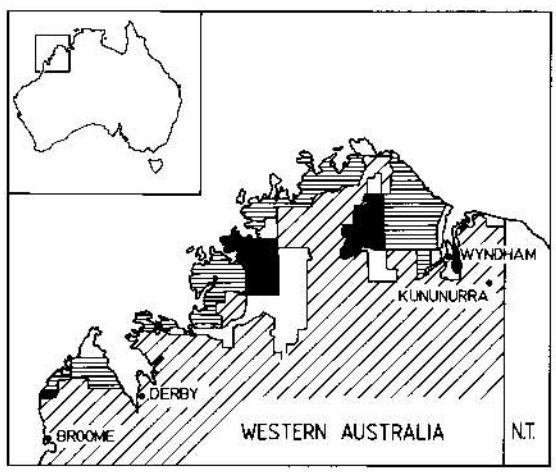

Fig. 1. The Kimberley region of Western Australia showing land tenure. Blackened areas — National Parks and Nature Reserves; horizonal lines — Aboriginal lands; diagonal lines — Pastoral lease; unshaded — Crown land.

Land tenure is of considerable importance when considering the management of wildlife species. In the Kimberley (Fig. 1) most coastal and near coastal land is included within Reserves for the use and benefit of Aboriginals. There is one major coastal conservation reserve, the Prince Regent Nature Reserve (for a description see Miles and Burbidge 1975) and one large National Park, the Drysdale River National Park (see Kabay and Burbidge 1977). Most of the hinterland is contained within pastoral leases and is used for open range cattle grazing.

Crocodylus porosus

Crocodylus porosus is found in near coastal parts of the Kimberley from King Sound northwards. In common with other parts of northern Australia, it was intensively hunted for the skin trade during the 1950's and 1960's. By 1969 there was considerable public pressure for the protection of the species and the Western Australian Department of Fisheries and Fauna let a consultancy with the aim of determining the abundance and composition of saltwater crococodile populations in Western Australia at that time. The report (Bustard 1970) showed that numbers had dropped so low that hunting was no longer commercially viable and recommended that the species be protected for ten years with a review at the end of that period. Bustard (1970) also recommended that a reserve be created for saltwater crocodiles in the Ord River near Wyndham.

The Western Australian Government acted quickly. *Crocodylus porosus* was protected in 1970 and the Ord River Nature Reserve was declared in 1973.

No further surveys of the saltwater crocodile took place until counts were made in seven river systems in 1977 and 1978. This work (Table 1) was carried out by the University of Sydney's Crocodile Research Group under contract to, and in conjunction with, the W.A. Department of Fisheries and Wildlife (Messel *et al.* 1977; Burbidge and Messel 1979).

Using the method for calculating 95% confidence limits given by Messel *et al.* (1981) the estimate of the number of non-hatchlings present in the areas examined was 960 to 1231 if based on the individual counts and 1048 to 1152 if based on the totals.

The total Kimberley non-hatchling *C. porosus* population was estimated by Burbidge and Messel (1979) to be about 2000. This estimate was later revised by Messel *et. al.* (1981) to be about 2500.

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Pages 125-27 *in* WILDLIFE MANAGEMENT: CROCODILES AND ALLIGATORS ed by Grahame J. W. Webb, S. Charlie Manolis and Peter J. Whitehead. Surrey Beatty and Sons Pty Limited in association with the Conservation Commission of the Northern Territory.

Table 1. The results of *Crocodylus porosus* surveys carried out in some tidal rivers of Western Australia in 1977 and 1978.

System	Total numbers sighted	Hatchlings	Non-hatchlings	95% Confidence levels
Ord	179	14	165	245-297
Lawley	44	13	31	40-62
Mitchell	50	8	42	56-82
Hunter	47	11	36	47-71
Roe	176	52	124	181-225
Prince Regent	189	56	133	185-241
Glenelg	213	73	140	206-253
Total	898	227	671	960-1231

The areas of the Kimberley inhabited by *C. porosus* differ markedly from most of the Northern Territory, where detailed studies have been undertaken and estimates of the population size have been made. The Kimberley coastline and hinterland are chiefly composed of steep, rugged, ancient, deeply faulted sandstones. Access up many rivers is blocked to crocodiles by waterfalls and their associated gorges. There are few areas of floodplain and very few freshwater swamps; hence breeding habitat is scarce. It would appear, therefore, that the carrying capacity of the Kimberley river systems and the Kimberley as a whole is much less than that of the Northern Territory. Furthermore, because of the restricted breeding habitat, recovery of the population may be slower.

One interesting difference between some Kimberley rivers and those elsewhere in northern Australia is the presence of extensive areas of mangal (mangroves) at their mouthes. This is especially so with the Glenelg River, which has large areas of mangal in the Barlee Impediment, and the Prince Regent River with its associated St George Basin. The latter area, in particular, contains relatively high numbers of larger crocodiles. In the 1978 survey, 92 *C. porosus* were sighted in the Prince Regent River and its tributaries, 13 of which were over 1.8 m. In St George Basin, 41 of 97 *C. porosus* sighted were over 1.8 m. The percentage of large crocodiles in the two areas (28.6%), is appreciably higher than in most of the river systems in northern Australia (Messel *et al.* 1981). It has been postulated that where "holding" habitat does not exist near the mouth of a breeding river, many larger crocodiles move out to sea and are lost. Study of the Prince Regent/St George Basin system could lead to a better understanding of *C. porosus* population dynamics.

Crocodile-human interactions in the Kimberley are rare at present because there are few coastal settlements and most *C. porosus* habitat is remote. Interactions have occurred around Wyndham, where the situation has been exacerbated by the presence of a meatworks which discharges wastes into Cambridge Gulf. Other places with minor problems include One Arm Point, Cockatoo and Koolan Islands, Kalumburu and Kununurra.

The capacity of the State Department of Conservation and Land Management to handle nuisance crocodiles is poor due to its lack of resources in the Kimberley.

Crocodylus johnstoni

Crocodylus johnstoni is widespread in the Kimberley wherever there is suitable habitat. Its distribution extends well inland along the two largest river basins — the Ord and the Fitzroy. It has been protected since 1962. No intensive legal hunting ever took place but there was significant poaching in accessible habitat during the 1960's and early 1970's.

The area of most extensive habitat is the high rainfall north-west Kimberley. Populations in this region have not been affected by European hunting because of the rugged, inaccessible nature of the country.

The Ord River Irrigation Scheme has resulted in the construction of two dams which impound sections of the river — the very large Lake Argyle behind the main dam, and the smaller Lake Kununurra behind the Diversion Dam. A count carried out in Lake Kununurra in 1979 by J. Brennan, formerly attached to the University of Sydney's Crocodile Research Group and then with the Western Australian Department of Agriculture, revealed slightly more than 1000 *C. johnstoni* in Lake Kununurra. This count was made when the lake level had been lowered well below the fringing vegetation for dam maintenance. Anecdotal information suggests that Lake Argyle now contains large numbers of freshwater crocodiles.

THE FUTURE

The approach to management of crocodiles in Western Australia is a conservative one. As can be seen by the foregoing discussion, most crocodile habitat is remote from centres of human population. Furthermore, there are no proposals current, nor likely, to change the protected status of either species.

Moves are underway to extend the protection of important areas of *C. porosus* habitat adjacent to the Prince Regent Nature Reserve. In 1979 the Western Australian Environmental Protection Authority recommended that St George Basin and Prince Frederick Harbour be declared aquatic reserves to protect the extensive areas of mangroves and their associated fauna, especially *C. porosus*. This recommendation was accepted by Government but has yet to be implemented, due largely to the lack of staff to carry out the procedures necessary under the relevant legislation.

Problems with nuisance *C. porosus* are likely to increase, especially around Wyndham and Kununurra and extra specialist staff to handle such matters are urgently needed. The current move by Australia to change *C. porosus* from Appendix I to Appendix II of the Convention on International Trade in Endangered Species may lead to "farming" or "ranching" proposals in Western Australia. These would allow nuisance animals, which have to be taken from the wild, to be used as breeding stock.

Farming or ranching proposals for *C. johnstoni* seem a possibility, especially if associated with the Ord River Irrigation Scheme. Any such proposals put to the Western Australian Government will be examined on their merits. The provision of a regular food supply is likely to be the major problem faced by prospective farmers.

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