



THE NORTH MARINE BIOREGIONAL PLAN

# BIOREGIONAL PROFILE

## APPENDIX D5

# NORTH MARINE REGION PROTECTED SPECIES GROUP REPORT CARDS: CROCODILES



A DESCRIPTION OF THE ECOSYSTEMS, CONSERVATION VALUES AND USES  
OF THE NORTH MARINE REGION



Australian Government

Department of the Environment, Water, Heritage and the Arts

Guinea, M.L., Limpus, C.J. and Whiting, S.D., 2004, 'Marine Snakes', National Oceans Office, *Description of Key Species Groups in the Northern Planning Area*, Commonwealth of Australia, Hobart, <[www.environment.gov.au/coasts/mbp/publications/north/n-key-species.html](http://www.environment.gov.au/coasts/mbp/publications/north/n-key-species.html)>, accessed September 07.

Jayne, B.C., Voris, H.K. and Heang, K.B., 1988, 'Diet, Feeding Behaviour Growth and Numbers of a Population of *Cerberus rynchops* (Serpentes: Homalopsinae) in Malaysia', *Fieldiana Zoology New Series*, 50:1–15.

Kropach, C., 1975, 'The Yellow-bellied Seasnake, *Pelamis*, in the Eastern Pacific', in Dunson, W.A. (ed.), *The Biology of Seasnakes*, University Park Press, Baltimore, USA, pp.185–213.

Limpus, C.J., 1975, 'Coastal Seasnakes of Subtropical Queensland Waters (23° to 28° south latitude)', in Dunson, W.A. (ed.), *The Biology of Seasnakes*, University Park Press, Baltimore, USA, pp.173–182.

Milton, D.A., 2001, 'Assessing the Susceptibility to Fishing Populations of Rare Trawl By-catch: Seasnakes Caught by Australia's Northern Prawn Fishery', *Biological Conservation*, 101:281–290.

Storr, G.M., Smith, L.A. and Johnstone, R.E., 2002, *Snakes of Western Australia*, Western Australian Museum, p.309.

Ward, T.M., 2000, 'Factors Affecting the Catch and Relative Abundance of Seasnakes in the By-catch of Trawlers Targeting Tiger and Endeavour Prawns on the Northern Australian Continental Shelf', *Australian Journal of Marine and Freshwater Research*, 51:155–164.

Wassenberg, T.J., Salini, J.P., Heatwole, H. and Kerr, J.D., 1994, 'Incidental Capture of Seasnakes (Hydrophiidae) by Prawn Trawlers in the Gulf of Carpentaria, Australia', *Australian Journal of Marine and Freshwater Research*, 45:429–43.



Saltwater crocodile. Photo: Robert Thorn, Department of the Environment, Heritage, Water and the Arts.

## D5 North Marine Region Protected Species Group Report Card – Crocodiles

Current at February 2008. For updates see <[www.environment.gov.au/coasts/mbp/north](http://www.environment.gov.au/coasts/mbp/north)>.

### General information

The saltwater (or estuarine) crocodile (*Crocodylus porosus*) belongs to the family Crocodylidae. It has a tropical distribution that extends to the north coast of Australia, where crocodiles inhabit coastal waters, estuaries and freshwater lakes, inland swamps and marshes (Webb *et al.* 1987).

### Nationally protected species

The saltwater crocodile is listed under Section 248 of the EPBC Act and is protected as a listed migratory and marine species. The saltwater crocodile is also listed on Appendix I of CITES in all countries other than Australia, Papua New Guinea and Indonesia, where it is listed on Appendix II (Ross 1998). The Australian population of *Crocodylus porosus* was transferred to Appendix II in 1985 following a proposal (Webb *et al.* 1984) to pursue sustainable use through ranching, which aims to save wild populations and their habitat by placing a commercial value on wild stocks (Webb and Vardon 1996). In 1994 the Australian population was given an unqualified Appendix II listing under CITES to allow the incentive-driven conservation programme to extend beyond ranching to limited wild harvest.



## Ecology of protected species in the North Marine Region

### Saltwater crocodiles

Saltwater crocodile species range from Rockhampton in Queensland (Miller 1993; Taplin 1987) across the coastal areas of the Northern Territory (McNamara and Wyre 1993; Webb *et al.* 1987) to King Sound in Western Australia (Burbidge 1987; McNamara and Wyre 1993).

Harvesting of crocodiles was common across northern Australia from the 1940s and caused drastic declines in the wild populations, prompting protection of the species in the early 1970s, by which time less than five per cent of the original population remained. By 1984, the Northern Territory population of saltwater crocodiles had increased to 30–40 per cent of pre-harvest levels (Webb *et al.* 1984) and by 2000 was considered completely recovered (Webb *et al.* 2000). Since their protection, numbers of saltwater crocodiles have grown substantially across northern Australia, and they now occur far inland, in areas where they have not been known to occur in living memory.

Saltwater crocodiles mostly occur in tidal rivers, coastal floodplains and channels, billabongs and swamps up to 150 km inland from the coast, as well as far out to sea (Webb *et al.* 1983a; Webb *et al.* 1987).

Studies have shown that saltwater crocodiles are opportunistic feeders using active hunting or a sit-and-wait strategy (Cooper and Jenkins 1993). Immature saltwater crocodiles (under 180 cm total length) eat crustaceans, insects, lizards, snakes, fish, birds and mammals, though their diet varies between seasons and depends on the body size of the crocodile (Taylor 1979). Larger crocodiles (over 2 m in length) prey mostly mud crabs, birds, sea turtles, fish, flying foxes, dingoes, cats, dogs, pigs, buffalo, cattle, horses and humans (Webb and Manolis 1989). Rocks and stones ingested by crocodiles may function as gastroliths and aid digestion, as well as serving other functions such as ballast (Webb and Manolis 1989).

In the Northern Territory, nesting of saltwater crocodiles occurs during the wet season (December–March), with a peak in January and February. Courtship occurs four to six weeks before nesting and continues through the nesting period (Webb *et al.* 1987). Large males control a territory through aggression and signalling, and fertilise most reproductively active females within their range.

During courting, the females approach the males and an elaborate courtship of swimming together, body contact and rubbing follows (Grigg and Gans 1993).

### Important areas for saltwater crocodiles in the North Marine Region

Important sites for saltwater crocodiles in or adjacent to the Region include:

Kakadu and adjoining rivers – important area for crocodile populations and habitat diversity.

Southern Gulf of Carpentaria on the Norman and Bynoe Rivers – productive recruiting region.

Between Aurukun and Port Musgrave – productive recruiting region in Queensland waters.

Port Musgrave north to Bamaga – productive recruiting region in Queensland waters.

### Known interactions and threats

In Australia, threats to the saltwater crocodile include incidental mortality in fishing nets and habitat destruction (Taplin 1987). In Arnhem Land, buffalos destroy crocodile nesting wetland habitat by trampling, thereby increasing drainage and reducing vegetation (Webb *et al.* 1984; 1987).

### Key references and further reading

Burbidge, A.A., 1987, 'The Management of Crocodiles in Western Australia', *Wildlife Management: Crocodiles and Alligators*, pp.125-127.

Cooper, P.H. and Jenkins, R.W.G, 1993, 'Natural History of the *Crocodylia* in Fauna of Australia', Volume 2A, *Amphibia and Reptilia*, pp.337–349.

Department of Environment and Heritage, 2004, *Saltwater Crocodile (Crocodylus porosus) and Freshwater Crocodile (Crocodylus johnstoni) Management Plan for Western Australia, 2004–2008*, Commonwealth of Australia, Canberra.

Grigg, G. and Gans, C. 1993, 'Morphology and Physiology of the *Crocodylia* in Fauna of Australia', Volume 2A, *Amphibia and Reptilia*, pp.326–343.

McNamara, K.J. and Wyre, G.J., 1993, 'The Conservation, Management and Farming of Crocodiles in Western Australia', in *Crocodiles, Proceedings of the 2nd Regional Meeting of the Crocodile Specialist Group*, pp.435–450.

Miller, J.D., 1993, 'Crocodiles in Queensland: A Brief Overview', in *Crocodiles, Proceedings of the 2nd Regional Meeting of the Crocodile Specialist Group*, pp.272–289.

Ross, J.P., 1998, *Crocodiles: Status Survey and Conservation Action Plan*; Second Edition.

Taplin, L.E., 1987, 'The Management of Crocodiles in Queensland, Australia', *Wildlife Management: Crocodiles and Alligators*, pp.129–140.

Taylor, J.A., 1979, 'The Foods and Feeding Habits of Subadult *Crocodylus porosus* Schneider in Northern Australia', *Australian Wildlife Research*, 6: 347–359.

Webb, G. and Manolis, S.C., 1989, *Crocodiles of Australia*, p.160.

Webb, G., Manolis, S., Whitehead, P. and Letts, G., 1984, *A Proposal for the Transfer of the Australian Population of *Crocodylus porosus* Schneider (1801) from Appendix I to Appendix II of CITES*, p.82.

Webb, G.J.W., Britton, A.R.C., Manolis, S.C., Ottley, B. and Stirrat, S., 2000, 'The Recovery of *Crocodylus porosus* in the Northern Territory of Australia: 1971–1998', in *Crocodiles, proceedings of the 15<sup>th</sup> Working Meeting of the IUCN–SSC Crocodile Specialist Group*, Varadero, Cuba, 17–20 January 2000, IUCN: Gland, Switzerland, pp.196–235.

Webb, G.J.W., Sack, G.C., Buckworth, R. and Manolis, S.C. 1983a, 'An Examination of *Crocodylus porosus* Nests in Two Northern Australia Freshwater Swamps, with an Analysis of Embryo Mortality', *Australian Wildlife Research*, 10: 571–605.

Webb, G.J.W., Buckworth, R. and Manolis, S.C., 1983b, '*Crocodylus johnstoni* in the McKinlay River area, Northern Territory III Growth, Movement and the Population Age Structure', *Australian Wildlife Research*, 10:383–401.

Webb, G.J.W., Whitehead, P.J. and Manolis, S.C., 1987, 'Crocodile Management in the Northern Territory of Australia', *Wildlife Management: Crocodiles and Alligators* pp.107–124.

Webb, G.J.W. and Vardon, M.J., 1996, 'Conservation Through Sustainable Use: a Discussion of Concepts and Guidelines for Use', in *Proceedings of the First International Conference on Eastern Indonesian–Australian Vertebrate Fauna*. Manado, Indonesia, November 22–26, pp.83–87.

Webb, G.J.W., Britton, A.R.C., Manolis, S.C., Ottley, B. and Stirrat, S., 2000, 'The Recovery of *Crocodylus porosus* in the Northern Territory of Australia: 1971–1998', in *Proceedings 15th Working Meeting of the IUCN–SSC Crocodile Specialist Group*, Varadero, Cuba 17–20 January 2000, IUCN: Gland, Switzerland, pp.196–235.

Western Australian Museum (Department of Terrestrial Vertebrates), 2001, *Assessment of Vertebrate Fauna of the Yampi Sound Defense Training Area (YSTA)*, Derby, Western Australia.

