CHAPTER 25

Crocodile Capture Methods used in the Northern Territory of Australia

Bryan Walsh[1]

WITHIN any crocodilian management programme, animals will need to be caught and handled. This in turn necessitates the development of capture and handling techniques, or the modification of techniques already in use to suit local conditions. In some cases, old and tried methods may simply be improved by a little innovative thinking on the part of those using them.

Within the Northern Territory of Australia, crocodile management and research requires the capture and handling of both saltwater *(Crocodylus porosus)* and freshwater *(C. johnstoni)* crocodiles. The sizes of animals caught range from 40 g hatchlings to large adult male *C. porosus*, which may exceed 750 kg. There are differences in "wariness" between small and large crocodiles, and between those that have "learned" to avoid man and those that have not. There are also significant differences in habitat: approaching a crocodile exposed at the edge of a mudbank in an open, tidal river is completely different from approaching the same sized crocodile in a heavily vegetated, shallow, freshwater swamp.

This chapter briefly describes the capture and handling techniques used within the Northern Territory and discusses some of the advantages and disadvantages of each of them.

CAPTURE TECHNIQUES

The majority of *C. porosus* which need to be caught are 'problem' animals, which have either attacked stock, pets or people, or which have immigrated into areas that for management purposes are designated as "crocodile free". These animals are almost always in areas exposed to the influence of the tide, and in Darwin Harbour, for example, high and low tide can vary by as much as 8 m. Tidal influence is a particularly important parameter to take into consideration when capturing crocodiles in the Northern Territory. At high tide the crocodiles are frequently in amongst the flooded mangroves, whereas at low tide they are usually in shallow water on the edge of exposed mudbanks. From the point of view of setting traps, a trap set on the water's edge at low tide will be completely submerged at high tide. Few *C. johnstoni* exist in tidal areas, however on occasion they are removed from "crocodile free" areas using the same methods. In addition large numbers of *C. johnstoni* have been caught for research purposes.

Fig. 1. Crocodiles up to 1.2 m can be caught by hand if they allow the boat or airboat to approach them.

Hand Catching

Animals of both species up to about 1.2 m total length (TL) are often caught by hand. The determining factor is normally whether or not the crocodile will allow the boat or airboat (Fig. 1) to approach, and whether or not the "catcher" can use one or both hands. The *C. johnstoni* hatchling harvest depends totally on hand catching.

Harpoons

Harpooning has proved to be the most efficient general capture method we use. The main advantage is that crocodiles of both species between 1 and 5 m TL can be caught with the same piece of apparatus. In

[1]Conservation Commission of the Northern Territory, P.O. Box 38496, Winnellie, Northern Territory 5789.
Pages 249-52 *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.

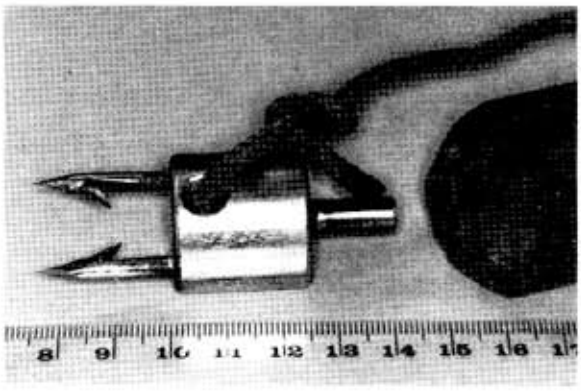


Fig. 2. Harpoons have proved the most efficient capture method for crocodiles which allow a reasonably close approach at night.

addition, because the harpoon head is mounted on the end of a 4 m long pole, it does not require the close approach needed for hand catching or even noosing (Chabreck 1963). The equipment (Fig. 2) consists of a small, cylindrical harpoon head, as described by Webb and Messel (1977), and some 50 m of cord line. The key to its successful use, however, is a sturdy, solid harpoon pole, normally about 4 m long.

Crocodiles are approached at night in a boat with a spotlight, and the harpoon head is jabbed into the relatively soft skin of the neck. The barbs lock into the skin and the crocodile is then "played" on the line. It is then pulled into the side of the boat where a noose is placed around the top jaw before the jaws are tied shut, and the crocodile is either hauled into the boat or towed to land. The time taken between harpooning and securing an animal varies with its size, but is around 5 minutes for animals up to 2 m TL, 10 minutes for animals 2-3 m TL and 20-30 minutes for animals 3-4 m TL.

With experience, people can become very efficient at harpooning crocodiles. Wary individuals can sometimes be harpooned from a rapidly moving boat or airboat, that approaches the crocodile at speed with the spotlight switched off until the last minute. In such cases the tail rather than the neck can be used as a target, and the 4 m approach distance can be lengthened by spearing the pole if the operator is sufficiently skilled. The main disadvantages of a harpoon are the small wounds it creates, the entanglement of harpoon lines in vegetated areas, the effects of struggling on the larger animals (see Seymour *et al.* Chapter 26), and the need to avoid osteoderms in order for the barbs to lock in under the skin.

Trapping

Traps are used to catch animals that are: too wary for other methods; too large for harpooning; in habitats where conventional methods of approach cannot be employed (e.g. mangrove, floating vegetation mats); or, where the aim is to catch animals that may move into an area but that are not necessarily there when the trap is set.

Fig. 3. A steel trap mounted on floating pontoons in a tidal river.

A trap designed by the Conservation Commission of the Northern Territory (Fig. 3) is composed of cylindrical, steel mesh sections that bolt together (one section can be inserted into the other during transport). This type of trap is portable, can be extended or reduced in length, is durable, works quite simply with a drop door arrangement and can be erected by one man. Crocodiles up to 4.5 m in length have been caught in them. They can be used in shallow water on the edge of non-tidal areas, or can be suspended on floats (Fig. 3) in tidal areas. The floats are constructed of 20 cm diameter by 5 m long sections of PVC pipe, and bracing lines are used to ensure the traps rise and fall in the desired position. The main disadvantage of steel traps is that animals can damage themselves while struggling.

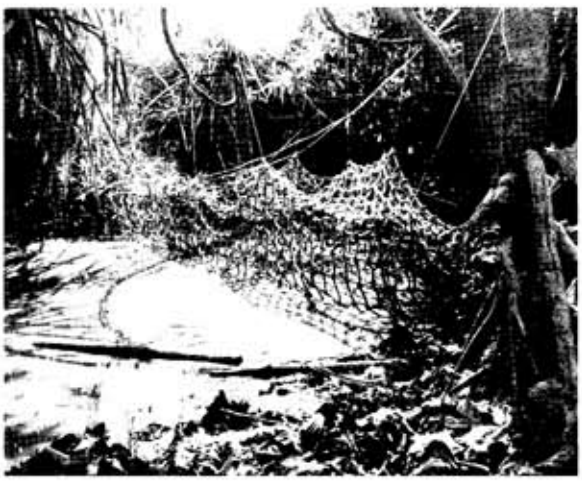


Fig. 4. A rope trap set up in a small, shallow backwater that opened off a deep-water billabong.

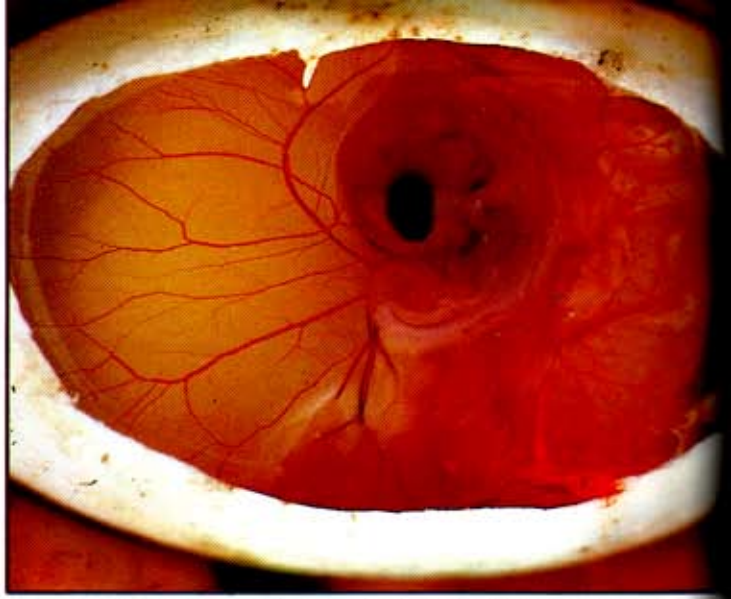
Rope traps (Fig. 4) as described by Webb and Messel (1977) are used when particularly large crocodiles (>5 m TL) are to be caught. The design is relatively simple, but they take a considerable

Because crocodilians are ectotherms, regulation of body temperature is achieved largely by behavioural means. They bask in the sun or seek shaded areas, and move between the water and land as necessary. But in addition to their thermoregulatory behaviours, there is a great range of lesser known behaviours associated with territoriality, courtship, mating, nesting and protection of the young, which vary between species.

Above: An American Alligator (*Alligator mississippiensis*), basking. The "mouth-open" posture is partly a territorial display, but it also allows evaporative cooling across the palate, which effects the rate of heating of the head. (Ted Joanen)

Right: Courtship behaviour of the New Guinea freshwater crocodile (*Crocodylus novaeguineae*). The smaller female continually indicates submission to the male by lifting her snout. (Jeff Lang)

Left: A male American Alligator (*Alligator mississippiensis*) advertising his presence



It has become increasingly apparent that the incubation environment of crocodilian eggs, in the wild and in laboratory incubators, effects both the sex and "fitness" of hatchlings. Research into crocodilian embryology is proving beneficial for both conservation and commercial purposes, but in addition, there is a medical application. Research on palate and jaw abnormalities in crocodilians is broadening our understanding of human deformities such as cleft palate.

Top Left: The sex and "fitness" of saltwater crocodile (*Crocodylus por* hatchlings can be dramatically affected by the incubation environm especially temperature. (Grahame Webb)

Top Right: A saltwater crocodile (*Crocodylus porosus*) embryo one qu of the way through incubation. The ramifying blood vessels of the vit network surround the yolk, but at this stage, the chorioallantoic b vessels, which exchange respiratory gases through the shell and s membrane, are restricted to the area of the opaque band on the egg (Grahame Webb)

Above: A saltwater crocodile (*Crocodylus porosus*) hatchling in which the lower jaw has not developed. These abnormalities are shedding new light on human jaw and palate deformities. (Grahame Webb)

Above: A saltwater crocodile (*Crocodylus porosus*) hatchling in which tail has failed to develop. It is unclear whether this is a genetic anom an effect of high incubation temperatures during the earliest stag development. (Grahame Webb)

Below: Twin saltwater crocodiles (*Crocodylus porosus*) are reasonably rare and come from both single and double yolked eggs. Most die soon after hatching, but some survive and grow in captivity. (Grahame Webb)

Below: A female saltwater crocodile (*Crocodylus porosus*), excavating a nest on a floating raft of vegetation on the Finniss River, Northern Territory. Behind her, a hatchling lies amongst the vegetation. Most wild nests in this area do not hatch. The embryos either overheat and die, or are submerged by rising water levels. (Grahame Webb)

Below: Collecting saltwater croc (*Crocodylus porosus*) eggs for incubation Eggs need to be handled carefully, and if le one quarter developed, need the nest orie of the eggs to be maintained. If rotated young embryos will die beneath the yolk.

Fig. 5. A 5.2 m long *Crocodylus porosus* caught in a rope trap.

time to set up. The trap must be positioned in a channel off the mainstream (or somewhere similar) where the crocodile will enter the mouth of the trap to get the bait rather than go around the side or back. A heavy counterweight, usually a tree, must be erected to close the mouth of the trap when the bait is pulled. Ideally the trap is set up and left for 1-2 weeks before being baited. We are not sure why, but the largest, wary crocodiles seem to enter rope traps much more easily than they do steel traps. The main disadvantage of rope traps is the time required to set them up, and the main advantage is that crocodiles become wrapped up in the trap and rarely hurt themselves (Fig. 5).

Baits used for traps depend somewhat on what is available. The legs of buffalo and whole wild pigs are often used in rope traps, whereas the most common bait used for the steel traps is dead chickens. Choice of bait is based largely on availability and the two most important characteristics of a good bait appear to be smell and the time it will last before needing to be changed.

As described by Webb and Messel (1977), radio alarms with site-specific codes and a 30-40 km range, are now in use so that traps do not need to be visited until they have been sprung. This greatly reduces the man-hours needed to check traps, it avoids the problem of scaring wary animals during checks, and it means crocodiles can be removed soon after they have been caught.

Nets

When *C. johnstoni* congregate in discrete pools during the dry season (May-October) (Webb *et al.* 1983) fine nets are an efficient method of capture (Fig. 6). These are generally floating nets with a 6-8 cm stretched mesh size and a cord diameter less than 1 mm. Once nets have been set, they must be checked regularly (each 20-30 minutes) to remove animals before they drown. The principle upon which the nets work is that they are fine and light,

Fig. 6. A *Crocodylus johnstoni* being removed from a fine net.

giving very little resistance when crocodiles hit them. Heavy duty commercial fishing net has been used to remove *C. porosus* from small waterholes, but unless especially made with excess mesh (Webb and Messel 1977), they are not particularly effective.

Miscellaneous Methods

In a "one-off" situation where a *C. porosus* took up residence in a sewerage settling pond, it was impractical to set a trap and the animal would not allow itself to be approached for harpooning. It was eventually caught by a method used to catch wary *Caiman latirostris* in Argentina. A 10 cm long cattle bone with a hole drilled in the centre and a line attached was inserted in a dead chicken, and this was hung over the water. When the crocodile ate the chicken, the bone twisted at right angles and prevented the line coming out of the stomach; the crocodile was found and harpooned by following the line. On this occasion the line was cut leaving the bone and a little cord to digest, however had the line been passed through the bone and knotted well outside it, it may have been possible to untie the knot and pull the line out completely.

Many of the snare methods that have proven successful in other countries have met with little success in the Northern Territory, principally because they are designed for use in non-tidal areas. The spring-loaded snare from Zimbabwe (see Hutton *et al.* Chapter 24) and various snout snares have been tried, but only with occasional success. Modification and development of snares that work on the same principle, but which can be used in tidal areas (e.g. on floating platforms) is progressing. Snares are potentially cheap, easily erected, can be maintained by one man and have proven very successful in other countries.

HANDLING

For animals up to about 3.5 m TL, a wet hessian bag is wrapped around the head, covering the eyes and ears, and this appears to have a marked, calming effect. Currently no immobilizing drugs are used on crocodiles up to this length, unless the animal struggles unduly and is in danger of injuring itself, or the handlers in which case Flaxedil is used. For ease of transport, crocodiles are often tied to boards, in which case the head-end is tilted upwards. Regardless of whether crocodiles are being transported in boats or vehicles, or whether they are tied to boards or not, the head is tilted up or secured above the general level of the body to prevent regurgitated bait or other stomach contents from blocking the glottis.

In situations where large numbers of crocodiles are caught at the one time, they are often tethered in the water until they can be measured and marked or packed for transport. Normally a strong rope line is run along the water's edge, and each crocodile has a shorter tether line tied around the top jaw. The two jaws are then bound with cord. The individual tether lines are then secured to the main tether rope with about 30 cm tether length, and the crocodiles are allowed to lie in the shallow water (where they usually submerge) until required.

REFERENCES

CHABRECK, R., 1963. Methods of capturing, marking and sexing alligators. *Proc. Ann. Conf. Southeastern Assoc. Game Fish Comm.* **17**: 47-50.

WEBB, G. J. W., MANOLIS, S. C. AND BUCKWORTH, R., 1983. *Crocodylus johnstoni* in the McKinlay River area, N.T. II. Dry season habitat selection and an estimate of the total population size. *Aust. Wildl. Res.* **10**: 373-82.

WEBB, G. J. W. AND MESSEL, H., 1977. Crocodile capture techniques. *J. Wildl. Manag.* **41**: 572 5.