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THE CROCODILE MUZZLE: AN EXPERIMENTAL METHOD FOR PACIFYING CAPTURED CROCODILIANS. Crocodilians are predatory, semi-aquatic reptiles which vary in size, morphology, behaviour and ecology. Yet, all species pose certain challenges to capture for research or re-location purposes. Capture and handling techniques are therefore critical to ensure safety of both the crocodilian and the capture team.

There are many capture methods documented for crocodilians, each with its own merits, including snares, catch poles, tongs, nooses, harpoons, traps and nets (Chabreck 1963; Jones 1966; Murphy and Fendley 1973; Webb and Messel 1977; Walsh 1987; Mazzotti and Brandt 1988; McDaniel and Hord 1990; Forster 1991; Woodward and David 1994; Leslie 1997; Cherkiss *et al*. 2004; Mazzotti 2012).

Post-capture requires crocodilians to remain relatively calm for physical examination or data capture to occur. Here we document a method of reducing stress and improving pacification of crocodilians without the use of drugs. The technique involves reducing sensory stimuli through the application of a muzzle, reducing vision, hearing and stress from touching sensitive facial domed pressure receptors. The

muzzle also serves as a jaw restraint, preventing potential bite injury to capture teams.

The principle method of capture that facilitates applying a muzzle to a crocodilian is a rope jaw-noose. Once the specimen has been caught and beached on a shoreline using a jaw-noose, then application of a muzzle becomes an option. The set-up of operators and equipment is shown in Figure 1.

Figure 1. Applied 'Croc Muzzle'.

Firstly the method requires a minimum of three operators and preferably in an open area (we recommend a fourth to be a look-out and as many extras to assist the first operator as required). The tested method involves:

1. The first person holds the animal on the end of the taut jaw-rope. The second and third operators assist the first to slide the muzzle over the end of the jaw-rope.

2. The second and third operators then disperse away slowly from the first to create an approximate 45^{o} angle to keep the muzzle open.

3. The second and third operators then slowly draw the muzzle down toward the face of the crocodilian using the guide ropes. NB: distance is critical at this stage to not stress the animal and there is no guidance for specific species. We recommend operators remain a minimum of 3 metres from the captured specimen.

4. When the muzzle is closer to the specimen the second and third operators swiftly slide the muzzle onto the animal's face in unison and keep the guide ropes secure and in place.

5. The first operator then proceeds to pull him/her self along the jaw-rope toward the animal's muzzled face.

6. Provided the animal does not twist, turn, stress or try to retract into the water, the animal can be approached and possibly subdued by all three operators.

Application of the muzzle on various crocodilian species takes less than 3 minutes post jaw-rope capture. On occasions where the muzzle was applied, crocodilians suspended rolling and other movements to attempt escape, and became visibly calmer. It is important to note however, that the material used to form the muzzle needs to be of sufficient strength and durability. The application of the muzzle has been overseen by the Ugandan Wildlife Centre and veterinarians from the University of Toronto, Canada, and was considered a valuable tool promoting safety of both captured animals and the capture team.

The successful capture and subsequent pacifying of crocodilians is an essential part of veterinary work, zoo-keeping, conservation biology and human conflict control. With this short pilot technique we hope to provide interest and discussion from all experts in crocodilian research about the use of blindfold techniques to calm specimens post-capture. The muzzle we display was conceived, designed and tested by PP. It is a preliminary device that later will receive modification to hone its intended purpose. We believe the equipment has potential to be used with many crocodilian species. However, the prototype's formal release requires further testing on more key crocodilian species and under a variety of environmental conditions before we could deem its conclusive safe use.

We believe the technique has the potential to improve the safety and opportunity to perform basic morphometrics, simple veterinary procedures and possibly enhance education about crocodilians. It is our hope that the device may become useful to other herpetologists and in future perhaps become a retailed commodity that could raise funds for crocodilian projects around the world.

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