



Crocodile with a Bow

Part One

By Anthony Williams

The Nile Crocodile - Crocodylus niloticus - A creature in which we find few redeeming qualities. Its cold reptilian demeanor speaks of all we hate in creatures we hardly understand. Images of being dragged from the river's edge, or snapped up as we swim or wade fill us with revulsion. Countless films have documented its legendary strength and agility. A power seemingly beyond its narrow frame... a fully grown wildebeest no match for its vice-like jaws which can exert tons of pressure in a heartbeat! And a seeming intelligence we can only guess at.





Hunting the beast requires a measure of stealth and cunning, its unblinking eyes ever vigilant. Reputed to be able to feel the vibrations of approaching footfalls, or smell a human as a leopard might, it is extremely patient and has an uncanny ability to melt into the depths when danger threatens. "There is something else though." Shaking his head and staring out over the river at a croc on the far bank Pieter Bothma muses "... it's a sixth sense. They just know." However, their golf-ball size brain is accredited with little ability to "learn" or analyze complex situations, though sometimes they seem to. The Nile crocodile is one of 28 functionally similar animals which has remained unchanged for 80 million years. Known to live for around seventy years and attain lengths in excess of 18 feet, hunting them requires some measure of skill, and when done with a bow, preparation is everything.

Pieter Bothma has been hunting professionally for 20 odd years and in that time has built a successful safari business. Sable Safaris which operates in the Luangwa valley in Zambia is some million-and-a-half acres in extent and home to four of the Big Five - lion, leopard, buffalo and elephant. Pieter's interest in bow hunting has seen him develop specific techniques for hunting all game, and even a bow method for delivering a tranquilizer dart when "green" hunting white rhino on his ranch in South Africa. As such Pieter hunts the big five successfully with bow. He has done this with likeminded hunters such as Pete Shepley of PSE Bows, taking all but rhino together. Pete Shepley has been a dedicated hunter of African game with bow for decades and is actively involved in the development of his product.

While equipment is often a matter of personal choice, Pieter has put much time into researching the best way to approach croc hunting with a bow. Some of the early advice suggested hanging baits close to water, getting the croc to rear up to grab the bait, effectively exposing its soft under side for a killing spine or heart shot. But this method seemed too restrictive - getting the right croc to the bait, then hoping it will latch on and present the ideal pose for a underbody shot was flawed with too many variables.

Unlike a brain shot with a rifle which effectively anchors the croc on the spot, any bow shot crocodile is going to head for the water, and even a heart shot croc will make it and disappear. Says Pieter "As a reptile, even a heart shot will not kill

it, or at least immobilize it immediately. They still have enough in them to get to the water, and disappear." Crocodiles are known to have the most advanced circulatory system of any reptile, but as a reptile they have been known to survive for some 20-30 minutes with the heart destroyed. Brain shots from normal ranges with a bow are not possible due to the hard bony skull and thick armor-plated skin covering it. Indeed, many normal shot placement targets on a croc when using a rifle are not an option for the bow hunter. The thick scaled skin is pretty much impenetrable. Close examination of the back-skin shows individual lateral rows of rectangular scales which overlay bony plates and are linked but free moving with no accessible chinks in the armor. "Arrows just bounce off this or are totally destroyed on impact. They just will not penetrate." He says. Interestingly, the knobly fin-like protuberances on these scales - known as scutes - contain growth rings, and if sectioned can be used to determine the age of the crocodile.

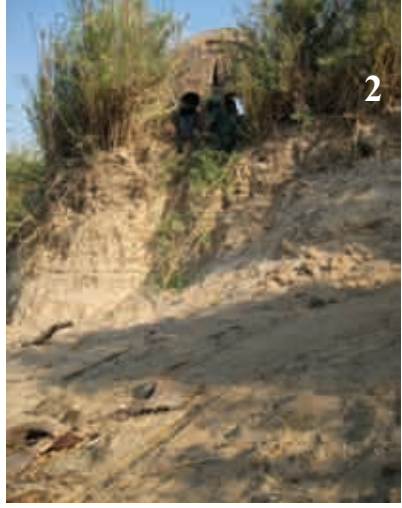
There are, however, some vulnerable areas along the flanks and even the neck skin which is soft and fatty to the touch. The right combination of bow and arrow will get through this and into the vitals, but they are tricky shots with little margin for error. "A wounded croc feels sorry for itself pretty quickly." says Pieter. "It will crawl out of the water onto the bank or rest in shallow water quite quickly if not pursued." But, at the first sign of danger it will make off again, and this cat-and-mouse game can last for hours if the wound is not quickly fatal. Most presented shots will be quartering on, resulting in usually only one lung being hit. But with one lung, a croc can last a mighty long time, and cover some considerable distance... underwater, leaving the hunter with a lost animal! Single shots, even if good like the direct heart shot, will seldom anchor the croc long enough for a second arrow to be placed either.



The original Muzzy Gator Getter Arrow (bottom) and Pieter's modification which now carries a standard Broadhead which has had the pointed tip ground to a chisel shape giving better penetration. Note the extension tube which attaches the modified broadhead.



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1) The blind site has been selected and clearing begins. Pieter assesses the set-up of the proposed blind site. 2) The blind is erected and clearing of the actual shooting lane begins 3) Chopping away any snags - roots and branches which might interfere with the tether line which will be laid later. 4) Once all the snags have been removed a layer of fresh river sand is shovelled and allowed to cascade down the slope to still further cover and smoothen the ground. 5) Levelling the ground for the pop-up blind on the higher bank. 6) The approach to the completed blind. It is important to remain out of sight of the water so as not to unduly alert any feeding crocs. 7) Adding to the riverside vegetation to further camouflage the blind and approach route to the blind. 8) The blind with additional camo and shooting lane prepared. 9) The bait - in this case a leopard carcass - is secured to the stake at the water's edge. 10) A scout is tasked to beat the water with a log, alerting any nearby crocs to the potential meal... while trying not to become one himself! 11 & 12) The tether line is laid from the blind to the bait over the soft shovelled sand. It then doubles back to the float which is placed midway between blind and bait and camouflaged with a thin layer of loose river sand and vegetation.



Due to its low, bony profile, a bow shot to the brain, which is a comparatively small target, even at ten yards, is not an option.

pure bow hunting, and not an avenue Pieter wanted to explore. The arrow heads used for fishing are not designed to penetrate crocodile skin... how would a broadhead be incorporated to accomplish this and deliver a killing wound? How would such a projectile affect bow performance, or was he going to have to design a bow to carry a whopping

broadhead along with high tensile steel cable to the luckless croc? Given the croc's skittish nature, what would the minimum shooting range likely be? The finer details would be worked out, but at least he had a starting point.

Through trial and error, Pieter finally settled on the Muzzy Gator Getter Arrow for which he designed a connecting union (machined tube threaded at both ends) that would take a two bladed Rocky Mountain broadhead. Experience showed that the standard broadhead point would invariably bend or buckle on impact, limiting penetration. Pieter ground off the point to create a sharpened chisel tip which had much better penetration, even standing up to impact with bone. Total arrow weight exceeds 3000 grains - a considerable projectile. Unlike the original arrowhead which detached from the shaft once embedded in a fish, Pieter glues his arrowhead to the shaft. Once in the croc, the protruding shaft is likely to inflict more

The dilemma forced Pieter to think outside the box, so to speak, looking to other disciplines for a method which could be adapted. Not surprisingly, the beginnings of a solution came from the equipment used for bow shooting fish. Bow fishermen have the same problem. It is pointless putting an arrow into a fish if you cannot retrieve it. Muzzy manufacture an arrow which is designed to carry a tether line (attached to the arrowhead) to the fish with the arrow, then detach from the arrow shaft after penetration, leaving the "angler" attached to his fish by the line. Now Pieter had something to keep him awake at night, his mind pondering how to adapt this to harvesting crocodiles. What line would be strong enough to hold a 16 foot croc? How would you hold onto 1200 pounds of writhing beast? Another method he had seen involved shooting alligators with an arrow which carried a line, then pulling the alligator to the surface and despatching it with a handgun. Not exactly

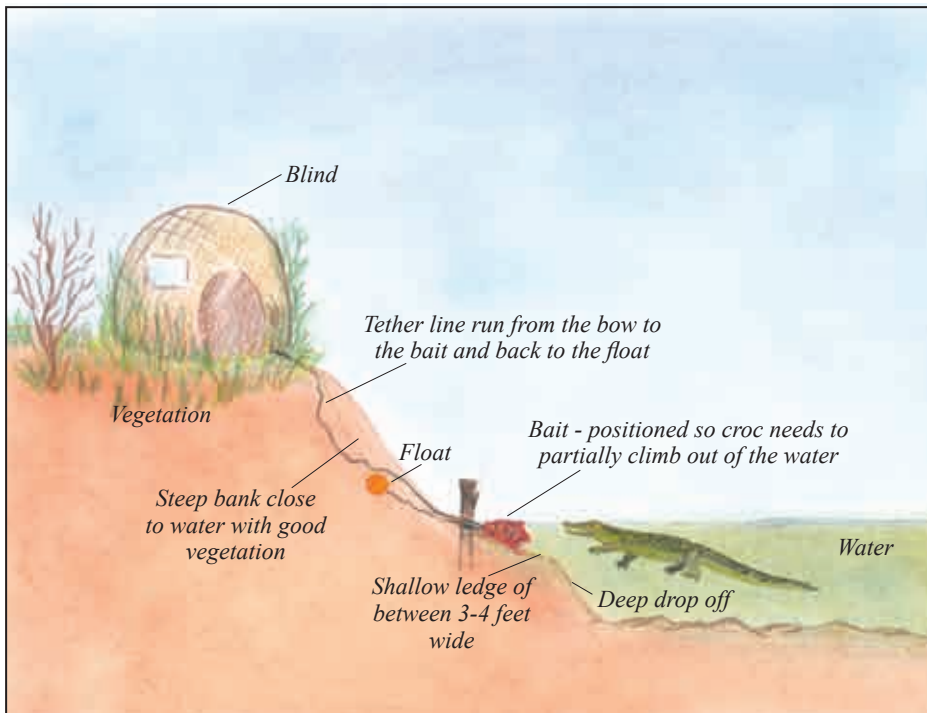
damage, working the blade deeper. Using the purpose made holes in the original arrowhead he attaches a 20 meter length of 600lb test Muzzy Gator Cord which in turn is attached to a float or bouy at the other end. Trials with the usual bow reel which attaches to conventional modern bows to hold the line greatly affected accuracy (giving a 6" group at 10 yards) and Pieter would develop a better method suited to his final set-up which shaved the grouping to about 2".

As shooting ranges are short he found the un-fletched arrow would remain stable up to about 15 yards before starting to oscillate, resulting in an average shooting range of about ten yards. A bow set up to shoot a conventional 500grn arrow (typically used for plains game) with a

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Using a rifle the hunter has many more baiting and shot options. A brain/spine shot will effectively anchor the croc until an insurance shot can be placed and the animal retrieved. Bow hunting is a very different story.



Side view showing the waterline with shelving riverbed and anchored bait, with position of blind on higher ground.

It is essential to find a section of water with a deep approach to the bait, but shallow within a few yards of the riverbank so that any feeding crocodile will have at least a third of its fore-body exposed for a vital organs shot. Note the elevated angle from the blind to the water, limiting shot placement options.



The broadhead/fishing arrow combo with the tether line attached. Tying the cord to the arrow head with a low profile knot is essential so as to reduce any unwanted drag when the arrow enters the skin. Note the wire barb. This and the 600lb Gator Cord will hold just about anything.



Practice is essential to set the sights and the feel of the tethered arrow over its 10-15 yard trajectory.

Crocodiles

By Richard Fergusson

Some years ago in Zimbabwe there was a spate of crocodile attacks which elicited the standard observation that "there are too many crocodiles and they should all be shot." Since, and probably before, there have been numerous other croc attacks on the rivers and lakes of Africa, most notably the Zambezi river system. During the 1990s, Richard Fergusson wrote an article published in the African Fisherman magazine which outlined some of the facts on crocodiles, and while the information was specific to Zimbabwe waters, it makes for interesting general reading. Statistics offered for crocodile ranches and farming of the animals have almost certainly changed in the present day Zimbabwe. What follows is a partially edited version of the article.

The Nile crocodile, one of 28 functionally similar species worldwide, has existed unchanged in African rivers for 80 million years (Blake 1993). Their basic biology is fairly well known. They are large, long-lived, cold-blooded aquatic predators. They occur in virtually all natural and man-made water bodies south of the Sahara which are sufficiently warm and have food and cover.

The largest wild specimens now are unlikely to exceed 5,5 metres long (males) and four metres in females. All crocodiles are immensely strong for their size and are well protected by a leathery yet sensitive hide, heavy bone structure on the head and conical teeth which are continually replaced. All their senses are well developed and they may live for 70 or more years. Their activity is largely controlled by temperature - when warm they will be alert, move, hunt and feed more frequently than in mid-winter although they regulate their temperature by moving between warmer and cooler environments, hence basking and submerging. Growth is rapid in warmer waters, up to about two metres within the first 10 years and then more slowly over the rest of their lifespan.

Males are territorial and females occupy distinct home ranges throughout most of the year but congregate with males in the breeding season (Hutton 1984).

Females become sexually mature at 2,5m long, mating in May/June and laying a single clutch of 20 to 90 eggs in September. They dig a nest near the

water and remain close-by to guard against nest predators but the eggs are incubated by the warm sand for about 90 days. The temperature of incubation plays a vital part in crocodile biology as sex is determined by temperature, so that if the nest is consistently over 33°C, then predominantly males will hatch, while below 30°C, females will result. In December/January the mother digs the hatchlings up, sometimes carrying them down to the water in her mouth. Parental care of the hatchlings may continue for several weeks after hatching.

Juvenile crocodiles (under 1,2m long) feed on insects and crustaceans, progressing to a mainly fish diet as sub-adults (up to 2,5m) (Games 1991). Larger prey including mammals, birds, larger scaleless fish and terrapins are taken by adults. At all ages they are widely opportunistic about food and will cannibalise and scavenge readily and participate in communal feeding.

However, crocodiles are not voracious feeders, the total off-take of fish by crocodiles in Kariba is estimated at 225 tonnes a year (Games 1991). Juvenile crocodiles consume only one gram/day of insects and 1,4 grams/day of vertebrate prey. The fish taken by sub-adults is estimated at 53,5kg per animal per year and for adults at 23kg per animal per year (Games 1991). Less than half of the fish taken by sub-adult and adult crocodiles in Kariba are of the "commercial" i.e. scaled species (Games 1991). For comparison, gill-netting is estimated to remove over 2 250 tonnes of fish each year.

Crocodiles are very primitive animals

and are generally timid, tending to avoid contact with humans. However, they are capable of learning that in some areas they have little to fear from man. They are also capable of learning where food may regularly be found. Hence they may lie in full view on sandbanks and follow houseboats on Kariba, contributing to the belief that Kariba is "full of crocs", The crocodile has little ability to reason and its reaction to the taste/smell of food is also primitive - they will approach and bite, likewise whenever cornered or handled.

The increased interaction with the human population over the last century caused the first known wide scale decline in the crocodile population. They were largely seen as valueless vermin and could be shot without permit, then during the 1950s hunting of adults for the skin trade reduced the numbers found in accessible rivers to a fraction of the carrying capacity. For example, over 6 000 are known to have been shot in the middle and upper Zambezi (Taylor, Blake & Loveridge 1992). Subsequent international concern about the status of crocodilians worldwide has resulted in their legal protection and the control of skin marketing.

Zimbabwe as a party to CITES is obliged to adhere to regulations concerning crocodiles. The Zimbabwe crocodile population is listed on Appendix II: allowing the utilisation and trade of "ranching" animals. In terms of this listing, Zimbabwe's crocodile populations are monitored and the wild population is maintained. The National Parks and Wildlife Act 1975 (Section 48) gives

the Director of DNPWLM the power to prohibit all capture and disturbance of crocodiles in all areas.

There is still a distinct conflict between crocodiles and the gill-net fishery. Mortality of crocodiles in gill-nets is said to be low but this is probably underestimated (Fergusson 1992). Gill-net owners are antagonised by the damage that crocodiles do to their nets (often tearing away large sections of net while scavenging on fish already caught in the net (Chimbuya & Hutton 1987)) and by the danger of crocodile attack when lifting nets by hand at night. There are now few areas of Kariba and the Zambezi that are unaffected by gill-netting. Destruction of crocodile eggs in Communal Lands is well known but this may be reduced by illustrating their monetary value by payment of a levy on eggs collected in Communal Lands as part of the CAMPFIRE programme. Closure of estuaries to gill-netting and to all boat access during the crocodile breeding season is unenforced and largely ignored.

The crocodile population in Zimbabwe has responded to protection and to expanded habitat (e.g. from new dams), however the "2,5 million" story for Kariba, is a myth. In Lake Kariba, population surveys have been made in areas of high crocodile density - some major estuaries of Lake Kariba - which indicate a maximum density of ten animals per kilometre of shoreline (Games 1991, Fergusson 1992 and unpublished data). Taylor, Blake and Loveridge (1992) found an overall density of five animals per kilometre. Densities are significantly higher on National Parks shoreline areas, and are higher east of the Sengwa river. These figures, together with data from egg collection, indicate a total population on the Zimbabwe shore of Lake Kariba of an absolute maximum of 30 000 animals (Taylor, Blake and Loveridge 1992) although other estimates are lower (Games 1991). While the population has grown to some extent, the increase in the number of crocodile sightings also reflects the increase in visitor numbers since the early 1980s which has coincided with falling water levels. The proportion of the population seen during surveys is known to increase with falling water level (Fergusson unpublished data, Hutton & Woolhouse 1989).

The late 1960's saw the start of the crocodile farming/ranching industry in Zimbabwe. This is now a small but dynamic industry, holding approximately 90 000 animals of all ages on 45 farms scattered throughout the country (CFAZ 1993). From

small and very experimental beginnings, successful procedures have been developed here for collecting, hatching and growing out crocodiles. The national Crocodile Management Policy and general farm management procedures have been copied by several other African countries.

Crocodile ranchers collect over 45 000 eggs annually from the wild. The majority are collected from the Zambezi/Kariba system and from the south east Lowveld. These eggs are incubated on the farms and 80 to 90% hatch. These animals are grown out for two to three years before being killed for the skins which are tanned and manufactured into luxury leather goods, largely in the Far East and Europe with only a small proportion of skins being processed locally.

Obviously the removal of 45 000 eggs from the wild cannot be sustainable as this represents most of the eggs laid, unless a release to the wild is to be made to compensate for this off-take. For this reason, Zimbabwe has released young crocodiles from the farms into the wild for the last three years. A number for release is calculated for each farm of the number of eggs collected, which is equivalent to the number that would survive without egg collection. These "releasings" are two or three years old and about 1,2m in total length. At the end of each year the animals are tagged and measured, then released in small groups at selected sites away from concentrations of larger crocs and away from human pressure (boating and gill-netting).

The survival, growth and dispersal of these released animals has been monitored continuously for two years in Kariba to evaluate the process. The data are still being analysed but general indications are that the successful integration of these animals into the wild population is related to water level. In years of good rainfall and consequent rising water levels, the released animals establish themselves in weedy inlets, tributaries and bays and most survive. If the water level falls considerably, the weed band becomes exposed which leaves the smaller crocs without food and shelter and many succumb to starvation and predation.

The results of this research will lead to an improved knowledge for the choice of release strategy to maintain the wild population: the numbers required for release; the most successful size of animals to release; the best sites and times for release. 🐾

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Hunting Tips - As with many predatory species like lion, leopard, hyena, a good way to judge the position of the heart and lungs is to imagine where the elbow would be if the front leg was extended down the side of the body. When estimating the overall length of a crocodile, a good 'rule-of-thumb' is that the distance between the centre of the eye and the centre of the nostril in inches is roughly the equivalent to the total length in feet.



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standard sight pin for 60 yards will be accurate at 10 to 15 yards. Given the considerable weight of the arrow, anything more than a 70lb bow delivered too much energy, bending the arrow shaft on release and affecting accuracy. With all other factors taken into consideration, the 70lb bow, carrying the 3000grn broadhead arrow and line over the ten yards to the target was both accurate and had enough energy to deliver a fatal wound assuming it was placed accurately.

Now that Pieter had the equipment sorted out, he turned his attention to the blind and bait set-up which would get the croc close enough and positioned right for the initial shot. Conventional set-up for rifle hunting crocodiles requires the animal is either out of the water, or lying in very shallow water, preferably away from any deep channels it might head for if not instantly anchored. "Crocs are always suspicious of baits along the main shoreline." Says Pieter. "If a bait is placed out in the middle of the river, say on a sandbar or island, the crocs have little fear and are easily tempted out of the water." Range is not a problem with a rifle, so such a set-up is quite easily executed. But given their skepticism for shoreline baits, especially if it meant the croc would have to approach through shallow water, and the need for the bow blind to be so close to the water's edge, further thought was needed.

Contrary to the rifle set-up, Pieter looked for a short, shallow shelf with a deep drop-off close by. The arrow shot was not going to be instantly fatal anyway, and wherever the croc was when shot, it would get to deep water. A deeper approach would enable the croc to home in on the bait in relative comfort, sliding up on the shallow shelf to reach the meat, and hopefully exposing its vitals for a killing shot. At best he could hope for the front third of the croc to be exposed, though most times this would be quartering on, limiting the possibility of an arrow getting the heart and both lungs. Shoreline vegetation is essential if the blind is to be successfully concealed. Such vegetation normally only grows close to the river when on a higher embankment away from the main shore line and while it offers a good view of the target and its approach it further limits shot options. Because the scaly skin across the croc's back is impenetrable to an arrow, leaving an elevated, quartering-on shot into the soft flanks as a pretty difficult shot to execute.

With the equipment now refined for the job of getting the arrow into the croc, Pieter set about perfecting the blind set-up to deliver the arrow, and techniques for keeping the dying croc visible and accessible for the *coup-de-grace*. In part two of this series, we will examine this set-up. 🐾

Sable Safaris

Sable Safaris, owned by the Aloo family in Zambia and managed in conjunction with Pieter Bothma, operate in a vast wilderness along the Luangwa river in Zambia 160 miles north east of the capital Lusaka. Comprising almost a million and a half acres sprawling along the borders of the well known South Luangwa National Park, game is prolific and the big four - lion, leopard, buffalo and elephant - are prime species, while hippo and crocodile complete a list of dangerous game hard to find in one location. Sable Safaris also have rights to hunt further private areas in Zambia. Plains game complement the dangerous game, and all are taken with either bow or rifle. Pieter Bothma also owns and operates Cheetah Safaris in northern South Africa. For more information, contact Nicky or Pieter Bothma on e-mail info@cheetahsafaris.co.za or on telephone (+27-14) 763 5070, (+27-82) 373 1531 or fax them at (+27-14) 763 5071. They also maintain a web site which can be visited at www.sablesafaris.co.za.

