An analysis of crocodilian attacks worldwide for the period of 2008 - July 2013

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Abstract

Attacks on humans by crocodilians have been documented reasonably well in developed countries in the last few decades. Conversely, attacks in developing countries are typically poorly documented despite those countries holding the highest frequencies of crocodilian attacks. Here we present the results of an analysis of 1237 crocodilian attacks resulting in 674 fatalities worldwide for the period of January 2008 through July 8th, 2013. Attacks were recorded from 15 crocodilian species and fatal attacks were recorded from 7 of those 15 crocodilian species. 494 attacks resulting in 285 fatalities were recorded for Crocodylus niloticus (problem areas identified for the species include East Timor, Sumatra and East Kalimantan of Indonesia, Sarawak of Malaysia, Orissa of India, and coastal Sri Lanka), 428 attacks resulting in 309 fatalities for C. porosus, 98 attacks resulting in 50 fatalities for C. paluensis (mostly from India, particularly within Gujarat state), 69 attacks resulting in 13 fatalities for C. acutus (problem areas were the Pacific Coast of Mexico, Costa Rica and Panama), 36 attacks resulting in 9 fatalities for Melanosuchus niger (mostly from the Amazonas state of Brazil), 8 attacks resulting in 4 fatalities for Tomistoma schlegelli, 16 attacks resulting in 2 fatalities for C. moreletii (with the most severe cases coming from the Tamaulipas state of Mexico), 47 attacks resulting in no fatalities for Alligator mississippiensis, and 33 non-fatal attacks for 7 other species (C. johnstoni, C. siamensis, C. mindorensis, C. intermedius, Caiman yacare, C. latirostris, and C. crocodilus); in 8 attacks (2 of them fatal) the species responsible was undetermined (could have been either of two species present in the area). Issues encountered included a paucity of attack data being available from much the C. niloticus range and some of the C. porosus range (e.g. New Guinea, Solomon Islands), as well as information disappearing from online news archives over time resulting in a loss of records prior to when we began compiling the database. We began compiling our data in 2010, thus there is a slightly less amount of data available for 2008 and 2009 due to this loss of online reports. Attack data were compiled from a number of sources including online media reports, local wildlife officials, crocodilian experts, and relevant recent publications.

Species Reports

Crocodylus porosus

494 attacks resulting in 285 fatalities were attributed to C. porosus during the study period; C. porosus was responsible for 39.9% of all reported crocodilian attacks and 42.3% of all reported crocodilian fatalities. Indonesia was the location of the highest amount of conflict with 211 attacks resulting in 107 fatalities. Provinces with the highest numbers of attacks were East Kalimantan (35 attacks, 22 fatal), South Sumatra (22 attacks, 16 fatal), Bangka-Belitung (26 attacks, 8 fatal), East Nusa Tenggara (22 attacks, 11 fatal), and Riau (16 attacks, 8 fatal). Other countries with a high level of C. porosus - human conflict were East Timor (31 attacks, 26 fatal), Malaysia (57 attacks, 32 fatal), India (54 attacks, 31 fatal), Papua New Guinea (50 attacks, 40 fatal), and Sri Lanka (21 attacks, 12 fatal); it is important to note that in some areas (particularly the entire island of New Guinea) data regarding attacks is very limited and thus the number of attacks reported is likely much lower than the number that have occurred. In Papua New Guinea the vast majority of our data has been provided by Dr. Valerie Archer of Kikori District Hospital in Gulf Province; according to Dr. Archer, attacks are just as frequent in the Western province (Fly River region) and likely other areas (such as the Sepik/Ramu River regions) but that no data were available from these regions. It also appears to be highly likely the attacks within the Solomon Islands are underrepresented in our database due to a lack of reporting to the media. Australia, although home to one of the largest existing C. porosus populations, has a fairly low fatality rate (29 attacks, 8 fatal; 27.6%) compared to the rest of the C. porosus range (59.6%); the reason for this is unknown, although it may be related to better access to medical care and perhaps the smaller size of the attacking crocodiles. We also cannot discount the possibility that the media is biased towards reporting fatal attacks, and thus many non-fatual attacks may go unreported within developing regions.

Crocodylus niloticus

428 attacks resulting in 309 fatalities were attributed to C. niloticus during the study period; C. niloticus was responsible for 34.6% of all reported crocodilian attacks and 45.8% of all reported crocodilian fatalities. Collecting attack data for C. niloticus is problematic since most attacks occur in areas with little or no reporting occurring; in areas like Malawi attacks frequently occur along Lake Malawi and the Shire River and they are very rarely reported (Bruce Carruthers pers. comm.). Getting an estimate for the number of people killed by C. niloticus every year is very difficult; we know that at the very least dozens of people are killed in Mozambique and Uganda every year and the situation could be similar in,

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other areas that have little reporting (such as Somalia, Ethiopia, Burundi, etc.). The small amount of data available suggests that the species is responsible for far more attacks on humans than all other species, but little else is known.

**Crocodylus palustris**
98 attacks resulting in 50 fatalities were attributed to *C. palustris* during the study period; *C. palustris* was responsible for 7.9% of all reported crocodilian attacks and 7.4% of all reported crocodilian fatalities. The majority of these attacks occurred within India (83 attacks, 43 fatal) followed by Sri Lanka (11 attacks, 4 fatal) and Nepal (4 attacks, 3 fatal); no attacks were reported from Iran or Pakistan. Problem areas within India included Gujarat state (particularly around Vadodara city) (21 attacks, 14 fatal), Uttar Pradesh state (16 attacks, 4 fatal), Karnataka state (7 attacks, 5 fatal), and Madhya Pradesh state (9 attacks, 4 fatal). It is unknown if more *C. palustris* attacks occurred in Nepal but went unreported to the media.

**Crocodylus acutus**
69 attacks resulting in 13 fatalities were attributed to *C. acutus* during the study period; this makes *C. acutus* responsible for the highest percent of reported attacks (46.6%) and fatalities (54.2%) within Latin America, but still a fairly low fatality rate (18.8%) compared with four of the Old World species. The highest number of *C. acutus* attacks were reported from Mexico (37 attacks, 2 fatal), Costa Rica (14 attacks, 5 fatal) and Panama (8 attacks, 3 fatal). Problem locations in Mexico include Jalisco state (particularly around Puerto Vallarta) (9 attacks, 1 fatal), Quintana Roo (particularly around Nichupte Lagoon in Cancun) (7 attacks, all non-fatal), and Oaxaca (4 attacks, 1 fatal). Although the site of the most fatal attacks, the frequency of attacks within Costa Rica has dropped significantly in recent years; 71.4% of attacks and all fatalities occurred between 2008 and 2010.

**Crocodylus moreletii**
16 attacks resulting in 2 fatalities were attributed to *C. moreletii* during the study period. Attacks for this species were reported from Mexico (11 attacks, 2 fatal), Guatemala (3 attacks, all non-fatal) and Belize (2 attacks, both non-fatal). The majority of the Mexican attacks (8 of the attacks and both fatalities) were reported from extreme southern Tamaulipas state (Altamira, Tampico and Madero City municipalities). The first fatal attack occurred in 2008 at Contadero Lagoon in Altamira; it involved a fisherman bleeding to death after being bitten in the leg. The second fatal attack also occurred in 2008, this time at Carpintero Lagoon in Tampico city; in this incident an intoxicated man was reportedly dragged into the lake by multiple crocodiles in front of a crowd of onlookers after attempting to "pet" one of them. His body was later recovered intact without any sign of consumption by the crocodiles.

**Crocodylus johnstoni**
Six attacks, all of them non-fatal, were attributed to *C. johnstoni* during the study period; four of the attacks were reported from Western Australia and two of the attacks from the Northern Territory. The first WA incident occurred in 2009 when a woman was attacked while swimming within the Throssel River (Hines and Skroblin 2010) and the second WA incident also occurred in 2009, this time at Lake Argyle which is known to have one of the largest *C. johnstoni* populations in existence; this incident involved a man swimming in the lake and was apparently unprovoked (Somaweera 2011). The third WA incident occurred in 2012 at Ivanhoe Crossing on the Ord River; a teenage boy was attacked while in waist-deep water, this incident was initially logged as a *C. porosus* attack, but it has since been confirmed to have been *C. johnstoni* (Ruchira Somaweera pers. comm.). The fourth and final WA incident occurred in 2013 at Slatey Creek Gorge; a woman was attacked by the crocodile while swimming within a waterhole. The first NT incident occurred in 2009 in an upstream portion of the Adelaide River populated by *C. johnstoni* (rather than *C. porosus*, which is abundant along much of the Adelaide River) (Charlie Manolis pers. comm.); only minor injuries were inflicted on the victim. The second NT incident occurred in 2012 along the Daly River; the female victim had been hunting for turtles and may have unintentionally provoked the crocodile; she sustained severe injuries to one of her hands during the attack, nearly resulting in the loss of one of her fingers.

**Crocodylus siamensis**
Two non-fatal attacks were attributed to *C. siamensis* during the study period and in both cases it appears as though the attacks were defensive in nature and may have involved provocation. The first incident took place within Cat Tien National Park of Vietnam in 2008; apparently a man had been illegally fishing within the park and was attacked by a crocodile that may have been defending her hatchlings (Heng Sovanarra pers. comm.). The second incident took place in 2012 at Lake Mesangat in East Kalimantan of Indonesian Borneo; in this incident a fisherman may have unintentionally provoked the crocodile into attacking him while attempting to retrieve a stuck fishing line from a log. Both *T. schlegelii* and *C. siamensis* are present within the waters of Lake Mesangat, but the crocodile responsible in this case is believed to have been *C. siamensis* (Agata Staniewicz pers. comm.).
Crocodylus mindorensis
Two attacks, both of them non-fatal, were attributed to *C. mindorensis* during the study period; both attacks occurred within the San Mariano municipality on the island of Luzon in 2010. The first incident involved a pregnant woman bathing at Dinang Creek in barangay Cadsalan; she sustained severe leg wounds during the attack but recovered. The second incident involved a man fishing within the Catalangan River of barangay Dibuluan; it is has been suggested that he may have been "electro-fishing" and that the crocodile attacked him in response, but this has not been confirmed (van der Ploeg *et al.* 2012).

Crocodylus intermedius
Only one non-fatal attack was detailed for *C. intermedius* during the study period, although one other non-fatal attack is reported to have occurred within the same area. The report comes from the La Palmita town along the Cojedes River in 2009; the attack was quite severe, involving a fisherman losing his lower right leg to a large crocodile during the attack (Barrio-Amoros 2012).

Tomistoma schlegelii
Eight attacks resulting in four fatalities were attributed to *T. schlegelii* during the study period, all of them occurring within Indonesia; since this species is sympatric with *C. porosus* in many areas, attacks were only attributed to it when the species was specifically mentioned as the attacking crocodilian or when expert advice suggested the species was more likely to be responsible than the more dangerous *C. porosus*.

Two fatal attacks occurred within Central Kalimantan province of Indonesian Borneo, both in late 2008; in one of these incidents a large (4 meter +) *T. schlegelii* was killed and the remains of the victim were retrieved from its stomach. Two attacks, one of them fatal, occurred within the East Kalimantan province; the non-fatal incident took place in 2011 along the upper reaches of a river typically known for *C. porosus* attacks (the Sangatta River), but the victim specifically identified the attacking crocodilian as "buaya supit" (one of the local names for *T. schlegelii*, translates as "chopstick crocodile"). The fatal East Kalimantan attack occurred along the upper reaches of the Belayan River in 2010 and it has been stated that the species responsible was *T. schlegelii* (Rob Stuebing pers. comm.).

Within the Jambi province of Sumatra one non-fatal attack was attributed to the species in 2012; while *T. schlegelii* was not specifically mentioned in the attack article, the circumstances and location of the attack are more suggestive of that species, rather than *C. porosus*. The incident began when a man accidentally speared the crocodilian, which had been lying at the floor of a swamp, mistaking it for "labi-labi" (a soft-shelled turtle that often shares habitat with *T. schlegelii*) (Rob Stuebing pers. comm.). The crocodilian attacked in retaliation, seriously injuring the man. Within the Riau province of Sumatra two non-fatal attacks were reported from along the Air Hitam River of Rokan Hulu Regency in 2010 and 2013; in these cases the species was identified as *T. schlegelii* by the victims and witnesses. A single fatal attack was reported from the Rokan River near Rimba Melintang in 2010; initially we attributed this attack to *C. porosus* since both of the species inhabit this area, but following the attack a large (*T. schlegelii* was killed (the reports claimed 5.5 meters in length) and "human-like" bones were recovered from its stomach.

Alligator mississippiensis
47 attacks, all of them non-fatal, were attributed to *A. mississippiensis* during the study period; all bites, even very minor and provoked incidents, are reliably recorded throughout the range of *A. mississippiensis*, so the reported number of non-fatal attacks is much higher. Many attacks by the species are provoked or defensive in nature and unprovoked attacks are fairly rare. Fatal attacks by *A. mississippiensis* are very rare, with none occurring since prior to the study period in 2007.

Melanosuchus niger
36 attacks, resulting in 9 fatalities, were attributed to *M. niger* during the study period; Brazil held the highest number of reported attacks (29) and all of the reported fatalities, but non-fatal attacks were also reported from Peru (3 attacks), Ecuador (3 attacks) and Guyana (1 attack). More attacks, including some fatalities, have also occurred within Guyana, but no details have been made available (Peter Taylor pers. comm.); officials within French Guiana state that no attacks by *M. niger* have occurred there (Beniot de Thoisy pers. comm.). Within Brazil the highest number of attack reports came from Amazonas state (24 attacks, 6 fatal), followed by Acre state (2 attacks, 1 fatal), Rondonia state (2 attacks, 1 fatal), and Amapa state (1 fatal attack). It is possible that attacks have gone unreported within remote portions of Brazil or in other parts of the range of *M. niger* (e.g. Bolivia).

Caiman crocodilus
15 attacks, all of them non-fatal, were attributed to *C. crocodilus* during the study period; attacks were reported from Brazil (8 attacks), Colombia (5 attacks), Suriname (1 attack), and Trinidad (1 attack). Four of the attacks were reported to have been provoked by the victim, although it is possible that some of the other attacks may have as well. In 2013 two attacks occurred at Campo Maior Dam of Piaui state within a 2 month period.
Five non-fatal attacks were attributed to *C. yacare* during the study period, two in Argentina and three in Brazil. The first and most severe attack occurred in 2008 at a dam in Ingeniero Juarez in the Formosa province of Argentina; in this incident a young boy lost one of his feet to the caiman. The second Argentinean incident took place along the Paraguay River in 2012; very little detail is available for this attack but it involved a fisherman being bitten. The first Brazilian incident occurred in 2011 along the Paraguay River within the Pantanal; a fisherman was attacked by a 1.5 meter caiman while cleaning fish along the edge of the river (Neto, Stolf and Haddad 2013). The second Brazilian incident took place in 2012 along a river within the Pantanal of Mato Grosso do Sul; a man was attacked by a caiman while walking along the Taquari River in the Pantanal. The third Brazilian incident occurred in 2013 along the Cuiaba River of Mato Grosso state; a man was attacked by a caiman estimated to be around 1.5 meters in length while attempting to retrieve his stuck fishing line from the river.

Two non-fatal attacks were attributed to *C. latirostris* during the study period; both attacks occurred in Brazil and in both cases the caiman was unintentionally provoked by the victim. The first incident took place in 2009 within the Jaguaribe River of Paraiba state; a man accidentally stepped on the caiman while net-fishing. The second incident took place in 2011 within the coastal waters of Illha do Mel (Honey Island) in Para state; a fisherman accidentally stepped onto a caiman mistaking it for a log.

**Literature Cited**


