

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES  
OF WILD FAUNA AND FLORA

---



Fifteenth meeting of the Conference of the Parties  
Doha (Qatar), 13-25 March 2010

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of the Egyptian population of *Crocodylus niloticus* from Appendix I to Appendix II in conformity with the preventative measures of ranching (Conf. Res. 11.16) included in Annex 4 (2d) of the conference resolution 9.24 (Rev. CoP14).

B. Proponent

Arab Republic of Egypt\*

C. Supporting Statement

1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Crocodylia
- 1.3 Family: Crocodylidae
- 1.4 Genus, Species or Subspecies, including Author and Year: *Crocodylus niloticus*, Laurenti 1768
- 1.5 Scientific Synonyms:
- 1.6 Common Names: English: Nile crocodile  
French: Crocodile du Nil  
Arabic: Temsah
- 1.7 Code numbers: L-306.002.001.006

2. Overview

The Nile crocodile in Egypt was historically revered for its strength and utilized as guardians to the pharaohs and priests of ancient Egypt and to this day is synonymous with Egypt. However, by the 1950's this species was virtually, if not entirely, eradicated from the Egyptian Nile. Construction of the High Dam at Aswan and subsequent impoundment of Lake Nasser gave the Nile crocodile a second chance in Egypt, and by the 1970's crocodiles were again seen irregularly. The vast, remote, highly productive habitat that is Lake Nasser quickly facilitated a population resurgence and by the 1990's crocodiles were a common fixture of the biological landscape and fishermen started becoming vocal about their numbers. In 2008 the

---

\* The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat or the United Nations Environment Programme concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

Egyptian Environmental Affairs Agency recognized the potential of the Nile crocodile as an economic resource, and in turn, their sustainable utilization as an answer to the demands of the large and influential Lake Nasser fishing community. In preparation for this we took steps to initiate a crocodile monitoring program. The first year of this program was a great success resulting in trained personnel, estimates of population size, indices of abundance for continued monitoring efforts, a recognized presence amongst the natural resources users and administrators of Lake Nasser, and collaborations formed with international specialists. This has resulted in the formal creation of the Egyptian Crocodile Management Unit to oversee future crocodile management and related activities. **This has set the stage for our request to transfer of the Egyptian population of *Crocodylus niloticus* from Appendix I to Appendix II in conformity with the preventative measures of ranching (Conf. Res. 11.16) included in Annex 4 (2d) of the conference resolution 9.24 (Rev. CoP14).** Ranching will be based on a harvest of hatchling crocodiles from the wild. All individual crocodiles maintained in a ranch setting will be marked with toe-web tags and all tags must be available for inspection of carcasses (both ranch mortality and processed) and leathers. International trade will focus on processed leathers and leather products. This trade will be regulated through adoption of the universal tagging system (Resolution Conf. 9.22). There are currently no stocks of crocodiles in Egypt, and as such we are requesting that an annual export quota of 750 skins from ranched individuals be put into effect starting 2013. This will allow ample time for approved ranching operations to build a stock and ensure that in the intervening time no animals are harvested from the wild to fulfil the quota. It is worth noting that we have yet to approve any ranching proposals domestically because we are certain that ranching will result in international trade whether it is legal or not. We have put in place a system for monitoring our crocodile population and utilization programs that will develop, and have taken steps to ensure: 1) enforcement will be successful, and 2) proceeds from ranched individuals will benefit wildlife management efforts and local people.

### 3. Species characteristics

#### 3.1 Distribution

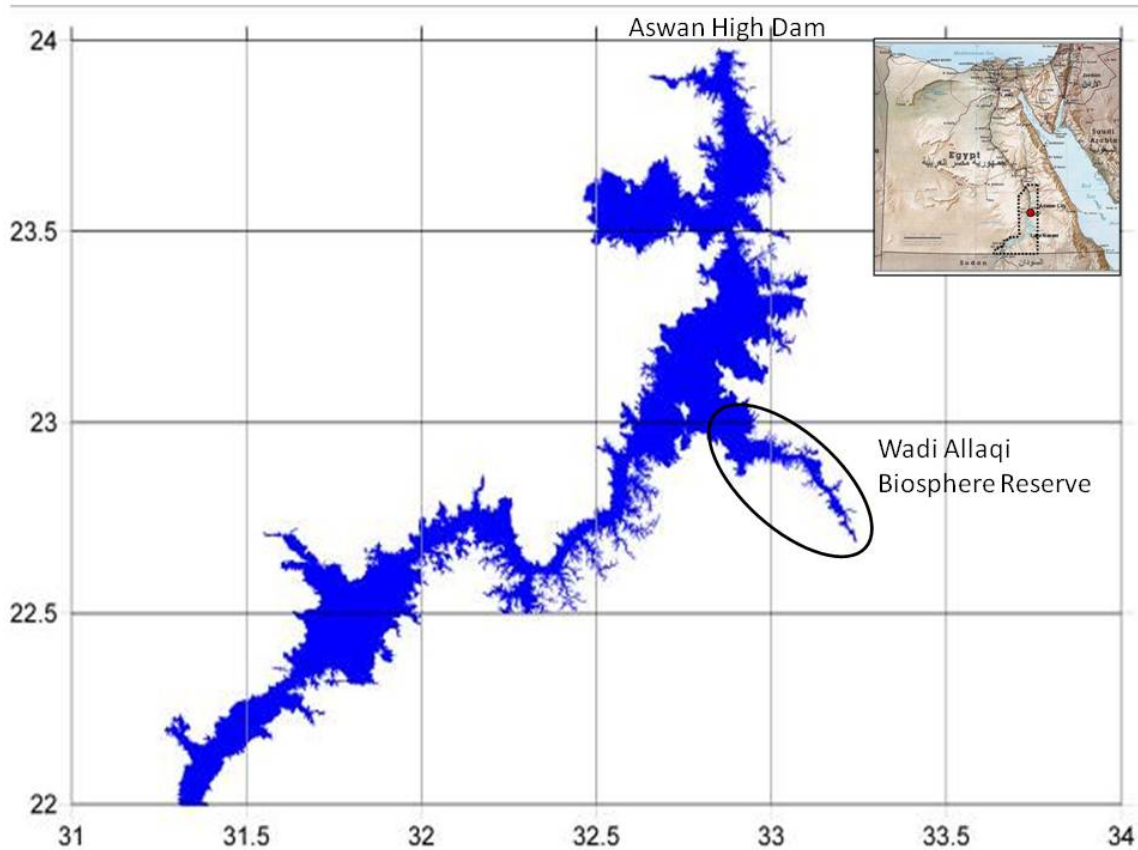
The Nile crocodile is the most widely distributed crocodile species in Africa occurring in virtually all sub-Saharan countries, including: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Republic of Congo, Côte d'Ivoire, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Mauritania, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Within Egypt it is limited in distribution to Lake Nasser in Upper Egypt, where it is widespread. There have been recent reports of individuals from as far north as Cairo along the Nile River but, while this species was formerly distributed all throughout the Nile Valley and into the Delta, these recent reports are almost certainly due to escapees or releases and not natural occurrences. The next nearest population of this species is in Sudan where the population is continuous with the Sudanese section of Lake Nasser but not contiguous with the next nearest population south in the White Nile and in the Sud Wetland.

#### 3.2 Habitat

Throughout its range the Nile crocodile is a robust species capable of surviving in virtually any moderately suitable habitat (i.e. wetlands including lakes, rivers, swamps, and coastal lagoons), and in some parts of its range has even been found in extremely seasonal wetlands (e.g. Mauritania, Shine et al. 2001), isolated mountain pools (e.g. Chad), and artificial village dams up to 100km from natural water sources (e.g. throughout West Africa, Shirley et al. 2009).

In Egypt, the Nile crocodile is limited to Lake Nasser. Lake Nasser is the largest man-made lake in the world stretching some 480km south into Sudan. It was created with construction of the Aswan High Dam, which began in 1959, and the ensuing water impoundment initiated by 1964 (Bishai et al. 2000). The dimensions of the lake change with variable water levels, however, it can reach up to 35km in width with 7,844km maximum shoreline largely owing to its irregularity and the extensive khors (flooded valleys creating finger-like branches; Bishai et al. 2000). The entire lake is suitable habitat for Nile crocodile occupancy during one life stage or another. However, only 60% or so contains suitable nesting habitat. A single protected area, Wadi Allaqi, has been created to protect the largest khor in the lake and crocodiles are known to occur here and use this area for nesting.



### 3.3 Biological Characteristics

The Nile crocodile is a fairly typical *Crocodylus* species in its semi-aquatic nature not showing strong preference for any specific aquatic habitat given that the habitat is relatively open and there is good availability for sandy nesting beaches. In Egypt it is a lacustrine species preferring the relatively shallow shoreline and lake extension habitats (called khors). It is generally not found in exclusively cliffy areas as it requires haul-out sites for basking. In some places this species will aestivate in burrows during dry and/or winter seasons, but in Egypt this is not known to be the case.

The Nile crocodile is a large-bodied *Crocodylus* species capable of attaining lengths greater than 5m. Females are usually reproductively active by 2.5m, while males are usually bigger than this before they have access to mature females. Females are thought to have an annual reproductive frequency of 75% and the average clutch size is 45 eggs (Thorbjarnarson 1996). Like most crocodylians, Nile crocodile females guard their nests and hatchlings resulting in 84% egg hatching success and 10% hatchling survival (Craig 1992).

### 3.4 Morphological characteristics

The following was taken from Brazaitis (2001):

**SIZE:** Adults 700cm would be extremely large individuals. Average size would be 400cm to 600cm. Hatchlings, 26cm to 34cm.

**COLORATION:** Adults and young dark olive green, yellow-green, brown with dark cross-bands on the back and tail. Old adults uniform dark brown or green with faint dark cross-bands. Dark spots and irregular striations on the sides of the body extends down onto the lateral ventral scales. Ventrals are white, light gray, or cream. Specimens from Madagascar are densely flecked with 6rk brown or black on the head, back, and tail.

**CONFORMATION:** The snout is moderate, extremely rugose, length 1.6 to 2 times the width at the base. The transverse dorsal scales are broad at the mid-body and extend onto the sides. The lateral body scales are large, barely discernible from the dorsal scales in size but feebly keeled. ISO's are present on the head and body scalation. The fingers are slightly webbed at the base.

#### **SCALATION:**

*Post-occipitals*: a single transverse row of 4 to 6 enlarged scales divided equally at the midline, otherwise in contact with each other.

*Nuchals*: 4 large scales in a square, flanked by a scale on each side, forming a cluster. Nuchals are separated from the dorsal scales by 1 to 2 small scales.

*Dorsals*: 17 to 18 transverse rows of 6 to 8 small scales.

*Double crest caudal whorls*: 17 to 18.

*Single crest caudal whorls*: 15 to 16.

*Ventral collar*: 1 to 2 transverse rows of slightly enlarged scales.

*Ventral scales*: 26 to 30 transverse rows.

*Sub-caudal scale rows*: usually uniform uninterrupted rings.

*Flanks*: Usually only one or two rows of enlarged scales on the sides of the body.

**SIMILAR SPECIES:** *Crocodylus p. palustris*, *Crocodylus p. kimbula*: some transverse dorsal rows reduced to four scales per row; ventral collar consists of a single transverse row of enlarged scales; some populations without a noticeable ventral collar. *Crocodylus novaeguineae*, *Crocodylus mindorensis*: ventral scales in 24 to 26 transverse rows. *Crocodylus siamensis*: from 30 to 34 transverse ventral rows; a longitudinal bony ridge raised between the orbits on the frontal region of the skull.

### 3.5 Role of the species in its ecosystem

The Nile crocodile, like all large-bodied crocodylians and in fact all predators, plays an important role regulating the population dynamics of species below it in the food chain. In Egypt this role is likely vital to populations of fish species, both commercially valuable and valueless. Aside from its role as a top predator, this species also provides an important food source to other organisms in the area. For example, crocodile eggs are likely heavily predated by terrestrial predators like foxes (there are two species around Lake Nasser) and monitors, hatchlings are heavily predated by both of these species, as well as, large-bodied predatory fish (e.g., Nile perch) and wading birds.

## 4. Status and Trends

### 4.1 Habitat Trends

Lake Nasser was created as water impoundment began in 1964 and ultimately completed by 1968 (Bishai et al. 2000). The perimeter of the Lake in Egypt can reach nearly 7,900km. The only inhabitants in this area are small populations of nomadic, Bedouin peoples and working camps for local fisherman. Approximately 6,000 fishermen are currently utilizing the resources of Lake Nasser, and they are distributed through  $\pm$  750 camps consisted of 2-16 people/camp (Abdel-Latif 1974, Bishai et al. 2000). Other than this, the entire lake can be considered as undisturbed habitat.

We view water security and the long-term safety and cleanliness of Lake Nasser waters as a top priority. We have prepared and are currently implementing the Egyptian Strategy for Biodiversity Conservation and Action Plan in 1998. This strategy and action plan was mainstreamed in the National Environmental Action Plan (NEAP) in 2002. Lake Nasser was given special priority for conservation during this 5 year plan 2007 – 2012, and as such no development, building, farming, livestock ranching, or any other activities that may ultimately harm the water quality are allowed on Lake Nasser. Lake Nasser may be considered simultaneously among the remotest places in Egypt, free from current and future disturbance and degradation.

### 4.2 Population Size

Surveys of the Lake Nasser crocodile population were begun in July 2008. Over the period July 2008 – 2009 we surveyed approximately 11% of the shoreline covering 15 different regions of the Lake. Through a modified double observer survey model, we were able to estimate that the detectable crocodile population was between 3,047 – 3,500 individuals (Shirley et al. *in prep.*). This number is absolutely lower than the total population size owing to the well-known fact of crocodile submersion bias. Submersion bias in crocodile surveys effectively creates two crocodile populations at any given locality: the detectable population (i.e., those on the surface) and the undetectable population (i.e., those submerged). Relatively few studies have estimated the submergence rate of crocodylians; however, those that have estimate that at any given time 0% – over 50% of the population may be emerged at any given time (Woodward and Marion 1979; Hutton et al. 1989; Pacheco 1996a,b; Bugbee 2008). Using these values as a rough guide, we confidently estimate the size of the crocodile population in Lake Nasser to be 6,094 – 30,470 (assuming 10-50% detectability). This estimate is

obviously quite broad and refinement of this estimate is currently a major goal through a newly initiated radio telemetry project (i.e. to estimate detectability) and through continued survey and monitoring efforts. Regardless of our exact estimates of population size, these surveys (and our continued efforts) have enabled us to establish population indices (by location and habitat type) for continued monitoring efforts (e.g., Table 1).

#### 4.3 Population Structure

The population is quite heterogeneous and commensurate with other Nile crocodile populations around Africa. You can see from Table 1 that a minimum 15% of the population are in adult breeding size class. This figure is also a bit conservative given the high proportion of sighted individuals whose size class was not estimated (38%), and a figure closer to 20% may be more accurate and would be within the normal range for other African populations (Parker and Watson 1970, Hutton and Woolhouse 1989, Games 1990, Brown et al. 2004, Bourquin 2007). Using conservative sex ratios (i.e., 50:50) in conjunction with our estimates of population size (above), it is likely that there are 457 – 2,288 breeding size females on the lake. Female Nile crocodiles produce an average 45 eggs/nest (Thorbjarnarson 1996) with an estimated annual nesting frequency of 75%, meaning that our population is capable of producing 15,424 – 77,220 eggs annually. Craig (1992) estimated an 83% egg hatch rate (estimated 12,801 – 64,093 annually in our population) and 10% hatchling survival (estimated 1,281 – 6,409 annually in our population). Our surveys detected a minimum of 23.6% of the population to be in the yearling demographic (1,401 – 7,008) which is congruent with the data from Craig (1992).

**Table 1. Crocodile Sighting Data.** Size class H = hatchlings, Y = yearlings (<1m), and EO = "Eyes Only" for crocodiles for which a size could not be determined. Total Abundance is the Total #/Survey Distance, and Correct Abundance removes H and Y individuals from the calculation. \* = Average survey length and abundance estimates.

Survey Date	Site Name	Habitat Type	Crocodile Sightings by Size Class (meters)													Total #	Survey (km)	Total Abundance	Corrected Abundance
			H	Y	1.0-1.5	1.6-2.0	2.1-2.5	2.6-3.0	3.1-3.5	3.6-4.0	4.1-4.5	4.6-5.0	>5.0	EO					
July 2008	Khor Al Ramla	1	9	4	2	5	5	0	2	5	0	0	0	9	41	72.1	0.569	0.388	
July 2008	Dahmit West	2	0	21	4	2	1	2	1	1	0	0	0	21	53	44.2	1.199	0.724	
July 2008	Dahmit East	3	0	8	4	2	2	0	0	0	0	0	0	7	23	45.2	0.509	0.332	
Aug 2008	Khor Korosko	2	1	15	14	3	7	3	1	0	0	0	0	37	81	186.0	0.435	0.349	
Aug 2008	Khor Abu Handal	2	0	1	2	0	3	1	0	0	0	0	0	5	12	20.0	0.600	0.550	
Aug 2008	El Sebou	1	0	2	0	2	0	0	0	0	0	0	0	7	11	20.0	0.550	0.450	
Oct 2008	Wadi El Allaqi (North)	1	0	6	9	1	1	0	1	0	1	0	0	22	41	192.0	0.214	0.182	
Oct 2008	Wadi El Allaqi (South)	3	0	0	1	0	0	1	1	0	0	0	0	12	15	92.0	0.163	0.163	
Nov 2008	Amada	1	0	4	0	4	0	0	0	0	0	0	0	7	15	40.0	0.375	0.275	
Nov 2008	Tomas & Affia	1	0	12	2	5	2	1	3	1	0	0	0	6	32	76.0	0.421	0.263	
Nov 2008	Khor Qutta	1	0	2	2	1	0	0	0	0	0	0	0	2	7	24.5	0.286	0.204	
Nov 2008	Khor El Derr	2	0	11	2	0	3	3	1	0	0	0	0	2	22	79.8	0.276	0.138	
Dec 2008	Khor Kalabsha	1	3	5	3	1	2	1	2	1	0	0	0	9	27	158.8	0.170	0.120	
May 2009	Genina	3	0	0	0	1	1	0	0	0	0	0	0	2	2	20.0	0.100	0.100	
May 2009	Eniba	1	0	0	0	1	1	0	0	0	0	0	0	2	4	16.0	0.250	0.250	
<b>Total</b>			<b>13</b>	<b>91</b>	<b>45</b>	<b>28</b>	<b>28</b>	<b>12</b>	<b>12</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>148</b>	<b>386</b>	<b>1086.6</b>	-	-	
<b>Percentage</b>			<b>3.4%</b>	<b>23.6%</b>	<b>11.7%</b>	<b>7.3%</b>	<b>7.3%</b>	<b>3.1%</b>	<b>3.1%</b>	<b>2.1%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>38.3%</b>	-	<b>72.4*</b>	<b>0.408*</b>	<b>0.299*</b>	

#### 4.4 Population Trends

No historic survey data is available to truly assess population trends; however, anecdotal evidence is available to support a rising trend. Prior to the construction of the High Dam, Nile crocodiles were virtually, if not actually, extirpated from Egypt through over-hunting and conflict with Nile River fisheries activities (Anderson 1898, Flowers 1933, Marx 1968, Baha El Din 2006). However, since the impoundment and creation of Lake Nasser, crocodiles are seen as a regular biological feature of the

landscape and the local fishermen are becoming more and more vocal in their complaints about a growing crocodile population. Preliminary results from questionnaires conducted with fisherman have suggested that encounters with all demographic classes, but especially adults, are on the rise (Shirley et al. *unpub. data*). Our efforts since 2008 have allowed us to establish population indices for annual monitoring purposes and we have developed a work plan to survey up to 20% of the lake annually during the nesting season to keep a beat on the future of this trend.

#### 4.5 Geographic Trends

Prior to the 20<sup>th</sup> century the Nile crocodile was widespread throughout Egypt along the Nile River, into the Nile Delta, and even into its tributaries. Before it was exterminated from the country in the early part of the 20<sup>th</sup> century it was limited in distribution to Upper Egypt (i.e., southern Egypt from Aswan to the Sudanese border). After the creation of Lake Nasser it has been limited in natural distribution to the Lake. Our surveys have revealed that the crocodile is not evenly distributed around the lake, though most of the distributional heterogeneity can be accounted for by habitat type. Interviews with local fishermen have suggested that some areas are more susceptible to illegal hunting activities than others possibly indicating hunting-mediated fluctuations or declines. However, our surveys included several of these areas (e.g., Khor Kalabsha) and, despite reduced abundance, we did not encounter any areas of the Lake without breeding sized individuals and young individuals indicative of breeding activity. Additionally, there are no known areas of the lake that do not have any crocodiles.

Over the past decade there have been a growing number of reports of Nile crocodiles in the river downstream from the dam, even as far north as Cairo.

### 5. Threats

All threats to Nile crocodiles in Egypt are utilization or incidental mortality-based anthropogenic threats. There is conflict between crocodiles and the Lake Nasser fisheries where crocodiles drown in fishing nets, however, the extent of this conflict is not well documented and is likely low given the quality and type of gill nets used by the near shore fisheries (additionally, fishermen constantly cite crocodiles destroying fishing nets as a major source of conflict). Since the start of the 21<sup>st</sup> century there has been an increasing illegal trade in crocodiles from Lake Nasser. While it is difficult to quantify this trade (see "Illegal Trade" below) we feel that it is not detrimental at this time. It should also be noted that, contrary to most African populations of Nile crocodile, crocodiles in Egypt have not been a mortal threat to people in and around Lake Nasser. There have been few, if any, attacks resulting in the loss of human lives and our questionnaires in the local fishing communities have revealed that these individuals do not feel as though their lives are threatened by crocodiles.

### 6. Utilization and Trade

#### 6.1 National Utilization

There is currently only a single utilization program for crocodiles in Egypt, though this is non-extractive. There are a small number of tour operators in the Aswan area who regularly take clients onto Lake Nasser for wildlife viewing, including the possibility of seeing crocodiles.

It is worth specifying here that crocodiles are protected outright by Egyptian law and thus until now no extraction-based utilization has been approved. We have established a management and monitoring program with the express purpose of future utilization of the crocodile resource. As such, while crocodiles are protected by law currently, we view that these laws were established in the aforementioned time of crocodile extinction and in the light of rebounding populations should be amended. Our delay in doing so is a result of our population still being listed on Appendix I where changing laws to allow for extraction-based utilization would be futile if people could not benefit by legally exporting the products.

There are no legal, extraction-based utilization programs, though the potential for these is quite high. The Aswan area has one high production abattoir that could be used for slaughtering and processing harvested crocodiles, though consumption of crocodile meat is against the teachings of the Qur'an thus limiting the local market for meat to tourist-focused dining establishments. However, tanneries and other leather processing/production facilities are widely available throughout the country creating a high capacity for the domestic leather production and trade. We have, additionally, been looking into possible sport hunting activities in collaboration with the Lake Nasser sport-fishing and waterfowl

hunting sectors. Currently this activity is illegal under national biodiversity law; however, if conducted in collaboration with, for example, a nuisance crocodile program has potential to be successful. Finally, we have received several proposals from private interests to initiate ranching programs in Egypt. None of these have been approved as they were proposed before the start of our dedicated crocodile management program; however, we have been waiting to initiate these activities prior to our proposal for down-listing our population to Appendix II and consider ranching to be a viable opportunity in the future.

## 6.2 Legal Trade

There is currently no legal trade of Nile crocodiles outside of Egypt for commercial purposes. A few requests for the export of scientific (biological) specimens (e.g., blood and tissue samples) for genetic analyses have been approved recently. For more information see "Illegal Trade" below.

## 6.3 Parts and Derivatives in Trade

There is currently no legal trade in this species within and out of Egypt. However, we will initiate a ranching program for the domestic trade of meat and the trade of skins (leathers) both domestically and internationally.

## 6.4 Illegal Trade

Prior to discussion of this section it is worth noting that we currently consider laws making the trade of crocodiles within Egypt to be out of date. These laws will be adapted to incorporate multiple forms of utilization once the proposed Amendment of Appendix II is accepted. We have not seen a major reason to adapt our national laws if our population remains protected from international trade (and therefore benefit is prohibited).

<b>Crocodile Product</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Live Crocodiles (Mostly Hatchlings)	270	72	0
Taxidermy (Whole or Parts)	10	3	2
Leather Products	0	27	0
Whole Skins	0	9	2

Preliminary evidence suggests that there is a not unsubstantial illegal trade of crocodiles within and out of Egypt annually. Truly assessing this trade has been difficult, however, it is likely that in excess of 3000 hatchling crocodiles are illegally smuggled out of Egypt, and 200-400 sub-adult and adult crocodiles are killed annually for their skins. The skins are both exported and utilized locally in Egypt for typical leather products. This trade has been difficult to regulate in the past due to our lack of enforcement capacity; however, the recent creation of a dedicated Crocodile Management Unit and their outreach activities with local and environmental law enforcement agencies will certainly facilitate future efforts. Prior to our concentrated interest in crocodile management we were able to implement a similar outreach strategy in 2004 to eliminate the trade of hatchling crocodiles for sale as curios and live pets to tourist in the Aswan Bazaar. Throughout the 1990's and up until this time large numbers of small crocodiles could be readily encountered even out in the open. Our efforts working with the Aswan Police Department and outreach with tourists encouraging them not to buy crocodiles all but eliminated this practice.

## 6.5 Actual or Potential Trade Impacts

It is difficult to accurately assess impacts from the illegal trade at this time, however, given the above figures, our estimates of population size, and fishermen questionnaire results we assume that the current illegal trade is causing minimal impact. There is one individual who is currently responsible for most of the illegal trade and virtually all fishermen are loyal in their business to him. Additionally, the virtual linear route of trade/transport for goods coming from Upper Egypt (i.e., Lake Nasser → Aswan → Luxor/Cairo) allows for regulation choke points. These two factors make controlling the trade of crocodiles comparatively simple. Our questionnaire results additionally indicate that very few (less than 20%) of the Lake Nasser fishermen are involved with the illegal trade in crocodiles, and of these

maybe 10-20% (less than 5% of the total fishing community) consider it to be a regular part of their income. Finally, the sheer vastness and remoteness of Lake Nasser, the lack of permanent human inhabitants, and the few number of people involved in the trade of crocodiles, suggests that it will be very difficult for trade to have a significantly negative impact. We feel that, once legalized, trade will continue at the level it is with the added advantage of a framework for national legislation and control preventing the current, seemingly sustainable trade from becoming detrimental.

## 7. Legal Instruments

### 7.1 National

We implement two main laws: Law 102/1983 concerning Natural Protected Areas in its second article And law 4/1994 promulgating environment law amended by law 9/2009 article (28a) dealing with forbidden hunting, catching, wild animals, living aquatic organisms and transporting, exporting, importing or trading in it. Article (84a) of this law concerning penalties for any violations related to article (28a).

This legislation provides a framework for controlling the illegal trade, however, this has been largely ineffective to date. Our major problem has been education and cooperation with the law enforcement communities. We recognize this issue and now, through the creation of the Crocodile Management Unit, we have the capacity to overcome it. Additionally, we believe that in implementing new laws that allow for the sustainable utilization of crocodiles in Egypt we will better be able to regulate the trade with the assistance of the Universal Tagging System and established quotas, harvest/hunting permits, and facilities licenses.

### 7.2 International

The Egyptian Constitution stipulates that all international conventions are part of the national legislations. Egypt is committed to these conventions and submitted regular national reports to their secretariat.

Nile crocodiles are listed as Lower Risk/least concern on the 2009 IUCN Red List suggesting that its global population is not under threat of extinction. Additionally, it is protected from extensive international trade by CITES. In Africa, the crocodile populations of Botswana, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Namibia, South Africa, Uganda, United Republic of Tanzania, Zambia, and Zimbabwe are listed in Appendix II with provision for trading, however, all other populations (including that in Egypt) are listed under Appendix I precluding any international trade. This legislation has been largely effective in protecting Nile crocodile populations by providing local people and national governments incentive for protecting the resource.

## 8. Species Management

### 8.1 Management Measures

In August of 2009 Egypt formally established the "Crocodile Management Unit" consisted of three biologists and natural resources managers who have been trained by specialists from the IUCN/SSC Crocodile Specialist Group in crocodile monitoring and management theory and techniques. Over the course of the year July 2008 – 2009 these individuals initiated survey and monitoring efforts as part of their training and are in the process of drafting a management and monitoring plan. As such, details of our planned utilization are not yet fully worked out, and are additionally awaiting approval for international, commercial trade. However, we can say that ranching will be our primary focus for utilization with a limited number of licensed individuals. Ranching will likely be based on an annual hatchling harvest with initial quotas to be set at our estimates of current illegal off-take ( $\pm 2,500$  hatchlings/year). As part of these ranching programs we will require head-starting and reintroduction of individuals (10% to be returned to the wild) after they have reached a minimum size of 1m. At the start of this utilization program we will not approve any wild harvest, though will consider limited trophy hunting in conjunction with a nuisance crocodile program should this become a necessity. It is our goal that crocodile utilization benefits wildlife management in Egypt (e.g., fees collected from the sale of hatchling harvest permits and ranching licenses, for example, will be recycled to support the Crocodile Management Unit and, if possible in the future, other wildlife research and conservation efforts), capacity-building of future natural resources managers (e.g., University students and local primary and secondary students can be involved in head-start and release programs, and utilize



these activities as research platforms by, for example, monitoring the success of head-started crocodiles post-release), and the local Lake Nasser fishermen (by direct economic benefit from the harvest and sale of hatchling crocodiles).

## 8.2 Population Monitoring

Crocodile monitoring began in Egypt with minor survey efforts in 1997 and 2004, however, the program really began in 2008. Starting in July, 2008 the "Crocodile Team" of the Nature Conservation Sector undertook to survey key areas of the Lake to establish baseline data and indices of population size. Over the course of the year we established indices for 15 regions around the lake, covering over 11% of the shoreline. Starting in 2010 our efforts will consist of 6 monthly survey trips to designated sites around the lake to correspond with the annual breeding season. The newly formed Crocodile Management Unit will be responsible for outreach with the local Lake Nasser fishing community, the Nubian people, and any parties involved in the utilization of crocodiles.

## 8.3 Control Measures

### 8.3.1 International

Nile crocodiles are protected from extensive international trade by CITES, though they are listed as Lower Risk/least concern on the 2009 IUCN Red List suggesting that their global population is not under threat of extinction. In Africa, the crocodile populations of Botswana, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Namibia, South Africa, Uganda, United Republic of Tanzania, Zambia, and Zimbabwe are listed in Appendix II with provision for trading, however, all other populations (including that in Egypt) are listed under Appendix I precluding any international trade.

Since international trade is currently illegal from Egypt, there is no system in place for controlling the movement of specimens across the border specifically aimed at crocodilians. We have the Wildlife Authority who is responsible for search and seizure of wildlife products at the Aswan and Cairo Airports, as well as, in the Red Sea. Once a utilization program is put into effect, we will adopt the Universal Tagging System as outlined in Resolution Conf. 9.22. Crocodile leathers and products will be checked by local Aswan authorities and double-checked by Cairo Wildlife Authority officers prior to export. All individual crocodilians on approved ranches will be equipped with toe-web tags controlled by the Nature Conservation Sector of the Environmental Affairs Agency and all tags must be available for inspection of skins and carcasses to ensure the level of harvest and captive maintenance that is approved.

### 8.3.2 Domestic

The newly formed Crocodile Management Unit has already formed a working relationship with the administrative and user groups of Lake Nasser, as well as, the enforcement agencies that will be critical in facilitating enforcement of laws protecting and managing the crocodile population. This unit will also be launching a major education campaign for the stakeholders in crocodile management to commence in early 2010. Other domestic efforts will be put into place upon approval and initiation of utilization schemes including population monitoring, enforcement of permit regulations, and regulation of approved facilities.

## 8.4 Captive Breeding and Artificial Propagation

There currently exist no captive breeding or artificial propagation efforts in Egypt. Several entities (both private and government) have expressed an interest in this, however, no such permissions have been granted, and we feel it is prudent to establish a managed and legal system through which captive situations can sustainably exploit the crocodile resource prior to permitting these activities.

## 8.5 Habitat Conservation

As discussed above, the long-term safety of Lake Nasser is considered paramount to the future of Egypt and as such it is afforded the highest security and regard of any habitat in the country. Within Lake Nasser there exists a single protected area, Wadi Allaqi Biosphere Reserve.

## 8.6 Safeguards

Nature Conservation Sector through its newly established crocodile unit will monitor the export permits in away to ensure that crocodiles populations are maintained within the framework of carrying capacity of the ecosystems. The proposed quota will include information on collection, marking, internal transport and export control of specimens in accordance with programme of the crocodile unit. The unit will concern and inform that Egypt has effectively demonstrating implementation of CITES Article IV.

Inspection and regulation of ranching establishments will be coordinated through NCS and the crocodile unit, who together through a plan to draft and implement a rigorous Code of Practice whereby facilities and procedures are inspected twice annually. The crocodile unit will reports to NCS regularly and annual report will be submitted to the CITES Secretariat on the status of crocodile population both in wild and ranching.

## 9. Information on Similar Species

No other crocodile species, or other similar species, exist in Egypt. The Nile monitor (*Varanus niloticus*) occurs sympatrically with the Nile crocodile in Egypt. The population of the monitor has never been evaluated formally, though informal observations suggest it is rare.

## 10. Consultations

Proposal made with several governmental institute including general authority for development of Lake Nasser, National Institute for Oceanography and Fisheries, Professors at South Valley University, Management Authority of CITES in Egypt, experts for IUCN/SSC Crocodile Specialist Group and the Alligator Management Unit of the Florida Fish and Wildlife Conservation Commission (Florida, USA), and Egypt Nature Conservation Sector senior staff. In addition, stakeholders meeting were made in Aswan to discuss the proposal. Final version (current) has been approved by the management authority of CITES in Egypt.

## 11. Additional Remarks

Our Crocodile Management Unit was initiated with help from members of the IUCN/SSC Crocodile Specialist Group and the Alligator Management Unit of the Florida Fish and Wildlife Conservation Commission (Florida, USA).

## 12. References

- Abdel-Latif, A-F. 1974. Fisheries of Lake Nasser. Aswan Regional Planning, Lake Nasser Development Center.
- Anderson, J. 1898. Zoology of Egypt: I, Reptilia and Batrachia. B. Quartich, London.
- Baha El Din, S. 2006. A Guide to the Reptiles and Amphibians of Egypt. The American University in Cairo Press, Cairo.
- Bishai, H. M., S. A. Abdel-Malek, and M. T. Khalil. 2000. Lake Nasser. Cabinet of Ministers, State Ministry of Environment, Egyptian Environmental Affairs Agency.
- Bourquin, S. L. 2007. The Population Ecology of the Nile Crocodile (*Crocodylus niloticus*) in the Panhandle Region of the Okavango Delta, Botsawana. Dissertation, University of Stellenbosch, Stellenbosch, South Africa.
- Brazaitis, P. 2001. A Guide to the Identification of the Living Species of Crocodilians. Wildlife Conservation Society, Science Resource Center.
- Brown, C. J., P. Stander, R. Meyer-Rust, and S. Mayes. 2004. Results of a Crocodile *Crocodylus niloticus* Survey in the River Systems of North-east Namibia During August 2004. CITES Report, CoP13 Inf. 26, Bangkok, Thailand.
- Bugbee, C. D. 2008. Emergence Dynamics of American Alligators (*Alligator mississippiensis*) in Arthur R. Marshall Loxahatchee National Wildlife Refuge: Life History and Application to Statewide Alligator Surveys. Thesis, University of Florida, Gainesville, USA.
- Craig, G. C. 1992. A population model for the Nile crocodile with an analysis of sustainable harvesting strategies. In: Crocodiles. Proceedings of the 11th Working Meeting of the Crocodile Specialist Group. IUCN, Gland, Switzerland. pp. 78-81

- Flowers, S. S. 1933. Notes on the recent reptiles and amphibians of Egypt, with a list of species recorded from that kingdom. *Proceedings of the Zoological Society of London* 1933: 735-851.
- Games, I. 1990. The Feeding Ecology of Two Nile Crocodile Populations in the Zambezi Valley. Dissertation, University of Zimbabwe, Harare, Zimbabwe.
- Hutton, J. M., and M. E. J. Woolhouse. 1989. Mark-recapture to assess factors affecting the proportion of a Nile crocodile population seen during spotlight counts at Ngezi, Zimbabwe, and the use of spotlight counts to monitor crocodile abundance. *Journal of Applied Ecology*, 26, 381–395.
- Marx, H. 1968. Checklist of the Reptiles and Amphibians of Egypt. Special Publication, United States Naval Medical Research Unit Number 3, Cairo.
- Pacheco, L. F. 1996a. Effects of environmental variables on black caiman counts in Bolivia. *Wildlife Society Bulletin* 24: 44-49.
- Pacheco, L. F. 1996b. Wariness of caiman populations and its effects on abundance estimates. *Journal of Herpetology* 30: 123-126.
- Parker, I. S. C. and R. M. Watson. 1970. Crocodile Distribution and Status in the Major Waters of Western and Central Uganda in 1969. *East African Wildlife Journal* S: 85-103.
- Shine, T., W. Bomme, H. Nickel, D.F. Thies, and T. Wilms. 2001. Rediscovery of relict populations of the Nile crocodile *Crocodylus niloticus* in south-eastern Mauritania, with observations on their natural history. *Oryx* 35(3): 260 – 262.
- Shirley, M.H., B. Dorazio, E. Abassery, A. Abd Alhady, M. Saad Mekki, H. Helmi Asran. In Prep. Estimating the Abundance of Nile Crocodiles in Lake Nasser Using a Modified Double-Observer Count. Submission to the *Journal of Wildlife Management*.
- Shirley, M.H., W. Oduro, and H. Yaokokore-Beibro. 2009. Conservation status of crocodiles in Ghana and Cote-d'Ivoire, West Africa. *Oryx* 43(1): 136 – 145.
- Thorbjarnarson, J. 1996. Reproductive characteristics of the order Crocodylia. *Herpetologica* 52(1): 8-24.
- Woodward, A. R., K. G. Rice, and S. B. Linda. 1996. Estimating sighting proportions of American alligators during night-light and aerial helicopter surveys. Pages 509 – 519 in *Proceedings of the 50th Annual Conference of the Southeastern Association of Game and Fish Commissions*. 5 – 8 October, Hot Springs, AK, USA.