REVIEW OF CROCODILE RANCHING PROGRAMS

Conducted for CITES
by the

CROCODILE SPECIALIST GROUP of IUCN/SSC

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EXECUTIVE SUMMARY

1. The Crocodile Specialist Group of the IUCN Species Survival Commission was contracted by the CITES Secretariat to undertake a review of crocodilian ranching programs in accordance with defined terms of reference (Annex 1).
2. Information was collected on crocodilian ranching programs that operate:
   (a) under the specific CITES ranching criteria (*viz*. Resolution Conf. 3.15 on 'Ranching' and Resolution Conf. 11.16 on 'Ranching and Trade in Ranched Specimens'), which details operational and reporting requirements, including the need to demonstrate an ongoing "conservation advantage"; and,
   (b.) under the general conditions of Appendix II, subject to conditions stipulated in Article IV, *Regulation of Trade in Specimens of Species Included in Appendix II*, which including the need to demonstrate non-detriment on an ongoing basis rather than conservation advantage.
3. Information was obtained by consulting national CITES Management Authorities, producer organizations, individual producers and members of the IUCN-SSC Crocodile Specialist Group. In this way data from 23 countries was assembled, 15 in Africa, 5 in Latin America, plus the United States of America, Papua New Guinea and Australia. Each program is discussed separately with emphasis on programs that involved a transfer from Appendix I to Appendix II in accordance with the ranching resolutions (currently Resolution Conf. 11.16).
4. The scope, range of activities and effectiveness of ranching programs varied widely among the Parties from whom information was received. National programs ranged from more than 100 ranching facilities with exports of 100,000's of skins annually, to programs represented by a single ranch, which was inoperative and not exporting.
5. All Parties that conduct ranching operations approved in accordance with Resolution Conf. 11.16 are obligated to report information specified in Resolution Conf. 11.16 to the CITES Secretariat. When assessing the extent to which Parties comply with these reporting requirements it was found that none comply fully.
6. However, several Parties have made considerable progress with what may be considered the most important requirements from a conservation and management viewpoint, namely those related to the impact of ranching on the status of the wild population(s) subject to ranching.
7. Given the vastly increased global experience with ranching that now exists, the practicality and utility of some required information needs are questioned. The information, if provided, is rarely if every used in any constructive way and some information requirements are so difficult to implement that they thwart efforts by Parties to fully comply with the reporting provisions of Resolution Conf. 11.16. A strategic review of reporting requirements under Resolution Conf. 11.16 is timely.
8. Some of the problems encountered by Parties, that effects reporting, are:
   (a) Stock derived from ranching operations are often mixed in facilities with stock derived from other sources, such as captive breeding. Grading and resorting of crocodiles in accordance with size is required to maximise welfare considerations and improve production efficiency. If separation in accordance with origin were required, for no economic reason, operations could require duplication of raising facilities that would be a very serious practical and economic burden. The common practice ox mixed stock on most ranches also complicates the allocation of appropriate source codes on CITES export permits.
   (b) Some Parties do not have the capacity within their national management authority to regulate, control and manage ranching schemes in accordance with Resolution Conf. 11.16.
   (c) The costs associated with conducting population surveys required to fulfil Resolution Conf. 11.16 can be very high relative to the revenues generated from crocodile utilization through ranching.
9. Highest priority in reporting on ranching programs subject to Resolution Conf. 11.16 should be verification of "conservation benefit" and prevention of illegal trade. In the interests of simplifying reporting obligations generally, the reporting associated with Resolution Conf. 11.16 could be confined to these two considerations.
10. Ranching of crocodilians is now a widespread management practice which provides wild-caught specimens for international trade on the one hand, but provides commercial incentives to conserve adult crocodilians on the other. It has worked successfully in a variety of different countries with different socio-economic levels, technical capabilities and crocodilian species. Nowhere has ranching been associated with, or has alleged to be the cause of, detrimental effects on wild populations.
11. There is now considerable evidence to support the concept adopted by the Parties in 1981, when they agreed to Resolution Conf. 3.15 on ranching. Firstly, that ranching with some species is a "safe" and robust form sustainable utilization relative to wild harvest of adults. Secondly, that conservation benefits

for species on Appendix I could be derived through international trade, if the wild harvest strategy employed was conservative, safe, strictly regulated and subject to reporting.

12. Current and future management regimes adopted by the Conference of the Parties to CITES should attempt, wherever possible, to provide Parties with more flexibility when they are attempting to implement conservative and effective management prescriptions to a broader range of species.

INTRODUCTION

Ranching refers to the removal from the wild of juveniles or eggs, which are then transferred to controlled raising facilities, where the wild-caught specimens are grown for commercial purposes. It has been the preferred management option for crocodiles in some nations (e.g. Papua New Guinea) since before CITES came into force.

The 3rd meeting of the Conference of the Parties (New Dehli, 1981) adopted Resolution Conf. 3.15 on 'Ranching', which provided a specific legal framework for Parties to the Convention to be able to transfer Appendix-I listed species to Appendix II, if the utilization they proposed was to be largely restricted to ranching. Resolution Conf. 3.15 is now replaced by an amended version, Resolution Conf. 11.16.

This means that there are two legal bases under CITES through which ranching can be pursued. Firstly, it can be a standard management option adopted by any Party, for any Appendix II species, as long as the management satisfies Article IV of the Convention. Secondly, Appendix I species can be transferred to Appendix II specifically for the purposes of ranching (Resolution Conf. 11.16), and largely limited to that form of utilization, in which case additional conditions apply.

Numerous Parties have sought the transfer from Appendix I to Appendix II specifically for ranching (under the original Resolution Conf. 3.15 or its subsequent amended versions, currently Resolution Conf. 11.16). The prerequisites for seeking such a transfer to Appendix II under the ranching resolutions are:

(i) the population of the species is no longer considered to be endangered; and,

ii) the population's continued recovery and conservation would benefit from a ranching program.

Despite the term "benefit" not being formally defined, the requirements for a transfer from Appendix I to Appendix II, specifically for ranching pursuant to the ranching resolution (Resolution Conf. 11.16), require "benefit" to the wild population to be demonstrated. So it is more stringent than if ranching is adopted as a management strategy for a species already on Appendix II, or if it was proposed to pursue ranching with a species transferred to Appendix II because it no longer met the criteria for Appendix I (in accordance with the criteria for amending Appendices I and II: currently Resolution Conf. 9.24 Rev. CoP13). In both these cases "non-detriment" needs to be demonstrated rather than conservation benefit.

At the 17th meeting of the Animals Committee (Hanoi, 2001) the CITES Secretariat was requested to contact the IUCN/SSC Crocodile Specialist Group (CSG) to determine whether the CSG could compile a list of crocodile ranching operations authorised under Resolution Conf. 11.16, and review those operations under the framework of the Review of the Appendices. The CSG agreed in principle to this request and formulated terms of reference for the project, which were subsequently endorsed by the Animals Committee at its 18th meeting (San José, 2002).

The 19th meeting of the Animals Committee (Geneva, 2003) requested the CSG to conduct a review of crocodilian ranching operations to determine the performance of those programs and the extent to which each program complied with the provisions of Resolution Conf. 11.16.

As the budget of the Animals Committee did not permit it to support the work financially, Switzerland generously provided limited, extra-budgetary funding for the project. Additional funding and support was provided by the IUCN-SSC Crocodile Specialist Group and its members. The Terms of Reference (Annex 1) were circulated among the CSG Steering Committee in November 2003. Information was collected from the various national CITES Management Authorities (MA), producer organizations, individual producers and CSG members between January and April 2004. Additional information was provided as the final report was refined through the input of a range of different CSG members.

Five crocodilian species in 15 countries have been transferred from Appendix I to Appendix II pursuant to Resolution Conf. 11.16 and its predecessor Resolution Conf. 3.15. A further five Appendix-II listed crocodilian species, in three countries, are utilized through ranching, but they were not transferred to Appendix II for that purpose and are thus not subject to the provisions of the ranching resolution.

RANCHING UNDER THE RANCHING RESOLUTIONS: RESOLUTION CONF. 3.15 to RESOLUTION CONF. 11.16

African Nile crocodile Utilization Programs

All populations of Nile crocodile (*Crocodylus niloticus*) were listed in Appendix I on 1 July 1975, when the Convention came into effect. When acceding to the Convention, 7 Parties [Great Britain (on behalf of Hong Kong), Botswana, France, Italy, Zambia, Zimbabwe and Sudan] entered reservations against the Appendix-I listing of Nile crocodiles, but all reservations had been withdrawn by 1990.

Between 1983 and 2004, 15 African Parties had transferred their national populations of *C. niloticus* from Appendix I to Appendix II (Table 1). Eleven of these amendment proposals incorporated ranching in the management regime. Further details on the history of the CITES status of each national population can be found on the CITES website. Neither of the other two species of African crocodilians, *Crocodylus cataphractus* and *Osteolaemus tetraspis*, both of which are included in Appendix I, has ever been involved in ranching programs.

Utilization programs for wild *C. niloticus* limited by annual export quotas were approved by the Conference of the Parties in the mid-1980s for Sudan, Congo, Cameroon, and somewhat later in Somalia (Table 1). All of these were terminated by 1992, mostly through the implementation of stricter domestic regulations and legislation. Apart from one small operation in Sudan, none of these programs involved ranching and they are not considered further in this review.

Information received from CITES Management Authorities and other sources was used to compile a history of ranching operations and crocodilian management since each national population was transferred to Appendix II. The information was also used to assess;

i) The current status of populations and the sustainability of these programs, particularly where ranching is combined with wild harvest;

ii) The compliance of these programs with the requirements of Resolution Conf. 11.16; and,

iii) The adequacy of the national policies and capacity of the CITES Management Authorities to effectively conserve and manage their populations.

In some cases the above assessments were necessarily subjective as data were deficient.

Table 1 History of *Crocodylus niloticus* transfers from Appendix I to Appendix II. Countries currently practising ranching are shaded in grey.

Country	Res. Conf.	Effective Date	Comments
Zimbabwe	3.15	29th Jul 1983	Continued to present
Kenya	5.21	1st Aug 1985	Annual export quotas of 1000 wild skins to 1989
	3.15	11th Jun 1992	Continued to present
Malawi	5.21	1st Aug 1985	Annual export quotas of 700 wild skins to 1989
	3.15	18th Jan 1990	Continued to present. Also has annual export quota of 200 wild problem crocodiles
Mozambique	5.21	1st Aug 1985	Annual export quotas of 1000 wild skins to 1989
	3.15	18th Jan 1990	Continued to present. Also has annual export quota of 100 wild problem and trophy crocodiles
Sudan	5.21	1st Aug 1985	Annual export quotas of 5000 wild skins to 1990 and 1992. Transferred to Appendix I in 1992
Tanzania	5.21	1st Aug 1985	Annual export quota of wild skins to 1995
	3.15	11th Jun 1992	Ranching program continued.
	9.24	18th Jun 2000	Wild harvest of 1500 and 100 trophies annually. Ranching moribund
Zambia	5.21	1st Aug 1985	Annual export quota of 2000 wild skins to 1989
	3.15	18th Jan 1990	Continued to present

Congo	5.21	1st Aug 1985	Annual export quota of 150 wild skins to 1989. Transferred to Appendix I in 1992
Cameroon	5.21	1st Aug 1985	Annual export quota of 100 wild skins to 1989. Transferred to Appendix I in 1992
Madagascar	5.21	1st Aug 1985	Annual export quota wild skins to 1994, except 1990 and 1991
	3.15	18th Sept 1997	Continued to present. Export quota increased to 500 wild skins in 2000
Botswana	5.21	3rd Jan 1987	Annual export quota of 2000 wild skins to 1989
	3.15	18th Jan 1990	Continued to present.
Ethiopia	5.21	18th Jan 1990	Annual export quota of 20 wild skins to 1992 Transferred to App I in 1992
	3.15	11th Jun 1992	Continued to present
Somalia	5.21	18th Jan 1990	Annual export quota of 500 wild skins in 1990-92. Transferred to Appendix I in 1992
Uganda	7.14	11th Jun 1992	Annual export quota of 2500 ranched skins requested
	3.15	18th Sept 1997	Continued to present
South Africa	7.14	11th Jun 1992	Annual export quota of 1000 ranched skins requested
	3.15	16th Feb 1995	Continued to present. All ranched stock imported

Zimbabwe

The Zimbabwe program has been operating longer than that of any other African country and is relatively well documented in peer-reviewed and CSG literature. The government department responsible for crocodile management is the National Parks and Wildlife Management Authority (NPWMA), which is also the CITES Management Authority (MA) and Scientific Authority (SA) for Zimbabwe. During the late 1980s the NPWMA encouraged effective management of ranching by the private sector. The producer association, the Crocodile

Farmers' Association of Zimbabwe (CFAZ), has been responsible for compiling detailed production data and has reported these data to the MA annually since 1985. CFAZ has also been the impetus for monitoring the wild population in collaboration with the MA.

In the period 1985 to 2002 production increased significantly (Tables 2 and 3) and standards improved (CFAZ Annual Reports), although there have been problems in recent years associated with land reforms and a hyperinflationary economy. The number of CFAZ members holding stock and producing crocodiles has decreased from 47 in 1992 to 26 at present (Table 4).

Zimbabwe participated in a CSG internal review of its ranching program and Loveridge (1996) compiled a detailed report that was reviewed by a panel of senior CSG members. The weaknesses identified at that time were:

a) the lack of a current management plan;
b) poor communication between CFAZ and the MA; and,
c) monitoring of the wild population was inadequate.

These concerns were addressed by a workshop held in 1996 during which a revised Policy and Plan were drafted and commitments were made by the MA to improve communication and investment in monitoring.

The Zimbabwe Crocodile Research Group (CRG), comprising members from the MA, University of Zimbabwe and CFAZ was formed in 1994 and has met periodically since then. In 1997 the CFAZ and its producer members initiated new monitoring activities in collaboration with MA staff.

The revised Policy and Plan for Crocodile Management in Zimbabwe drafted at the 1996 workshop was approved by the Minister of Environment and Tourism in May 1997 and remains in effect. This is a comprehensive policy that has been used as a model elsewhere. The policy is based on zoning crocodile habitats to provide appropriate levels of protection and utilization.

There have been two significant developments since 1997;

1. CFAZ no longer has any role in marketing crocodile products and has reduced its input into research and extension because of economic constraints.

2. The MA has been transformed into a self-funding agency, which has had the effect of further reducing its investment in crocodile management. Crocodile issues are now dealt with as a minor responsibility of one fisheries ecologist and one utilization administrator. These individuals are the only NPWMA staff with any specialist knowledge of crocodiles and the farming industry. This has exacerbated the problems of communication and monitoring referred to above, as “institutional memory” has been lost and some distrust has arisen between the regulators and the industry.

Monitoring of the wild crocodile population through the annual egg collection has been improved. This is now analysed by geographic regions and landtype/landuse categories to identify trends and indicate potential problem areas. Since 1997, spotlight surveys have been carried out in areas that have shown declining trends in egg collection. This activity remains ongoing, funds permitting. Limited helicopter surveys were carried out between 2000 and 2003 in parts of Lake Kariba and the middle Zambezi to optimise egg collection efforts. There appears to be a trend towards the concentration of the wild population from rivers into dams, possibly related to increased siltation of rivers and increased human activity resulting from the recent land reform process. It is as yet unknown if this reflects an overall decline in the wild population. The monitoring has not yet resulted in any decisions on management action to address identified problems. It should be noted that all of these activities are carried out by CFAZ with minimal input from the MA.

The inspection and regulation of ranching establishments continues through CFAZ and the Department of Veterinary Services, who together have drafted and implemented a rigorous Code of Practice whereby facilities and procedures are inspected twice annually. The administration of a monthly stock return system and the annual egg collection reporting has been continued by CFAZ, albeit with reduced reporting in the last two years.

Table 2 Crocodile production parameters and results for Zimbabwe, 1990-2003. (Data from CFAZ)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
No of farms/ranches	27	41	47	41	42	38	37	35	36	37	38	38	33	27
Wild clutches collected	1236	1352	1197	1326	1103	1201	1325	1335	1473	1682	1553	1420	1766	1796
Wild eggs hatched	41,158	40,657	36,667	40,261	34,414	35,198	41,003	43,185	48,908	51,169	58,131	49,416	55,122	56,063
Farm clutches collected	518	601	624	847	954	1313	1540	1831	1948	2013	1741	1507	1849	1950
Farm eggs hatched	14,575	16,947	18,033	23,182	24,913	32,797	41,084	51,883	57,433	57,156	50,981	49,903	41,795	55,191
% prod'n from wild eggs	73.9	70.6	67.0	63.5	58.0	51.8	49.9	45.4	46.0	47.2	53.3	49.8	56.9	50.4
Hatchling mortality (%)	11.8	11.7	12.2	12.8	11.2	11.7	10.6	10.7	7.7	9.3	10.9	26.9	12.4	13.1
Rearing mortality (%)	2	1.8	2.2	2.7	2.5	2.1	2.1	2.5	1.9	1.2	1.9	2.1	2.8	4.9
Meat exported (kg)	400		600	300	28,265	64,603	38,561	91,806	94,322	122,267	169,135	158,530	124,760	226,100
Skins exported (animals)	15,247	22,973	32,634	50,086	42,104	38,641	35,242	46,456	40,720	63,064	81,962	76,657	85,335	73,707

Table 3 Gross exports of crocodile products from Zimbabwe, 1990-2003. (Data from UNEP-WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	5	0	0	0	1	0	2	0	0	2	0	0	50	126
Bodies	0	2	1	8	2810	12	9	5	162	14	41	108	46	55
Meat (kg)	404	5	1310	200	14,900	81,598	56,820	100,995	100,307	140,179	154,910	117,479	108,520	257,940
Skin pieces	517	3244	522	1805	3619	29	0	0	504	3	57	3463	17131	3924
Backskins	0	0	0	0	0	7032	3722	6367	250	10,746	15,980	36,478	48,015	14,891
Bellyskins	0	0	0	0	0	799	211	4148	7640	31,628	14,616	31,406	6204	21,767
Hornbacks	0	0	0	0	0	250	0	0	0	0	0	0	4016	927
Skins	16,678	22,489	43,539	54,119	44,874	38,304	39,251	50,440	43,910	42,984	71,125	71,853	83,382	92,826
Trophies	39	35	327	98	225	66	100	69	89	63	97	65	110	124
Total Animals	**16,722**	**22,526**	**43,867**	**54,225**	**47,910**	**39,431**	**39,573**	**54,662**	**51,801**	**74,691**	**85,879**	**103,432**	**93,808**	**115,825**

Table 4 Crocodile ranches and farms in Zimbabwe (2003) with the source of their stock. Some farms rear animals obtained from other farms through ranching and/or captive breeding.

No.	Company Name	Location	Ranching/Captive Breeding
1	Lake Crocodile Farm	Kariba	R, CB
2	Binga Crocodile Farm	Kariba	R, CB
3	Spencer's Creek Crocodile Ranch	Victoria Falls	R, CB
4	Chirundu Estates	Chirundu	R, CB
5	Ume Crocodile Farm	Kariba	R, CB
6	Le Rhone	Norton	CB
7	Chiredzi Wildlife Investments	Chiredzi	CB
8	Malham Estates	Norton	R. CB
9	LaLucie	Chiredzi	CB
10	Trianda Farm	Harare	CB
11	Dilrich	Concession	CB
12	Mazwikadei Crocodiles	Mazwikadei	CB
13	Pangoula Farm	Harare	Rearing only (CB and/or R)
14	Humani Estate	Bikita	CB
15	Dougmar P/L	Selous	CB
16	Keiray Crocodiles	Darwendale	CB
17	Crocraise P/L	Kariba	R. CB
18	Bufallo Range Ranch	Chiredzi	R. CB
19	N & B Ventures	Chiredzi	CB
20	Squatodzi	Trelawney	Rearing only (CB and/or R)
21	Cawood Ranch	Mwenezi	CB
22	Hunter Services	Chiredzi	CB
23	Dollar Bubi	Nyamandhlovu	CB
24	Sengwa Mouth Crocodile Ranch	Kariba	R
25	Lesdor Livestock	Chinhoyi	CB
26	Agric & Comm	Bulawayo	CB

Administration of the universal tagging system has been continued by CFAZ, with the MA handling the tagging of sport hunted trophies. The MA is responsible for the issue of all permits, which have been handled satisfactorily apart from quite frequent typographical errors. The MA has reported numbers of export permits issued annually for crocodile products to the CITES Secretariat albeit with some queries on the accuracy of these reports (Caldwell 2001). There are significant differences between the exports reported by CFAZ (Table 2) and those reported by the MA to UNEP-WCMC (Table 3). As the CFAZ data were compiled initially through a centralised marketing system, and more recently by several exporters as they obtain their export permits, it is believed that these data reflect the correct figures. The discrepancy between the actual and reported exports is a serious deficiency that needs to be addressed.

The collection of eggs from the wild and the keeping of crocodiles in captivity each require separate licences or permits issued by the MA. As these have to be renewed annually there have been some doubts among producers concerning their security of access to wild eggs. This has motivated the increase in captive breeding, with reduced conservation benefits. The marginal viability of smaller producers has also reduced the effort for the collection of eggs in lower-yield areas, which reduces the financial benefits that accrue to rural communities.

Zimbabwe also has a trophy hunting industry that for many years, prior to 2002, was limited to 150 trophy animals each year. In 2002 the annual export quota was increased to 250 specimens. Given the relatively low numbers of trophies reportedly exported (Table 3) it is not clear why the export quota was increased. The

interaction between these forms of utilization needs to be assessed. This has been planned by the CRG but requests to NPWMA for data on trophy hunting have not yet yielded results. The Management Plan indicates that hunting should not be allowed to affect ranching, but as both forms of use are administered by NPWMA, the argument is over the relative financial values of an animal taken as a trophy against the value derived from eggs collected in the wild over several years.

Ranching of crocodiles in Zimbabwe has always been conducted in parallel with captive breeding. Hatchlings from wild eggs are not marked or kept separate from those originating from captive breeding. The proportion of hatchlings from each source is taken as representative of the proportion of skins from each source (Table 2). All exports from Zimbabwe are identified on CITES documentation as "R" for ranched although the actual proportion of "ranched" skins among the exports has been as low as 45%.

There have been no recorded cases of illegal or irregular trade in any crocodile product in recent years. Zimbabwe conducted a release to the wild program between 1990 and 1994 in which a total of 3182 juvenile crocodiles were released as compensation for eggs harvested. This was discontinued for several reasons. Most habitats already possessed high densities of juveniles, and mortality in released animals was high, with most being lost to predation and drowning when entangled in gillnets. The program was also unpopular with most local communities. Any future release program can only be advocated in specific circumstances comprising a secure habitat with a low density of resident crocodiles and a suitable source population.

CFAZ and NPWMA previously administered a capture system for problem crocodiles but this has been discontinued in recent years. The incidence of human/crocodile conflict in Zimbabwe is low relative to other African countries and is apparently being resolved at a local level by NPWMA staff and/or villagers killing persistent problem animals.

In summary, there is little doubt that the crocodile population in the Zambezi catchment of Zimbabwe is relatively secure and that the utilization through ranching is sustainable. Conservation threats originate from human pressure and consequent landscape scale ecological changes. There is also no doubt that Zimbabwe is the only ranching country in Africa that has sustained an effort to fulfil the requirements of Resolution Conf. 11.16, and is the only country for which sufficient information is available to make a detailed assessment.

Although CFAZ reports to NPWMA annually and submits a draft report to NPWMA in the format of the required national report on ranching to the CITES Secretariat (detailing the condition of the wild population and production standards achieved), these reports do not appear to have been finalised and submitted to the CITES Secretariat by NPWMA in recent years (Chidziya, *pers. comm.*; T. de Meulenaar, *pers. comm.*). Zimbabwe is thus in default of the reporting requirements of Resolution Conf. 11.16.

Concerns raised in the CSG review of the Zimbabwe program in 1996 still remain. Communication between NPWMA and CFAZ does not appear to have improved, the MA now makes an even smaller contribution to the conservation of crocodiles than previously, and the monitoring of wild populations has only improved slightly.

Kenya

Crocodile ranching in Kenya began on a small scale in the late 1970s. There are currently seven authorised ranches of which only four are active producers (Table 5). There has been no significant increase in production in recent years (Table 6). The Kenya Wildlife Service (KWS) is the CITES Management Authority. The MA has submitted annual reports to the CITES Secretariat, but these include only a list of the export permits issued, without the narrative concerning the status of the wild population and production standards achieved as recommended in Resolution Conf. 11.16.

There is a nascent producer association, the Crocodile Producers Association of Kenya (CPAK), which has been several years in formation. CPAK claims to represent the producers situated on the coast but does not fulfil any other administrative functions for KWS. Ranches are required to report annually to KWS although some do so more frequently. The most recent stock and production figures available on file in March 2004 were from late 2002 to mid-2003. Figures from previous years were also unavailable (Table 6).

Table 5 Crocodile ranches and farms in Kenya (2003)

No	Company Name	Location	Ranching/Captive Breeding
1	Baobab Farm	Mombasa	R, CB
2	Nile Crocodiles	Mombasa	R
3	Kenya Croc Farm (Mamba Village)	Mombasa	CB
4	Malindi Crocodile Farm	Malindi	CB

5	Nairobi Mamba	Nairobi	Tourist farm
6	Three N Farm	Embu	Not active
7	Kanthenge	Embu	Not active

Table 6 Crocodile production parameters and results for Kenya, 2002. (Data from KWS)

Parameter	2002
No of farms/ranches	7
No of captive breeding stock	445
No of captive-bred clutches	No data
Slaughter stock (>1 y)	17,760
Wild clutches collected	No data
Wild eggs hatched	7873
Farm eggs hatched	5069
% production from wild eggs	60.8%
Hatchling mortality (%)	Approx 9%
Rearing mortality (%)	Insufficient data
Skins exported (animals)	2400

The Kenya Nile Crocodile Management Plan was drafted in 1990 and has not been revised since. It is similar to the original Zimbabwe plan, from which it was derived. It uses zones to provide for appropriate levels of protection and utilization options. It is specific in providing for ranching operations and on control and reporting requirements. The lack of detailed information at KWS that was revealed by this review reflects recent, inadequate application of the management plan by the MA. Until 1995, annual meetings were held between KWS and the ranches, which facilitated the conduct of farm inspections and the compilation of annual stock reports. This practice was discontinued when KWS pursued a policy of decentralisation and underwent many staff changes (Jama, *pers. comm.*). There is a discrepancy of 811 skins between the 2002 exports recorded during this review (Table 6) and the number reported to the CITES Secretariat (Table 7).

Table 7 Gross exports of crocodile products from Kenya, 1990-2003. (Data from UNEP-WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	0	0	0	0	0	0	0	0	2	907	0	0	0	4000
Backskins	0	0	0	0	0	0	0	100	200	0	2350	0	0	0
Bellyskins	0	0	0	0	0	0	300	1445	400	0	3460	350	2400	1337
Hornbacks	0	0	0	0	0	0	0	0	0	0	2350	0	0	0
Skins	2201	650	500	4020	4258	7128	3000	1307	400	3350	4576	4250	811	906
Total Animals	**2201**	**650**	**500**	**4020**	**4258**	**7128**	**3300**	**2752**	**802**	**4257**	**10,386**	**4600**	**3211**	**6243**

No surveys of the wild crocodile population in Kenya have been carried out since the Tana River surveys in 1993 and 1995. Fergusson (2003) undertook a limited survey of the lower reaches of the Tana River for the East African Wildlife Society and Tana Delta Environmental Management Forum. This survey revealed a large population of crocodiles and showed that egg collection activities have had no impact on recruitment of juveniles into the population.

The Utilization Task force of KWS undertook several inspections in 2001 to familiarise staff with the industry but this activity did not lead to a program of regular inspections. There is also no Code of Practice or guidelines for acceptable ranching practice. The CITES skin-tagging criteria are quite carefully followed. Producers make a request to KWS for tags annually, and KWS assigns the tag numbers and advises the CITES Secretariat and the tag supplier. The producers make payment directly to the tag supplier, and the tags are held by the producers.

All crocodile skins produced in Kenya are exported with CITES permits that use the source code "R". Although ranched stock is marked after hatching to identify its origin, the actual proportion that originates from wild collected eggs is around 60% (Table 6). The collection of eggs from the wild requires a separate permit and should theoretically involve local communities for their economic benefit. Detailed reporting of egg collection, incubation and hatching was done in great detail in the early years but this does not appear to have been required by the MA in recent years.

No trophy hunting or harvesting of crocodiles is allowed under the management plan or national legislation, so no conflict arises with ranching activities. There have been no incidents of illegal or irregular trade in crocodile products since the late 1980s.

A release to the wild program is provided for in the management plan but has never been implemented, as the concept was unpopular with local communities in the major egg collection area. There are serious problems with human/crocodile conflict in several parts of Kenya, although it is poorly recorded. KWS has made efforts to evaluate the problem but there has been no progress with any effective alleviation. The capture of adult problem crocodiles by ranchers is allowed, but no permit for this has been issued since 1997. It is known that problem crocodiles are dealt with in small numbers at a local level.

Although there are few recent data, it is clear that Kenya has a large crocodile population that is not adversely affected by the minimal ranching activities and hence there appears to be little doubt that these activities are sustainable. Effective conservation management and compliance with reporting requirements of Resolution Conf. 11.16 could be significantly improved. The policy framework is adequate but closer adherence to this by producers and the MA are required.

Malawi

Crocodile ranching and farming (captive breeding) has been practiced on a small scale in Malawi since the mid-1980s. There are presently three authorised establishments (Table 8), and the Department of Wildlife and National Parks (DWNP), which is also the CITES Management Authority for Malawi, has received proposals for two new farms in the last three years. DWNP is the only government agency responsible for crocodiles and crocodile production in Malawi. There is no producer association.

Table 8 Crocodile ranches and farms in Malawi (2003).

No	Company Name	Location	Ranching/Captive Breeding
1	Salima/Nyika Crocodile Farm	Senga Bay, Salima	CB
2	Koma Crocodile Farm	Salima	R, CB
3	Crocodile Farming & Research Centre	Mpatamanga	Not yet active?

Crocodile producers are supposed to obtain an annual license to operate and report on the previous years' activities when applying for a renewal. Despite this requirement there were very few data on file. There is also no apparent record of the hunting or export of the skins of problem crocodiles taken under Malawi's export quota of 200 per year.

Malawi submitted an annual report to CITES for 2002, which only listed the details of export permits issued and did not contain the narrative recommended by Resolution Conf. 11.16.

The original farm was at Dwangwa Sugar Estates but it was closed in 2001 after the estate was sold. The stocks were sold to Salima Farm. Production and exports of crocodile skins appear to have declined since Dwangwa went out of business (Table 9).

Table 9 Crocodile production parameters and results for Malawi, 2002-2003. (Data from DWNP)

Parameter	2002	2003
No of farms/ranches	2	3
No of captive breeding stock	No data	112
No of captive-bred clutches	No data	No data
No of growout animals	No data	No data

Slaughter stock (>1 y)	No data	10660
Wild clutches collected	No data	Collected but no data
Wild eggs hatched	No data	No data
Farm eggs hatched	No data	No data
% production from wild eggs	-	-
Hatchling mortality (%)	No data	No data
Rearing mortality (%)	No data	No data
Skins exported (animals)	240 & wild?	400 & wild?

The exports of crocodile skins and products reported by DWNP and the data obtained from UNEP-WCMC (Table 10) both show a decline in recent years. There is a discrepancy between the exports in 2002 and 2003 provided by DWNP for this review (Table 9) and those previously reported to the CITES Secretariat (Table 10).

Table 10 Gross exports of crocodile products from Malawi, 1990-2003. (Data from UNEP-WCMC)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Skins	1070	2389	266	2036	1731	1150	436	600	200	170	200	1416	60	331

A Crocodile Management Plan for Malawi was published by FAO in 1990 but has not been updated since then. In recent years there have been *ad hoc* modifications of the policy on crocodiles (Bhima, *pers. comm.*), and it appears that few of the actions listed in the policy have been implemented. There is urgent need to address the serious lack of data on the conservation status of the Nile crocodile in Malawi and to develop a new and workable management plan.

There has been no recent monitoring on the status of crocodiles in Malawi. Spotlight surveys were undertaken in the lower Shire River in 1998 as part of a wider multinational Zambezi Basin Project. The report on this work could not be located at DWNP but the results are referred to in the report on a 1991 Cambridge University expedition to the lower Shire River (Bartlett *et al.* 1991), which also included results of aerial and boat-based surveys of part of the Elephant Marsh area.

The crocodile producers were included in an inspection tour carried out by DWNP in November 2003. Their report provided much of the information reported here. No evidence of previous or regular inspection of facilities was available. Tags are sourced by DWNP from a supplier in South Africa and sold on to producers at cost.

Collection of eggs from the wild requires a separate permit but no record could be found on the issue of permits in recent years. No data on eggs collected, fertility, incubation or hatching were available.

There is apparently a considerable problem of human/crocodile conflict in Malawi, although documented evidence is lacking. As a consequence, DWNP issues annually 10 quotas of 20 crocodiles each to local hunters around Lake Malawi and along the Shire River. Skins derived from these animals are subsequently exported. In addition, DWNP annually shoots a considerable number of problem crocodiles (Table 11). The skins of these animals are not recovered or exported. It is likely that about 300 adult crocodiles are killed annually in Malawi, without any biological surveys being conducted.

Table 11 Problem crocodiles killed and wounded by DWNP staff in the vicinity of various Malawi National Parks, between August 1997 and July 2000. Both the stations that did not provide data include crocodile habitat, so the totals are underestimated.

Area	**No. killed**	**No. wounded**	**Average/year**
Lengwe NP	167	23	38
Vwaza Marsh NP	51	0	10.2
Lake Malawi NP	10	0	2
Nyika NP	70	4	14.8
Nkotakota NP	No data	No data	?

Liwonde NP	No data	No data	?
Totals	**298**	**27**	**>65**

There are no recorded cases of illegal or irregular trade. There has never been a release to the wild program from the crocodile ranches. As there is no demand from the ranching/farming sector for wild adult crocodiles, they are killed rather than being captured (see above).

The crocodile ranching program in Malawi is effectively moribund, and what activities that remain are poorly recorded. Despite the absence of survey data there is little doubt that the present level of utilization through egg collection is sustainable. Although not a CITES matter, the additional off-take of approximately 300 adult animals per year (200 on the harvest quota and >65 problem animals), if investigated, may allow annual quotas to be set on the basis of well designed and implemented monitoring. The policy framework needs updating and the MA, which appears to be seriously under-funded, needs skills training and funding to improve its capacity to manage and conserve the wild population.

Mozambique

No information was received from the CITES Management Authority of Mozambique despite several requests. The information provided here is compiled from other sources (Anderson, Barry, Namanhya, Pentolfe, van Jaarsveld, *pers. comm.*) and should not be regarded as authoritative.

It is believed that there is presently only one crocodile ranch in Mozambique, established in the 1990s at Lake Cahora Bassa, and a smaller crocodile farm near Maputo that was opened in 2002. There were previously crocodile ranches situated offshore on Bazaruto and Benguerra Islands, but it is understood that the last of these was closed in 2002 as it was not economically viable. The egg collection for all of these facilities was focused on Lake Cahora Bassa, particularly in the western upper reaches of the lake and on the lower Zambezi River.

Substantial exports from Mozambique of live specimens and increasing numbers of skins represent the products of both *ex situ* and *in situ* ranching respectively (Table 12). It is believed that this was initially in the form of eggs collected in Cahora Bassa being exported for incubation in South Africa.

In more recent years there have been significant exports of hatchlings to Zimbabwe and South Africa. A significant proportion of the exports from Mozambique are now animals that are initially raised in Mozambique and then exported live to South Africa for finishing prior to slaughter. The products are exported from South Africa as re-exports.

Table 12 Gross exports of crocodile products from Mozambique, 1990-2003. (Data from UNEP-WCMC)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Live animals/eggs	1000	4240	3500	49	0	1100	1500	0	4000	10,000	49	0	7000	8600
Backskins	0	0	0	0	0	0	0	0	0		0	0	0	0
Bellyskins	0	0	0	0	0	0	0	0	0		0	0	0	2115
Skins	590	484	2727	4366	3159	4963	477	1430	1183	605	732	485	293	4987
Trophies	0	0	0	0	0	2	5	16	17	4	53	25	37	26
Total Animals	**1590**	**4724**	**6227**	**4415**	**3159**	**5165**	**1982**	**1446**	**5200**	**11,017**	**834**	**510**	**7330**	**15,728**

On the basis of a unilateral notification to the CITES Secretariat in 2004, Mozambique increased significantly its annual export quota for wild crocodile skins. The increased export quota was subsequently published by the Secretariat through a Notification to the Parties. Prior to 2004 the annual export quota for sport hunted specimens and problem animals was 100 specimens per year. This quota is now 900 per year. The increase was justified on the grounds of an increased frequency of human/crocodile conflict. This harvest and its interaction with the ranching sector should be closely monitored, as it is understood that there are very few data on either the crocodile populations or the incidence of conflict.

Tanzania

Crocodile ranching was attempted in Tanzania between 1989 and 1995. There are 6 crocodile ranches (Table 13), none of which has exported skins since 1995. Ranching did not prove to be successful in Tanzania for a number of reasons. Lack of capital, cash flow and expertise, reliability of food supply were principal factors mitigating against the economic viability of ranching. Against a background of these difficulties, an abundant wild population offered wild harvesting as an attractive alternative form of utilization.

Table 13 Crocodile ranches and farms in Tanzania (2003).

No	Company Name	Location	Ranching/Captive Breeding
1	Kaole Mamba Ranch	Bagamoyo	R, CB
2	Tumaini Crocodile Ranch	Ifakara	Not functioning
3	Teule Arts Crocodile Ranch	Ifakara	Not functioning
4	Mamba Ranch	Pangani/Tanga	Status unknown
5	Muze Crocodile Ranch	Sumbawanga	R, CB
6	Cossam Crocodile Project	Sumbawanga	R, CB

The Wildlife Division (WD) of the Government of Tanzania is the CITES Management Authority and no other organisations with interests in crocodile management exist. The MA has reported annually to the CITES Secretariat on the wild harvest approved at CoP11 in 2000, but in relation to ranching there has been no report since 1995. Up until that time, reporting was limited to listing of exports. All other information has been submitted in the form of various amendment proposals to CITES.

A policy and management plan with details of ranching activities was introduced in 1993 and remains in effect, although this is now somewhat redundant, as the wild harvest is now the only active form of utilization. The present policy document and management plan do not provide for a wild harvest. The Tanzania Wildlife Conservation Act and Wildlife Policy are currently under review and will, when completed, replace the existing crocodile policy document. It is unclear if the new document will prescribe more fully the harvesting program.

The existing ranches are required to hold an annually renewable Certificate of Ownership to keep live wildlife and obtain a separate permit for capture and egg collection. The producers are obligated to provide stock returns every three months. A total of 405 crocodiles are currently held on these farms.

The Tanzanian Wildlife Department undertook a series of aerial surveys between 1989 and 2003, largely covering the major crocodile populations in protected areas. This information has been communicated to CITES as elements of the supporting statement associated with amendment proposals.

There is no set program for inspection of ranching facilities but is understood to be carried out by local Wildlife Department staff at least once or twice per year to verify stock numbers and to check that the animals are housed and fed adequately.

The procedure for tagging ranched skins has not been used since exports ended in 1995 but was similar to the system currently used for wild skins elsewhere. Numbers of skins are confirmed with the CITES Secretariat and the required number of tags are ordered from a Zimbabwean supplier and held by the MA for attachment to each skin immediately prior to export. All skins are supposed to be identified by a detailed field tag up to this point. The MA applies a fee for each tag and export permit.

Permits are issued for egg collection based on producers' requirements and facilities. Eggs may be collected from all areas except National Parks. There has been no wild egg collection by ranchers since 1999.

The Tanzanian population of C. niloticus was transferred to Appendix II in 2000 in accordance with Resolution Conf. 9.24. An annual export quota of 1600 animals taken from the wild (comprising both trophy specimens and problem animals) is an integral component of the present Appendix-II listing. Although peripheral to the present review of ranching programs, the data on exports from Tanzania since 2000 (Table 14) indicate recorded exports in 2000 and 2001 exceeded the 1600 annual quota approved by CITES. Quotas for harvesting are issued annually between July and October, which frequently results in the quota running over into the following calendar year. There are also difficulties in reconciling the figures for any period because of year end run-overs in the issue of permits and export dates.

Table 14 Gross exports of crocodile skins and trophies from Tanzania, including exports resulting from wild harvest, 1990-2003. (Data from UNEP–WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	1	0	0	20	22	157	0	0	0	0	0	12	0	14
Meat (kg)	0	0	0	0	0	0	1300	0	0	0	0	0	0	0
Skins	1555	982	134	476	348	927	1304	651	815	933	1534	1583	1376	1442
Trophies	38	33	54	20	63	64	103	97	147	83	77	148	113	138
Total Animals	**1594**	**1015**	**188**	**516**	**433**	**1148**	**1407**	**748**	**962**	**1016**	**1611**	**1743**	**1489**	**1594**

The Wildlife Division conducted an aerial survey in late 2003 that included some new rivers and sections outside protected areas. The results were variable, indicating stable populations within the Selous Game Reserve, and both declines and increases in the numbers of animals inhabiting other areas.

Most of the crocodile ranchers receive a share of the quota for wild skins. There are no gazetted regulations for the harvest, but quota holders are routinely advised of the procedure and requirements in a letter from the Wildlife Department. The field tags are sometimes not applied or not filled out (pers. obs.) and the data on these tags do not appear to be routinely collected. There is little communication between the sections of the Wildlife Department to apply quotas in problem areas or obtain feedback on the efficacy of the harvest.

The benefits from the harvest program to rural communities are through the removal of problem crocodiles and there is apparently little financial benefit. Exporters of the wild skins are charged a fee of US$40/skin - the 75% of the fee reverts to Treasury and 25% is allocated to the Tanzania Wildlife Protection Fund, which is used to fund some community-based projects.

Zambia

Crocodile ranching commenced in Zambia in the 1980s and there are now 9 producers (Table 15) and two possible new entrants. A producers association, Zambia Crocodile Farmers Association (ZaCFA) has recently been formalised. The Zambia Wildlife Authority (ZAWA) is the CITES Management Authority and Scientific Authority.

Table 15 Crocodile ranches and farms in Zambia (2003).

No	Company Name	Location	Ranching/Captive Breeding
1	Zongwe Farming Ents	Sinazongwe, Lake Kariba	R, CB
2	Gordana Croc & Fish Farm	Sinazongwe, Lake Kariba	CB (most years), R
3	Kaliolio Crocodile Farm	Siavonga, Lake Kariba	R, CB
4	Sumbu Crocodiles Ltd	Siavonga, Lake Kariba	CB
5	J & I Brooks Ltd (Lunchinze)	Sinazongwe, Lake Kariba	R, CB
6	Kalimba Farms Ltd	Lusaka	R, CB
7	Luangwa Crocodile Farm	Luangwa, Mfuwe	R
8	Croc Hide Ltd	Sinazongwe, Lake Kariba	R, CB
9	J & I Brooks (Gwembe)	Choma & Livingstone	CB

Crocodile producers obtain an annual license to operate. Renewal of the licence is dependent on the applicant reporting on the previous year's activities, but some reports had not been submitted in recent years. The number of producers has remained relatively stable, and a few small producers were closed by ZAWA in the 1980s. Production of skins has been increasing in recent years with improved marketing. Meat sales have declined because of difficulties with veterinary certification, transport and market requirements (Table 16).

Table 16 Crocodile production parameters for Zambia, 2001-2003.

Parameter	2001	2002	2003
No of farms/ranches	8	8	8

No of captive breeding stock	2180	2299	2333
No of captive-bred clutches	Incomplete data	Incomplete data	Incomplete data
Slaughter stock (>1 y)	Incomplete data	Incomplete data	Incomplete data
Wild clutches collected	No data	No data	No data
Wild eggs hatched	18,309	18,009	23,018
Farm eggs hatched	27,334	27,814	33,962
% production from wild eggs	40.1	39.3	40.4
Hatchling mortality (%)	No data	No data	No data
Rearing mortality (%)	No data	No data	No data
Skins exported (animals)	19,712	27,284	32,881
Meat exported (kg)	46,345	48,613	13,288

There were minor differences between exports reported by Zambia to the CITES Secretariat and the figures reported to this review (Table 17). Zambia has submitted reports to the Secretariat annually, which only list export permits issued, without the narrative recommended in Resolution Conf. 11.16 concerning the status of the wild population and production standards achieved. There were some discrepancies between the records of ZAWA and those of the producers for the number of skins exported each year but these do not differ by more than about 10%, and may be attributable to end-of-year over-runs and reporting differences.

A new Policy on Crocodile Conservation and Management has been drafted and should be approved by the ZAWA Board and the Minister by June 2004. The new policy explicitly favours sustainable use and seeks to address the low value placed on crocodiles by the Zambian public. There are indications in some official documents that the philosophy of ranching as a conservation tool has not been fully understood. There appears to be some impatience that crocodile producers are continuing to collect wild eggs and have not yet obtained sufficient breeding stock to become self-sustaining operations independent of the wild population.

Table 17 Gross exports of crocodile products from Zambia, 1990-2003. (Data from UNEP-WCMC)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Meat (kg)	0	0	0	0	25,000	44,900	25,514	38,909	74,803	65,593	78,671	60,640	32,821	13,289
Back skins	0	0	0	0	0	2500	664	7302	5614	3907	995	0	0	0
Belly skins	0	0	0	0	2755	5701	0	7952	7149	5867	7329	17,206	14,173	16,374
Hornbacks	0	0	0	0	0	0	0	0	0	0	0	3577	12,093	16,638
Skins	2390	1140	3323	8646	6207	13,410	5250	4936	6734	18,211	13,111	14,552	2976	6220
Trophies	0	0	12	19	54	56	52	20	1	2	23	2	7	1
Total Animals	**2390**	**1140**	**3335**	**8665**	**9016**	**19,167**	**5302**	**12,008**	**13,884**	**24,080**	**20,463**	**35,337**	**29,249**	**39,233**

In conjunction with the new draft Policy and with the reopening of trophy hunting there have been renewed efforts to survey the wild population. Since 1996 three sections of the Luangwa River have been surveyed using day and night counts. In 2003 an aerial survey was made of the Zambezi, Kafue, Luangwa, Luapula and Mweru wa Ntipa populations. However, the data analyses and drafting of the proposal had not been completed at the time of writing. ZAWA also has an agreement with a volunteer organisation that places graduate students in the field on ZAWA projects. This arrangement has produced some data on crocodile populations of the Kafue River and Itezhi-tezhi Dam. None of these results has yet been reported to the CITES Secretariat.

Inspection of facilities and stock are provided for in the new draft policy and in annual returns to be submitted by producers, but according to ZAWA this has not been implemented effectively in recent years due to budgetary constraints. A useful review of the farms and production for the period 1991 to 1996 was made in 1997 by the ZAWA veterinarian who is believed to be in the process of updating this to 2003.

The CITES tags for crocodile skins are sourced by individual producers from manufacturers in South Africa. Tags are delivered to ZAWA and issued in association with export permits. Permit applications and the issue of

tags have to be completed by 31 December each year, following which a 6-month period is permitted for actual exports to take place. All Zambian production is denoted on CITES export permits with the source code "R", although actual production from eggs collected in the wild amounts to about 40% of exports.

The collection of eggs in the wild and the capture of adult crocodiles for breeding stock are both subject to separate annual permits from ZAWA. There is very little biologically useful information reported from the egg collection that could be used for monitoring of the wild population, which is a lost opportunity.

The ZAWA policy requires ranchers to capture "problem crocodiles" and maintain these in captivity for breeding. The ranchers are charged a fee for each animal captured as well as covering the costs of the capture. While this system has worked successfully elsewhere, it is uncertain how many more breeding crocodiles are required by most of the Zambian producers. It was also indicated by one respondent that the ZAWA Board has approved the capture of up to 300 adult animals per year. This may correspond with the more recent initiative to use safari operators with clients to target problem animals.

The annual returns lodged by some producers indicate an annual capture of about 15 adult crocodiles by each operator. Whether these captures represent problem animals or simply captures to increase the breeding stock is unclear. In the period 1991 to 1996 there were requests by producers to capture a total of 517 adult animals, of which 125 were actually captured. If this constitutes capture for breeding stock only and is being continued at present, it clearly falls outside the definition of ranching. There is no reported instance of illegal trade apart from occasional recoveries of crocodile carcasses in the Zambezi and Luapula Rivers. The fate of these skins is unknown.

Pending the release of results of the 2003 surveys, it is difficult to comment on the status of the population in Zambia. However, given that approximately 25% of Zambia is wetland habitat with a relatively low-density human population, it is likely that the crocodile population is secure. The MA is more active than some, but lacks reliable information on some aspects such as egg collection. It is hoped that the farmers' association can, in future, obtain relevant information from ranchers and liaise with ZAWA. It could be argued that the capture of adult crocodiles and the hunting of problem crocodiles need to be better regulated and monitored.

Madagascar

There are currently two crocodile ranches in Madagascar (Table 18), and a number of other establishments that hold captive stock but which are not active in either egg collection or the export of skins. There is no producers' association and ranchers report to the Ministry of Water and Forests (MWF), which is the CITES Management Authority for Madagascar. The CITES Scientific Authority is the Biology Department of the University of Antananarivo.

Table 18 Crocodile ranches and farms in Madagascar (2003).

No	Company Name	Location	Ranching/Captive Breeding
1	Reptel sarl BP	Antananarivo	R, CB
2	Croco Ranching II	Antananarivo	R

Table 19 Crocodile production parameters for Madagascar, 2001-2003.

Parameter	2001	2002	2003
No of farms/ranches	2	2	2
No of captive breeding stock	170	182	212
No of captive-bred clutches	No data	No data	No data
Slaughter stock (>1 y)	11,202 *	13,544 *	16,895 *
Wild clutches collected	130 *	120 *	105 *
Wild eggs hatched	3596 *	2871 *	2870 *
Farm eggs hatched	No data	5248 *	4021 *
% production from wild eggs		35.4	36.4

Hatchling mortality (%)	21.4 **	24.4 **	No data
Rearing mortality (%)	0.6 **	17.6 **	No data
Skins exported (animals)	4322 C 4191 R 804 articles	3206 C 2723 R 934 articles	2700 C 3900 R 2460 articles

* denotes data incomplete - only Reptel reported. Croco Ranch II apparently has a separate incubation and hatchling facility in Diego in northern Madagascar, for which there are also no stock returns.
** indicates data from Croco Ranch II only.

Annual production of skins in recent years has been variable (Table 19), with the majority of skins being sourced from one ranch (Reptel). The MA was initially unable to produce any data from Croco Ranch II for this review and claimed the stock record book had been lost. This record, albeit partial, was later found and offered for the review. Some information was gathered from a visit to the farm to assess its capacity. It is unlikely that that farm could produce more than 1500 relatively small skins each year. The egg collection data for the period 1992 to 1999 show a maximum of 3119 which is congruent with this level of production, assuming 75% hatching and mortalities of 10-25% over 2 years (unpublished data provided for this review). Furthermore, there is little correlation between the number of animals slaughtered and skins exported by Croco Ranch II (Annex 2 - letter to CSG Chair dated 18th April 2005).

The export figures reported by Madagascar to CITES (Table 20) do not completely reconcile with the information provided by MEWF for this review (Table 19).

Table 20 Gross exports of crocodile products for Madagascar, 1990-2003. (Data from UNEP-WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	0	0	50	0	1	0	0	20	1189	1606	1460	418	10	1
Bodies	0	0	0	0	0	7	22	17	28	28	51	15	9	8
Skins	853	989	1459	1909	3905	3390	4589	6833	7020	7207	7983	9408	8045	7400
Total Animals	**853**	**989**	**1509**	**1909**	**3906**	**3397**	**4611**	**6870**	**8237**	**8841**	**9494**	**9841**	**8064**	**7409**

A policy and management plan for crocodiles containing a strategy for management of the human/crocodile conflict in Madagascar were drafted in May 2004 by a collaborative effort between CSG, the ranchers and MWF, but the relevant Minister has still not ratified the draft document. There was previously no written policy or management plan.

There has been minimal monitoring of the crocodile population. The CSG arranged aerial surveys in 1987, 1988 and 1997 but the MA did not participate in any of these surveys. The newly appointed Scientific Authority is interested in surveys but lacks the necessary technical capacity. Surveys of nest sites in the Besalampy region have been conducted on four occasions between 1996 and 2003. The CSG recently supported a survey of human/crocodile conflicts - demonstrating that relative to mainland African countries there were fewer fatalities in Madagascar. Given the uncertain status of the wild population, the necessity for the increased quota established by Madagascar in 2000 is questionable.

Inspection of the ranches is scheduled twice annually to verify stock figures. The absence (loss) of a stock record by one ranch suggests that inspections by the MA and compliance by the private sector need to be more rigorous.

The ranches forecast tag requirements each year, obtain a letter of authority from the MA and order tags from suppliers in USA which are delivered directly to each producer. There is no apparent supervision of the tagging procedure. The same tags and tag number range are used for both ranched and wild skins.

Collection of eggs is subject to a separate permit that is issued annually by the MA. Only Reptel has returned data on the eggs and nests located. No detailed record could be found on any collections carried out by Croco Ranch II, although these are known to have occurred. The data from Reptel for Besalampy show a steady decline in the number of nests and eggs collected at several localities. This decline has been attributed to forest

clearing and burning which has caused siltation of smaller lakes and the erosion of nesting areas. There is a trend towards egg collection in new areas each successive year to achieve the target number of eggs.

The impact on the wild egg collection and the increased harvest of at least 500 wild specimens is unknown. There is no record of locations from which wild harvested skins have been obtained, nor is there any control mechanism in place to prevent over-harvesting. There are apparently no regulations gazetted for the administration of the harvest. The skins that are used by the artisanal craftsmen for the production of stuffed specimens and small leather goods continue to be obtained from the wild. Although the number of such products being offered for sale has diminished considerably, the annual off-take of animals for this purpose may still amount to 500 smaller sized animals.

Madagascar uses the source codes "C", "R" or "W" for export permits issued for crocodile skins and is the only African country that differentiates the source of skins exported. There is no evidence of illegal trade, although there are allegations of skins being smuggled into the European Community via Reunion and/or Mayotte. There has never been a release program in Madagascar. MWF does not permit the capture of adults for breeding stock.

In summary, the long-term sustainability of ranching and harvesting in Madagascar would be enhanced considerably if the following actions were taken:

a) The newly drafted management plan is accepted and implemented;
b) The harvest is controlled and targeted on known localities with problem animals; and,
c) An updated survey of the crocodile population is undertaken.

The rationale and justification for the more than two-fold increase in the export quota of crocodiles established by Madagascar in 2000 in the absence of any new data must be questioned.

Botswana

No information was received from Botswana despite repeated requests. The information provided here is compiled from other sources (A. Leslie, D. Mughogho, pers. comm.) and should not be regarded as authoritative.

It is believed that there are still three functional crocodile ranches in Botswana and that their business is primarily *ex situ* ranching, whereby eggs are collected and incubated in Botswana and the live animals are exported at some stage to crocodile farms in South Africa for growing out, finishing and slaughter (Table 21). There is also an annual export quota of 50 sport hunted trophy specimens, very few of which appear to be taken.

Table 21 Gross exports of crocodile products from Botswana, 1990-2003. (Data from UNEP-WCMC)

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Live	504	3	0	1100	3100	2626	700	1800	2050	3827	3900	3670	720	0
Skins	380	719	1324	7392	687	358	349	337	2	0	1	152	2	0
Trophies	6	6	13	21	6	3	4	10	7	9	10	9	14	9
Total Animals	**890**	**728**	**1337**	**8513**	**3793**	**2987**	**1053**	**2147**	**2059**	**3836**	**3911**	**3831**	**736**	**9**

Ethiopia

There is only one crocodile ranch in Ethiopia (Table 22), which commenced operation in 1984. It is situated in the south of the country near Lake Chamo and Lake Abaya. It is owned and managed by the government, through the Ethiopian Wildlife Conservation Organisation (EWCO). EWCO is also the CITES Management Authority and Scientific Authority for Ethiopia.

Table 22 Crocodile ranches in Ethiopia (2003).

No	**Company Name**	**Location**	**Ranching/Captive Breeding**
1	Arba Minch Crocodile Ranch	Arba Minch	R

Production from this ranch has been erratic as a consequence of intervals of flooding and marketing difficulties. All stock currently held on the ranch has been derived from hatchlings collected from the wild and some animals that are 11-13 years old are still being held (Table 23).

Table 23 Crocodile production parameters for Ethiopia, 2001-2003.

Parameter	2001	2002	2003
No of farms/ranches	1	1	1
No of captive breeding stock	0	0	0
No of captive-bred clutches	0	0	0
Slaughter stock (>1 y)	No data	No data	3689
Wild hatchlings collected	2000	0	0
Wild eggs hatched	0	0	0
Farm eggs hatched	0	0	0
% production from wild eggs	100	100	100
Hatchling mortality (%)	No data	No data	No data
Rearing mortality (%)	No data	No data	No data
Skins exported (animals)	0	0	1000

In common with most other countries considered in this review, the data on exports reported annually to CITES (Table 24) do not reconcile exactly with the data reported for the review (Table 23).

Table 24 Gross exports of crocodile products from Ethiopia, 1990-2003. (Data from UNEP-WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Skins	2575	7	6	594	2	2005	0	0	0	0	934	42	203	1354
Trophies	2	2	2	1	0	0	0	0	0	0	0	0	0	4
Total Animals	**2577**	**9**	**8**	**595**	**2**	**2005**	**0**	**0**	**0**	**0**	**934**	**42**	**203**	**1358**

Ethiopia has submitted annual returns to CITES, including information on the infrequent exports of ranched skins from Arba Minch and on the crocodiles killed in trophy hunting (10-15 animals/year). These reports detail exports only and present no information on the state of the wild population or production activities.

In February 2004, a daylight survey by boat over 116 km of shoreline on Lake Chamo revealed a total of 1183 crocodiles in 8 zones. This indicates a relatively high-density population. No other surveys are known since the work of M. Bolton for FAO in 1988.

There is no system for inspection and regulation of the facilities, which are owned and managed by government. Furthermore, there is no crocodile management plan or policy for Ethiopia. All exports are correctly tagged as “R” and there is full adherence to the universal tagging system.

There is no egg collection and no capture of adult crocodiles for breeding stock as none are held at the farm. The oldest of the production stock will possibly start to breed in the future unless they are slaughtered. There are no reported instances of irregular trade.

Conflict between crocodiles and humans is reported to be increasing near the Sudanese border and at Lake Chamo and Lake Abaya, but does not appear to be a major problem at present.

With the reported high density of crocodiles in Lake Chamo and remaining populations in other parts of the country, there is little doubt that the current utilization through ranching and trophy hunting is sustainable. It seems unlikely that the ranch will become commercially viable without substantial investment in husbandry and marketing.

Uganda

The one crocodile ranch in Uganda commenced operation in 1991, and is situated on Lake Victoria near Kampala. Many problems have been encountered with the ownership and management of this ranch and production is limited (Tables 25 and 26).

Table 25 Crocodile ranches in Uganda (2003).

No	Company Name	Location	Ranching/Captive Breeding
1	Uganda Crocs Ltd	Katebo, Lake Victoria	R

Table 26 Crocodile production parameters for Uganda, 2000-2002.

Parameter	2000	2001	2002
No of farms/ranches	1	1	1
No of captive breeding stock	0	0	0
No of captive-bred clutches	0	0	0
Slaughter stock (>1 y)	No data	No data	2600
Wild eggs collected	2350	750	No data
Wild eggs hatched	No data	No data	No data
Farm eggs hatched	0	0	0
% production from wild eggs	100	100	100
Hatchling mortality (%)	No data	No data	About 25%
Rearing mortality (%)	No data	No data	No data
Skins exported (animals)	600	600	602

The exports reported to CITES are lower than those reported by UWA during this review, but in any case the volume is small (Table 27).

Table 27 Gross exports of crocodile products from Uganda, 1990-2003. (Data from UNEP-WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Skins	0	0	0	4019	9086	0	0	0	0	0	508	900	2	0

The Commissioner of Wildlife, Ministry of Tourism, Trade and Industry, as the CITES Management Authority of Uganda, has reported annually on the exports of ranched skins from the ranch but with no additional information. The Director of Uganda Wildlife Authority (UWA) serves as the CITES Scientific Authority.

The Uganda Wildlife Policy (1999) covers crocodiles both within and outside protected areas. The concept of sustainable use is well entrenched amongst the private sector and communities outside protected areas. There is also a problem animal management strategy that guides UWA in handling problem crocodiles outside protected areas. No other hunting operations are permitted in Uganda. There is apparently no illegal or irregular trade in skins from Uganda.

Monitoring of the wild population of crocodile has been intermittent. The last national scale survey was undertaken in 1996 in preparation for Uganda's amendment proposal submitted to the 10th meeting of the Conference of the Parties (Harare, 1997). A UWA Department of Field Operations report in 2003 states that "crocodiles' population status is not very well known in Uganda".

The Uganda Wildlife Authority has made three evaluations of Uganda Crocs Ltd since July 2001 all of which have resulted in recommendations to improve operations and the performance of UWA in monitoring the establishment.

A release to the wild program was implemented in 1993 and 1996 through which a total of 341 juvenile crocodiles were released into Murchison Falls National Park, where the eggs were originally collected. This

program was discontinued because of apparently low survival rates of the released animals and fear of disease transmission from the captive environment to the wild.

There are significant human/crocodile conflict concerns in parts of Uganda, which are currently handled by UWA staff attempting to kill specific individuals at the site of repeated attacks.

The crocodile ranching program in Uganda is now effectively moribund. It has had little impact, either negative or positive, on the wild population. The status of wild crocodile populations in Uganda however is in urgent need of assessment, as there appear to be increasing populations in some areas, while in other areas there are extremely low densities as a result from uncontrolled hunting.

South Africa

The South African population of *C. niloticus* was transferred to Appendix II under the ranching provisions of the Convention in 1994. Limited ranching, through egg collection, was proposed for the St Lucia estuary but was never carried out. The wild population is now fully protected by national and provincial legislation and all production is by captive breeding, with some establishments now producing second-generation offspring.

South Africa is a major exporter of crocodile products (Table 28). South African crocodile farms are also significant importers of live crocodiles from other African countries, notably Botswana, Mozambique and Kenya. The skins produced from these imported animals should be treated as ranched re-exports. However, it appears that at least some are treated as captive-bred specimens of South African origin. Implementation of CITES in South Africa has been decentralised to the provinces. During the course of undertaking this review, it proved difficult to obtain information from these authorities.

Table 28 Gross exports of crocodile products from South Africa, 1990-2003. (Data from UNEP-WCMC)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	18	721	50	155	4	72	18	544	3860	476	962	165	200	122
Bodies	1	1	1	1	20	6	6	5	1	0	5	1	4	11
Meat (kg)	0	1244	59	34,804	72,016	97,515	2113	157,450	135,419	232,368	213,791	175,794	153,265	221,084
Skin pieces	2	4450	8	3	1006	0	4	83	53	3046	1880	1837	1172	8615
Backskins	0	0	0	0	0	0	0	0	400	2600	3155	0	70	10
Bellyskins	0	0	0	0	0	12,647	0	0	0	1942	1275	1039	514	4655
Hornbacks	0	0	0	0	0	0	0	0	0	0	0	0	1000	144
Skins	525	3218	7048	19,999	28,768	16,640	12,988	18,413	8898	30,496	33,441	42,076	53,194	40,013
Trophies	1	3	3	18	6	21	14	11	29	24	39	19	32	67
Total Animals	**545**	**3943**	**7102**	**20,173**	**28,798**	**29,386**	**13,026**	**18,973**	**12,788**	**32,938**	**35,722**	**43,300**	**54,944**	**45,012**

South American and Caribbean Utilization Programs

Both *Caiman latirostris* and *Caiman crocodilius apaporiensis* were included in Appendix I of CITES by the 1973 Plenipotentiary Conference. The remaining *Caiman* subspecies (i.e. *crocodilus*, *fuscus* and *yacare*) were listed in Appendix II at the subspecies level when the Convention entered into force on 1 July 1975. The sub-species *C. c. yacare* is now considered a full species - *Caiman yacare*. *Crocodylus acutus* was listed on Appendix I in 1981 (CoP3).

Ranching programs in South America and the Caribbean involve 6 crocodilian species in 6 different countries. Three of these species have been transferred from Appendix I to Appendix II of CITES, but only one (*C. latirostris* in Argentina) is currently exploited on a commercial basis. On the other hand, *Melanosuchus niger* in Ecuador was transferred from Appendix I to Appendix II under the ranching resolution in 1994, with a zero quota and there has been no commercial production since then. There are also operations that combine the ranching of one species transferred from Appendix I to Appendix II, with the harvest of eggs of a species from Appendix II (*C. latirostris* and *C. yacare* in Argentina). Other countries like Brazil and Venezuela work exclusively with one Appendix-II species (*C. yacare* and *C. c. crocodilus*). Finally, Colombia is developing the first steps to ranch *C.*

c. fuscus and *Crocodylus acutus* but these are still in the experimental stage. Cuba's population of *Crocodylus acutus* was transferred to Appendix II in 2004 (CoP13, Thailand).

Argentina (*Caiman latirostris, Caiman yacare*)

The northern part of Argentina represents the southern-most limit of the distribution of the Broad-snouted Caiman (*Caiman latirostris*) and the Yacare Caiman (*Caiman yacare*). Both species are distributed throughout 9 provinces (Formosa, Santa Fe, Misiones, Corrientes, Entre Rios, Chaco, Santiago del Estero, Salta, Jujuy) in Argentina, although *C. yacare* occurs in higher densities above the 30° latitude and *C. latirostris* up to the 32° latitude.

Ranching of eggs, combined with restocking of the wild population, was considered the safest option to pursue with regard to minimizing the impact on the wild population. The ranching program was initiated on an experimental basis, but this is now fully implemented as a commercial option.

Listed in Appendix I of CITES, international trade in *C. latirostris* products was prohibited until the Argentine population of the species was transferred to Appendix II by the 10th Conference of Parties to CITES (Harare, 1997) for the purpose of ranching. In 1999 the ranching program for these two species was extended to include Chaco Province, and more recently, Formosa Province and Corrientes Province. *Caiman yacare* has been included in Appendix II since 1975.

Santa Fe Program:

This program started with an agreement between the Agricultural Ministry of the Province of Santa Fe and an NGO called "Mutual del Personal Civil de la Nación". This work started on an experimental basis in 1990, and became commercial in 1999.

The number of nests located varies from year to year, depending on weather conditions and other factors. For example, unusually high rainfall in 1998 due to El Niño conditions restricted access to nesting areas, and the total harvest was reduced. The proportion of nests located and that are harvested also varies from year to year [50.0 to 84.5% (1990-2002); Fig. 1], depending on weather conditions (e.g. extent of flooding) and other factors (e.g. predation). Between 1990 and 2002, 69% of nests located have been harvested (Fig. 1), resulting in the collection of 35,917 eggs that have produced 25,866 hatchlings (Fig. 2). Currently, the harvest is about 10,000 eggs per season.

Between 1999 and 2002, 50% of hatchlings were retained for commercial rearing, and 90% of hatchlings from the 2002/2003 season were retained (Fig. 3). From 1999-2002, some 4800 juvenile *C. latirostris* were retained for commercial rearing, but this almost doubled with 2002/2003 production (Table 29).

Numbers of nests is considered the main index of the population (Fig. 1, Table 29). Spotlight counts carried out in November-January provide an additional index of abundance over time. Recaptures of marked individuals, 9-10 years of age, indicate that they are now nesting successfully in the wild. They tend to be lighter in bodyweight than similar-sized caimans reared in captivity, but have similar clutch sizes to wild animals.

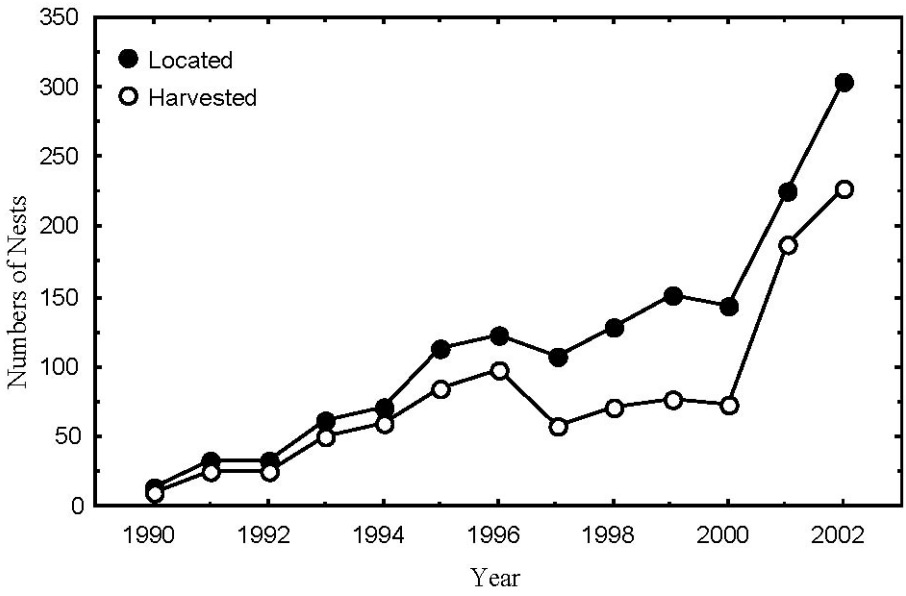

Figure 1 Numbers of *Caiman latirostris* nests located (closed circles) and harvested (open circles) in Santa Fe, Argentina, 1990-2002. 1990= 1990/91 nesting season, etc.

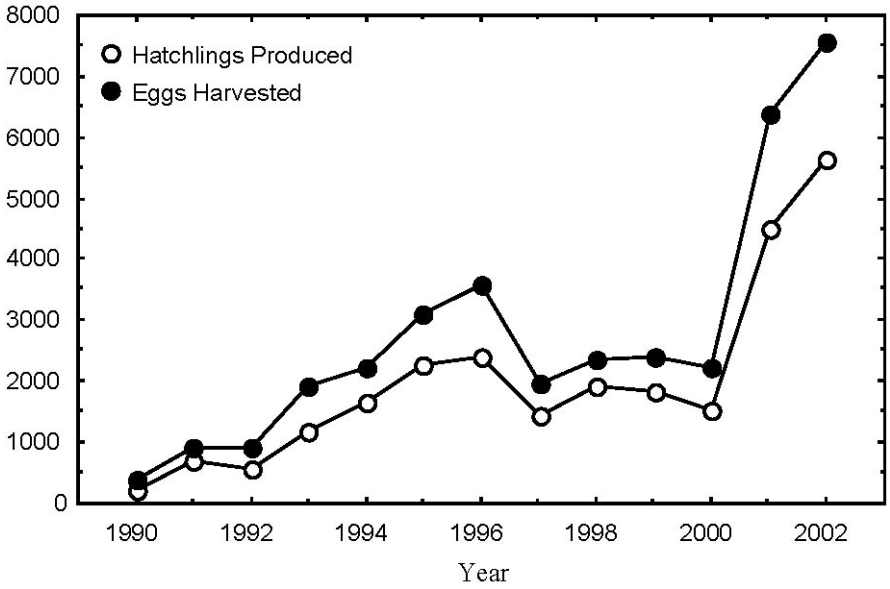

Figure 2 Numbers of *Caiman latirostris* eggs harvested (closed circles) and hatchlings produced (open circles) in Santa Fe, Argentina, 1990-2002. 1990= 1990/91 nesting season, etc.

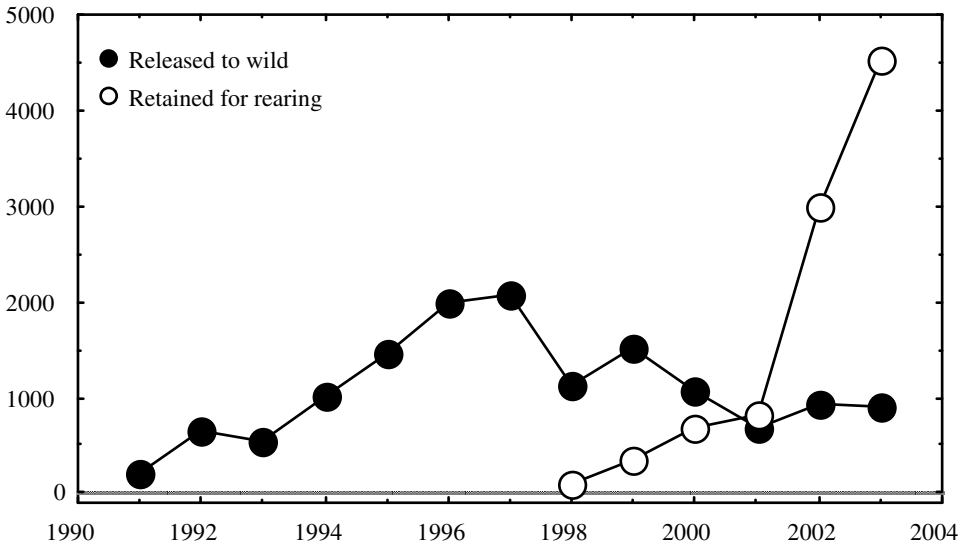

Figure 3 Numbers of *Caiman latirostris* yearlings (8-10 months of age) released back into the wild (closed circles) and retained for commercial rearing (open circles) in Santa Fe, Argentina. Animals were produced from eggs/nests collected the previous year (Figs. 1 and 2).

Table 29 Numbers of *C. latirostris* eggs harvested, juveniles released and commercial rearing in the Province of Santa Fe, Argentina.

Year	Nests harvested	Identified nests	Eggs harvested	Hatchlings produced	Number released	Retained for commercial rearing
1990/91	10	14	372	237	205	
1991/92	25	32	903	701	655	
1992/93	24	33	926	589	541	
1993/94	50	62	1936	1196	1022	

1994/95	60	71	2211	1646	1451	
1995/96	84	112	3120	2262	1980	
1996/97	97	123	3572	2394	2072	
1997/98	58	107	1954	1448	1123	100
1998/99	70	128	2347	1902	1521	333
1999/00	76	152	2397	1833	1058	667
2000/01	73	143	2227	1526	670	830
2001/02	188	225	6392	4494	927	2992
2002/03	228	304	7560	5638	915	4524
Totals	**1043**	**1506**	**35,917**	**25,866**	**14,140**	**9446**

Formosa Program:

The ranching program started in 2001, based on an agreement between the "Dirección de Fauna y Parques de Formosa" (Ministerio de la Producción), and a company called "Caimanes de Formosa SRL". The first wild egg harvest was carried out in 2002. The eggs of both species (*C. latirostris* and *C. yacare*) are harvested, as they live in the same areas, and it is not possible to distinguish between the nests of each species. Numbers of animals hatched and at one year of age at the rearing station are shown in Table 30.

Table 30 Stocks of *C. latirostris* and *C. yacare* in Formosa Province, Argentina.

Species	**Animals hatched in 2003**	**Animals (1 year old)**
Caiman latirostris (Yacare overo)	7689	5361
Caiman yacare (Yacare negro)	8229	1997
Totals	**15,918**	**7358**

Currently (2006), there are 42,000 animals in the rearing facilities, and the harvest of eggs was comprised 1400 nests of both species (about 43,000 eggs).

Chaco Program:

The project started in Chaco between the Dirección de Fauna y Parques del Chaco, Fundación Vida Silvestre Argentina and a cattle ranch ("El Cachapé"). As in Formosa, this project also involves the harvest of both *C. latirostris* and *C. yacare*. The first studies started here in 1996, and the results of the egg harvest since 1998 are in Table 31.

Table 31 Numbers of *C. latirostris* and *C. yacare* eggs harvested in Chaco Province, Argentina, 1998-2004.

Year	***C. latirostris***	***C. yacare***	**Total**
1998	242	96	338
1999	457	201	658
2000	1362	148	1510
2001	574	306	880
2002	1236	625	1861
2003	848	475	1323
2004	148	287	435
Totals	**4867**	**2138**	**7005**

Corrientes Program:

The program started in 2004, based on an agreement between the Dirección Provincial de Recursos Naturales of Corrientes Province, and a company called "Yacaré Porá S.A.." The first egg collection in the summer of 2005 reached 7000 eggs, but is expected to increase up to 18,000 eggs of both species in 2006.

Benefits to landowners and conservation value in Argentina:

Experience from Santa Fe Province indicated that most landowners are not interested in financial gain from the program. Rather, they appear more interested in the fact that people involved in the program work on their land and that they obtain good publicity from it as they are seen as an integral part of the conservation program. They have gained an understanding that the drying of swamps also impacts negatively on cattle production in the long-term.

The situation is different for the local inhabitants who, as employees of the cattle ranchers, benefit from the program through payments for each nest (US$7) that they locate and mark. Incentives have been created for the employees to not allow the killing of caimans, and to protect nesting areas, that in the past were regularly burned. Caimans now have a positive value to them.

National level:

The enforcement of the national and international regulations in Argentina is the responsibility of the Dirección Nacional de Fauna y Flora Silvestres, which is also the CITES Management Authority in the country. All three projects are supported by a regular monitoring system annually carried out by CSG members in the different provinces, through the standard night counts and the analysis of the annual egg (nest) collection.

This office is also in charge of the administration of the universal tagging system and the national tagging system. This is double tagging, the first one being applied at the slaughterhouse, and the second one being the CITES tag (if the skins are being exported).

Ecuador (*Melanosuchus niger*)

The Ecuador population of *Melanosuchus niger* (black caiman) was transferred to Appendix II for ranching in 1994, following a series of surveys of major rivers in the Amazon drainage of Ecuador indicating adequate densities of black caimans to support limited collection of eggs and hatchlings to stock a ranching operation. Because of uncertainties about the effectiveness of internal regulation and non-detriment determination that were not adequately described in the proposal or clarified by the MA, an export quota of zero was set pending demonstration of effective CITES implementation. Changes in the quota had to be approved by both the CITES Secretariat and the CSG. A ranch was established by a private investor on the Rio Napo and initially stocked with 300 hatchlings collected from the wild in 1995. Additional wild hatchlings were added to the ranch in 1999 and 2000. After initial anticipated technical difficulties of feeding and maintaining animals and some initial mortality, husbandry practices stabilised and adequate survival and growth of stock were achieved. By 2000 the first specimens reached a size suitable for the international market.

Unfortunately the MA was unable to establish regulations, implement inspection or establish clear procedures for controlling the facility or exporting products. The scale of the operation remained very small and by 2001 no commercial exports or domestic sales had been achieved and owners effectively abandoned further development of the facility. The remaining stock of approximately 150 individuals were maintained.

In 2001 an application was received from the MA to increase the export quota to 15 ranched specimens, to be exported alive for exhibit in European zoos. This was immediately approved by the CITES Secretariat with the supporting recommendation of CSG, however, to date this export has not occurred. In 2004 another request for a quota of an additional 50 live specimens was received from Ecuador. Due to the failure of the MA and the operation to satisfy the requirements for removal of the 1994 zero export quota, the CSG was unable to support this quota.

Ranching of *M. niger* in Ecuador must be acknowledged to have failed both economically and from a CITES implementation perspective. The scale and rate of the development of the enterprise did not generate economic incentives sufficient to promote adequate implementation of even the most basic requirements for regulation, management or non-detriment and no conservation value accrued to the wild population. The single commercial developer is reluctant to invest any further in a failed enterprise and all indications suggest that this situation is unlikely the change.

Cuba (Crocodylus acutus)

The Cuban population of *C. acutus* was transferred from Appendix I to Appendix II under Resolution Conf. 9.24 and Resolution Conf. 11.16 at the 13th Conference of the Parties to CITES in October 2004. Information presented here was obtained from Cuba's amendment proposal.

The National Enterprise for the Protection of Flora and Fauna (ENPFF), within the Ministry of Agriculture, is the responsible authority for *C. acutus* (the Ministry of Fishing Industries is responsible for *Crocodylus rhombifer*). The National Crocodile Program sponsored by ENPFF began in 1984, and between 1985 and 1993, six farms with *C. acutus* were established (Table 32). These farms began with ranched hatchlings collected from the Delta del Cauto Faunal Refuge (between 1987-1998). This is the only area proposed for ranching activities.

Although captive breeding occurs on two farms (Table 32), and F2-generation individuals have been produced, it is not promoted, but rather is viewed as an important source of hatchlings during periods when wild nesting is reduced due to natural climatic factors.

In June 1993, 7955 *C. acutus* were held on the farms (330 adults, 4750 juveniles, 2875 hatchlings). At the time of Cuba's proposal to CITES, about 2000 of the *C. acutus* held on the farms were of culling size.

Table 32 Crocodile ranches and farms in Cuba (2003) with the source of their stock. All farms are owned and operated by the State.

No.	Farm	Location	Ranching/Captive Breeding
1	Sabanlimar	Pinar de Río	R, CB
2	Morón	Ciego de Avila	R
3	Minas	Camaguey	R
4	Zabalo	Las Tunas	R
5	Virama	Granma	R
6	Manzanillo	Granma	CB

A reintroduction program has resulted in: some 400 animals being released into the Maximo Rive Faunal Refuge from the Minas Farm; over 700 animals being released into Delta del Cauto Faunal Park and Granma National Park from Zabalo Farm; and, 2000 released to protected areas in four Provinces from the Virama Farm.

Between 1980 and 1997, 26 taxidermied specimens were reported to have been illegally exported to the USA and Europe. By the end of 2004, no products had been exported from Cuba.

The wild population is monitored through spotlight surveys and nest counts. The numbers of eggs to be collected from the wild will be adjusted on the basis of monitoring results, and is not expected to exceed 40% of annual nest production in the designated area for ranching (see above). Eggs are incubated at facilities near the nesting area, and hatchlings are then transferred to the farms.

RANCHING AS A STANDARD MANAGEMENT OPTION FOR APPENDIX-II SPECIES: NOT UNDER RESOLUTION CONF 11.16

Countries such as Papua New Guinea developed ranching as a standard management option for their crocodiles (*Crocodylus porosus* and *C. novaeguineae*) before CITES came into force in 1975. When Papua New Guinea joined CITES and the two species were listed on Appendix II, the ranching program continued without change. It was obligated to meet the requirements of Article IV (*Regulation of Trade in Specimens of Species Included in Appendix II*), and was not affected by later resolutions enabling the transfer of species from Appendix I to Appendix II specifically for ranching. Since CITES came into force other nations with crocodilian species on Appendix II (eg Brazil) have also adopted ranching as a commercial management option. These programs do not need to adhere to the requirements of the ranching resolutions.

The different legal bases for ranching are exemplified in Australia. The original transfer from Appendix I to Appendix II in 1985 was for the purposes of ranching (Resolution Conf. 3.15), but in 1994, the recovered wild population was given an unqualified listed on Appendix II in accordance with the criteria for transfers between the Appendices (now Resolution Conf. 9.24 rev). Thus between 1985 and 1994 Australia had to meet the requirements of the ranching resolutions, but since 1994, it has not. The operation of ranching programs is similar, regardless of whether they are subject to the ranching resolutions or not, and the extent of reporting is not necessarily improved in programs subject to the ranching resolutions. Indeed, some of the ranching programs operating outside the ranching resolutions, such as in Australia and Papua New Guinea, provide

better reporting than many range States that have achieved an Appendix-II listing pursuant to the ranching resolutions.

Brazil (*Caiman yacare*)

Ranching in Brazil is restricted to *Caiman yacare* in the Pantanal region. Most of the ranches started in 1990, but because the USA is the principal importer of skins, the continued inclusion of the species in the US Endangered Species Act resulted in the bankruptcy of some operations. Following the Special Rule of the US Fish and Wildlife Service, the species was reclassified from "endangered" to "threatened" in 2001, and ranching activities in Brazil appear to be increasing. Currently there are 7 ranches with a total production of 55,000 animals per year. Although Mexico was an important destination for skins exported in 2003, available information suggests that the majority of production is now consumed domestically. For reasons that are not clear, Brazilian export permits that are issued for *C. yacare* skins apply the source code "C" rather than "R".

Colombia (*Crocodylus acutus, Caiman crocodilus fuscus*)

The commercial production of crocodilians in Colombia is based almost entirely on captive breeding. A small number of projects initiated in recent years are based on ranching, but these are aimed at benefiting local communities and are experimental in nature. These projects currently produce approximately 150 *Crocodylus acutus* (Appendix I) and several hundred *Caiman crocodilus fuscus* per year.

Venezuela (*Caiman crocodilus crocodilus*)

Even though the crocodilian utilization programs in Venezuela are based on hunting of wild adults, there is one operator in San Vicente who ranches *Caiman crocodilus crocodilus* for the production and export of live hatchlings as pets. Table 33 summarizes exports of the San Vicente ranching operation from 1992 to 2002. During the period 1992 to 1997, the principal skin markets were Japan and USA, but since 1998 they have been Taiwan and Thailand.

Table 33 Exports of San Vicente *C. c. crocodilus* hatchlings, 1992-2002.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Exports	10,350	23,940	18,340	11,450	12,180	3950	8790	5500	7200	11,100	10,512

Australia (*Crocodylus porosus, Crocodylus johnstoni*)

In the Northern Territory, ranching is based on *C. porosus* eggs and some *C. johnstoni* hatchlings. Eggs are collected on Government and private lands, Aboriginal and non-Aboriginal. Six farms purchase the eggs and/or hatchlings and a central goal of the program is that landowners receive payment for them. Five of the Northern Territory farms also have captive breeding and the two sources are mixed and not differentiated for export.

The six crocodile farms in Queensland rely on captive breeding for stock, but have also received ranched hatchlings and juveniles from the Northern Territory. In Western Australia some ranching of *C. porosus* eggs has been carried out since 1989 by one farm, but the two farms in the State rely largely on captive breeding with some ranched hatchlings and juveniles purchased from the Northern Territory.

Despite the original transfer of *C. porosus* from Appendix I to Appendix II being pursuant to Resolution Conf. 3.15, for ranching, since 1994 crocodile production in Australia has operated under an unqualified Appendix-II listing, thereby negating the need to satisfy the requirements of Resolution Conf. 11.16.

The results of extensive research are contained in a continuous series of Government reports and published papers demonstrating that the wild population in the Northern Territory has increased to close to its estimated carrying capacity under this management regime.

Annual production from Australia is currently about 15,000 *C. porosus* skins, with production of *C. johnstoni* having virtually ceased in recent years.

Papua New Guinea (Crocodylus porosus, Crocodylus novaeguineae)

In the late 1950s and 1960s the wild populations of crocodiles in Papua New Guinea were subjected to unrestricted harvesting for skins, and as a consequence were seriously depleted in many areas. Recognising that continued exploitation would threaten the remaining populations and undermine any potential for sustainable economic benefits, legal controls were implemented in 1966 through the Crocodile Trade Protection Act, which was further amended in 1974, 1981 and 1986.

In 1975, the law prohibited trade in crocodile skins in excess of 51 cm belly width, as a means of protecting adults in the wild population. This was a significant new step towards the implementation of a more refined national policy for the management of both crocodile species that emphasized ranching (Solmu 1996; Hollands 1982a cited in Hollands 1985).

The monitoring programs for *C. porosus* and *C. novaeguineae* are based on nest counts, and commenced in 1981 and 1982 respectively. Surveys were originally carried out annually for both species, during the peak of the nesting seasons. An egg harvest was incorporated into the survey program, as a means of increasing the value of nests and offsetting the costs of survey. The survey program is currently confined to the middle Sepik River region in the East Sepik Province.

Egg collection in Papua New Guinea is organized by agents acting on behalf of one large farm, and is undertaken with traditional landowners. Egg collectors receive both cash payments and substitute chicken eggs for crocodile eggs to maintain dietary needs. The program provides valuable incentives to local landowners to preserve crocodiles and their habitats.

Between 5000 and 10,000 eggs, hatchlings and juveniles, comprising approximately equal numbers of *C. porosus* and *C. novaeguineae,* were collected annually until 1995. Since 1995, collection and production has moved almost entirely to *C. porosus* because of the higher unit value of skins of this species. Regular surveys of nest densities confirm that population numbers are increasing with *C. porosus* in the collection areas (Fig. 4).

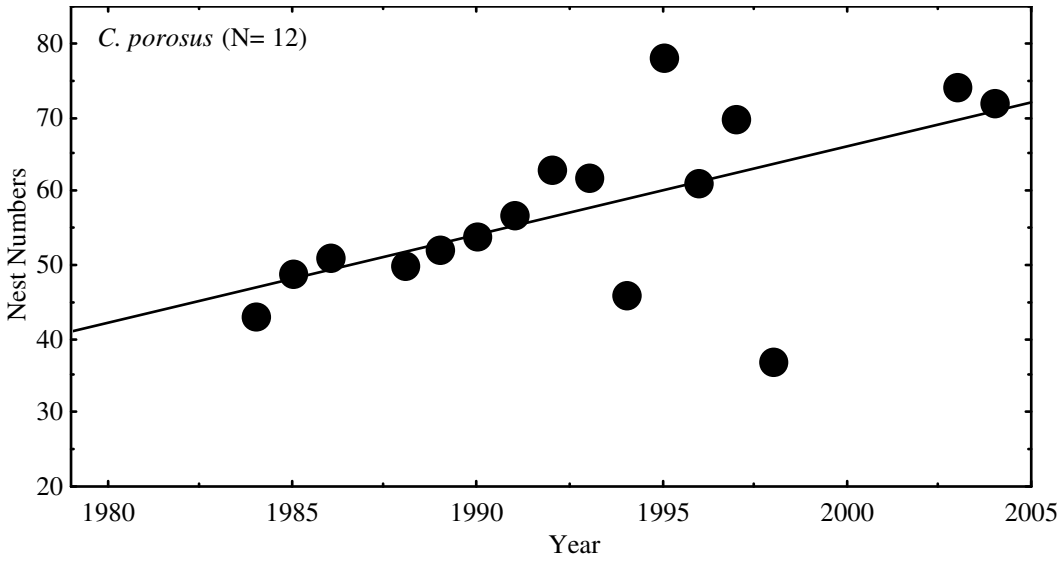

Figure 4 Regression relationship between numbers of *C. porosus* nests and year at 12 sites surveyed consistently since 1984 (from Solmu 2004).

USA (*Alligator missippiensis*)

Ranching of American alligators is conducted on approximately 120 facilities, primarily in Louisiana (55 licensed alligator farms/ranches in 2004) and Florida (14 active ranches in 2004) but with low numbers of facilities in Texas, Alabama, Georgia, Mississippi, Arkansas, North Carolina, Idaho and Colorado. Facilities in Idaho and Colorado operate outside the range of *A. mississippiensis*.

Each State collects data on eggs and/or hatchlings collected and skins exported. Total numbers of eggs collected from the wild is 300,000 to 400,000 per year in Louisiana alone (since 1995). In 2003, 49,041 wild eggs were collected in Florida, and 15,280 eggs were collected in Texas. Individual farms may combine ranched stock and captive-bred stock, although production through captive breeding is relatively minor (37,504 eggs produced in Louisiana and Florida in 2003).

Skins on any one farm may be derived from ranching, captive breeding or wild harvest programs. It is therefore difficult to differentiate the source of skins. This situation is further confused by the common practice of combining all skins from many farms under one permit and source code 'C' (Caldwell 2001). Utilization in all States is based upon regular and intensive surveys, population estimates and long-term population trends (Fig. 5) and the status of the species is absolutely secure throughout its range. Accurate inventories and estimates of mortality of ranch stocks are used to control ranches. Louisiana requires returns to the wild of a proportion of the ranched specimens.

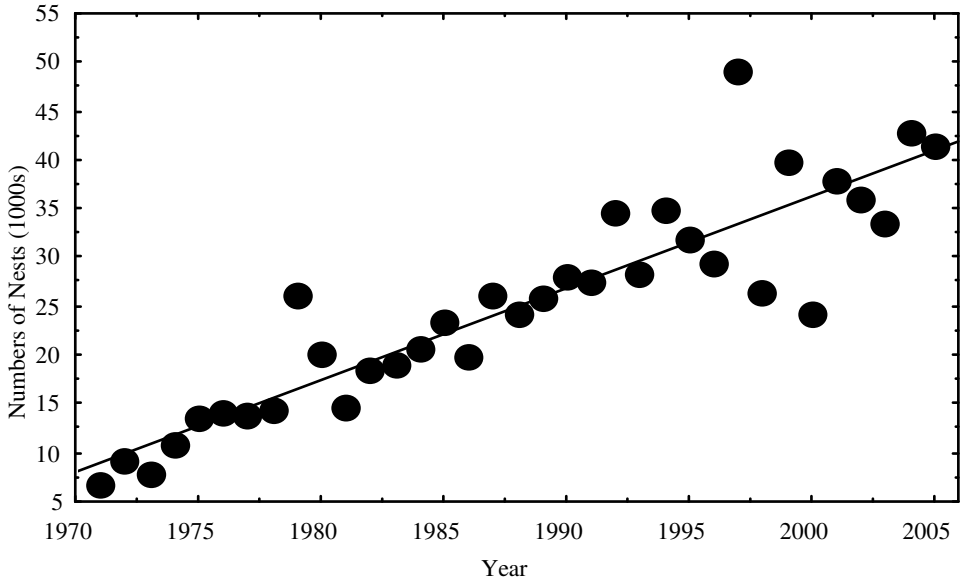

Figure 5 Numbers of Alligator mississippiensis nests in Louisiana coastal marshes, 1971 to 2005.

ANALYSIS AND CONCLUSIONS

General

Ranching is one of many different strategies for utilizing wildlife species. It is generally considered a "safe" strategy because it depends on harvesting the smallest or youngest animals (or even eggs) in a population, which relative to adults are numerically more abundant, are typically subject to higher mortality rates and are of less reproductive importance to the wild population in the short-term. Ranching has always been an available management option for using species listed in Appendix II.

In the late 1970s the Parties to CITES recognised that the conservation of some wild populations of species listed on Appendix I, which bans trade in wild-caught animals, would benefit from limited "safe" use and trade. For example, populations in the early stages of recovery which did not yet satisfy the criteria for an unqualified transfer to Appendix II, but were unlikely to be allowed to continue recovering and expanding unless people were receiving tangible benefits from them. Based on the results of a working group established by CoP2 (San Jose, 1979), CoP3 (New Dehli, 1981) adopted Resolution Conf. 3.15 on Ranching.

Resolution Conf. 3.15 provided a mechanism for transferring an Appendix-I species or population to Appendix II, if a clear conservation advantage could be demonstrated and if the utilization was largely restricted to ranching under an approved ranching program. To ensure that the criteria for transfer continued to be met after the transfer to Appendix II took place, the original ranching Resolution (Resolution Conf. 3.15) recommended that the Management Authority of the exporting Party shall include in its reports to the Secretariat, "… sufficient detail concerning the status of its population and concerning the performance on any ranching operation to satisfy Parties that these criteria continue to be met".

The requirement for a "conservation advantage" was central to the Parties supporting a mechanism that allowed the transfer from Appendix I to Appendix II outside of the normal criteria governing such transfers. "Conservation advantage" is thus retained in Resolution Conf. 11.16 as its primary justification - otherwise the transfer to Appendix II cannot be approved.

It is this requirement that is fundamentally different from ranching an Appendix-II species that is already on Appendix II. If ranching is adopted as a management option for an Appendix-II species, exporting Parties must

satisfy the provisions of Article IV of the Convention, which requires that the export is not detrimental to the survival of the wild population. Demonstrating no detriment is quite different from demonstrating a conservation advantage.

In adopting Resolution Conf. 3.15, the Conference of the Parties acknowledge that commercial trade is acceptable for an Appendix-I species if a conservation advantage can be secured, if the proposed mechanism of use is highly conservative and "safe", and if appropriate regulatory controls are in place. In 1981, when Resolution Conf. 3.15 was adopted by CITES, it represented a bold approach to the conservation of Appendix-I species. It was for this reason that high levels of reporting and oversight were included in the resolution, and made even more specific and stringent in subsequent but now invalid resolutions adopted at CoP5 and CoP6 (Buenos Aires, 1985 and Ottawa, 1987 respectively).

The information needs included in the current guidelines for reporting on ranching programs in Resolution Conf. 11.16 are:

"*RECOMMENDS that:*

a) annual reports on all relevant aspects of each approved ranching operation be submitted to the Secretariat by the Party concerned, and include any new information on the following:

i) the status of the wild population concerned;
ii) the number of specimens (eggs, young or adults) taken annually from the wild;
iii) an estimate of the percentage of the production of the wild population that is taken for the ranching operation;
iv) the number of animals released and their survival rates estimated on the basis of surveys and tagging programs, if any;
v) the mortality rate in captivity and causes of such mortality;
vi) production, sales and exports of products; and
vii) conservation programs and scientific experiments carried out in relation to the ranching operation or the wild population concerned."

Based on the data from 11 countries operating ranching programs under the provisions of Resolution Conf. 11.16 (or its predecessor resolutions) and 4 additional countries operating ranching programs for species with an unqualified Appendix-II listing (who are not obligated to comply with them) it is apparent that no Party complies fully with the reporting requirements of Resolution Conf. 11.16 (Table 34).

Table 34 Summary of compliance with reporting requirements of Resolution Conf. 11.16.

Information requirement	Parties with data (N = 15)	% of Parties in compliance
i. wild status information	9	60%
ii. specimens collected annually	11	73%
iii. % of production collected	3?	20%
iv. animals released	3 (not applicable to 10)	87%
v. ranch mortality data	7	47%
vi. production data	12	80%
vii. conservation progress	5	33%
Number of ranches	180 (approximately)	

Parties administering ranching programs pursuant to Resolution Conf. 11.16 (or Resolution Conf. 3.15) vary greatly in the types and extent of information provided to the CITES Secretariat, so there is utility in assessing what levels of compliance may be acceptable. That is, levels below which intervention may be required to ensure that ranching is indeed providing conservation benefits to the wild population.

Only three Parties attempt to estimate what proportion of the total wild production is being harvested under their ranching programs. In these cases, the estimates are based on population and production estimates, which have wide variances and largely unknown accuracy. This appears to be a difficult parameter to estimate, even in countries where research resources are readily available. The easiest data to obtain and report are those directly linked to the operation of the ranching program, such as numbers of eggs collected and numbers of skins produced and exported. Adequate population data are reported for only 60% of Parties, and progress with

conservation reported by only 33% of Parties. These results most likely reflect deficiencies in reporting rather than any declines of conservation significance in wild populations, but field data are required to verify this.

The following section examines more closely the purposes and practicalities of reporting in an effort to better understand the variability in compliance with the reporting requirements of Resolution Conf. 11.16.

Purposes of reporting

The reporting requirements of Resolution Conf. 11.16, which were already embodied as such in the original Resolution Conf. 3.15, were a response to three perceived insecurities about the opening of international trade, through ranching, in what would otherwise be an Appendix-I species in which trade in wild-caught specimens was prohibited.

1. Firstly, there was a concern that the higher requirement of "primarily beneficial", referred to above as "conservation advantage", would need to be monitored continually in order to ensure it remained a priority.
2. Secondly, there were explicit concerns that ranches could serve as conduits for Appendix-I specimens taken illegally from the wild to enter legal international trade.
3. Thirdly there was a perceived need already detected by the Parties to the Convention between the 1st and 2nd Conference of the Parties to distinguish properly between rearing wild-collected animals in captivity and real captive breeding. Before the adoption of Resolution Conf. 2.12 at the CoP2, which defined for the first time what captive breeding really means, a number of Parties considered the rearing of animals in a controlled environment as captive breeding and traded these animals or their products under the exemptions of Article VII(4) of the Convention. At CoP2 it was recognized that this might be a problem, for at that time there were already operational ranching operations involving populations of Appendix-I species that could withstand a certain level of exploitation, and a committee was set up to develop a proposal for CoP3 (Wijnstekers 1992).

The detailed reporting requirements, together with the extensive product labelling provisions developed in Resolution Conf. 5.16 and subsequent revisions, were intended to make the operation of ranches as transparent as possible so that laundering through ranches would be both difficult to conduct and easy to detect. Reporting provisions i) to iv) and vii) generally address the problem of maintaining a conservation benefit, whereas provisions ii), v) and vi) focus on providing documentary evidence making illegal trade through ranches more difficult.

In the two decades since these principles and conditions were first articulated by CITES, ranching has become a widespread and successful management strategy for crocodilians. In the same period, Parties have greatly modified their approach to the use of wild species and the mechanisms by which the Appendices to the Convention are amended [Resolution Conf. 9.24 (Rev CoP13)]. In keeping with the objective of simplifying the implementation of the Convention, by reducing the reporting burden on Parties, it is appropriate to assess whether or not all the reporting requirements remain necessary and the extent to which those that are required are able to be incorporated into other statutory reports, such as the Biennial Report, rather than needing to be reported annually.

Problems with the reporting requirements for ranching under Resolution Conf. 11.16

a. General

The reporting requirements for ranching, when a species has been transferred from Appendix I to Appendix II pursuant to a ranching resolution (Resolution Conf. 11.16), have rarely, if ever, been fully complied with. This suggests that there are some fundamental problems with the requirements that need to be addressed. The principal factors militating against full compliance appear to be that many range States lack the technical, financial and personnel resources needed to obtain the detailed, long-term population data required. However, even if the resources are available, crocodiles are often perceived as being a lower priority than more charismatic species (e.g. large mammals), to which the available resources are often preferentially allocated. Detailed reporting to CITES is often perceived as an administrative burden, without any feedback loop. As such it provides limited tangible benefits for wildlife managers or decision-makers in range States, and tends to be viewed as a cosmetic exercise.

Even Parties implementing successful ranching programs, widely recognised as meeting the conservation objectives of Resolution Conf. 11.16, appear unwilling or are unable to submit the required reports. In order to be useful, and hence justifiable, any reporting must have a clearly defined purpose if the people responsible for making the reports are to maintain their interest. If no action is taken on reports, or countries that produce detailed reports are treated the same as those who produce superficial reports or do not submit any report, then

obvious problems develop. The scope of information required must ideally balance simplicity and ease of preparation with effectiveness at achieving its purpose. In the case of ranching pursuant to a ranching resolution, conservation benefit and the legality of exports are the two main factors the Parties have an interest in. That some ranching programs are subject to Resolution Conf. 11.16, with special reporting requirements, and others are subject only to the reporting requirements of Article IV, may add further confusion about the utility of full compliance.

b. Specific

Each of the following seven types of information required in reports to the CITES Secretariat, if ranching is being pursued in accordance with the ranching resolutions, has different inherent difficulties.

i) Status of the wild population;

This remains the most basic requirement for ranching programs that is also now incorporated into monitoring provisions of the general down-listing process pursuant to Resolution Conf. 9.24 (Rev. CoP13). Recognition of the effectiveness of adaptive management regimes, that are responsive to observed changes in population status are fundamental to species management and conservation. Information on the status of the wild population is also the most onerous, expensive and time-consuming activity in managing any wildlife population. Parties need flexibility to develop monitoring that suit their needs and capacity. There is also a generally accepted balance between the intensity of use (e.g. removal of specimens for ranching) and level of resolution required in monitoring the response of the harvested population(s). Where only a small proportion of the overall population is being used, monitoring should be able to be less frequent with lower levels of precision. When a high proportion of a population is harvested, a greater level of resolution is required and monitoring may need to be more intense and precise. This reporting provision needs to be retained as a basic management tool for Parties and a necessary component of reports to CITES Secretariat. Resolution Conf. 11.16 only requires reporting of “new” information. Therefore if monitoring is not annual, reports only need reflect new and updated information, trends and estimates.

ii) Number of specimens (eggs, young or adults) taken annually from the wild;

Information on this aspect of ranching appears to be relatively straightforward and readily obtainable. Each ranching operation, as a condition of their licence, should be required to record and maintain this information. Centralizing and reporting these data should be relatively simple. Some difficulty may result from the seasonal nature of harvesting specimens (e.g. occurring across the transition from one calendar year to the next) but adjustments to accommodate this problem are routine in accounting and other reporting processes and the same simplifying mechanisms can be used. The number of specimens removed from the wild, considered together with specimens entering trade, and the status of the population, represent the minimum number of parameters required to assess the operation of a program.

iii) Estimate of the percentage of the production of the wild population that is taken for the ranching operation;

This is theoretically possible by combining information types i) and ii) above, but in practice is neither easy nor particularly valuable. Many monitoring programs use relative indices of abundance and do not estimate absolute numbers. Percentage extraction of specimens may be the basis of sustainable use programs but they are more often in the form of goals based on computer and mathematical population simulations, rather than real prescriptions for use. In theory, if monitoring is sufficiently precise, then the response of the population to any extraction rate will become quickly evident. Therefore, provided good reliable information on the status of the harvested population(s) is obtained, this reporting requirement is not necessary.

iv) Number of animals released and their survival rates estimated on the basis of surveys and tagging programs, if any;

This provision only applies in cases where re-introduction is part of a ranching program. Although many government management agencies retain the right to obtain captive ranched stock for return to wild, this has rarely occurred. Furthermore, there is no agreement on the necessity or effectiveness of reintroduction programs. At least some information indicates that density-dependent factors may compensate for the reduced recruitment of hatchlings that occurs with an egg harvest program. There is also an increasing awareness of the risks of introducing foreign pathogens and genes into the wild population through re-introduction programs. Many successful ranching programs satisfy the requirement of being ‘primarily beneficial’ in terms of population stability or increase, habitat protection and enhanced public acceptance of maintaining crocodiles as a functional component of wetlands, without needing to augment or compensate the wild population(s) with ranched crocodiles. In terms of evaluating the relationship between a ranching program and the wild

population(s) upon which the program depends, this reporting requirement can be treated as optional and more a matter of national evaluation of the program.

v) Mortality rate in captivity and causes of such mortality;

This provision, combined with ii) above and vi) below, enables individual ranching operations to be held accountable for stock held captive on the premises, as well as providing an effective method to evaluate the overall performance of individual ranches. Major discrepancies in the numbers reported may indicate the illegal introduction of wild specimens into trade. This information is essential for the Management Authority and enforcement agencies of a Party to ensure compliance by individual operations. It also assists the Scientific Authority in making a non-detriment finding under Article IV of the Convention. These data should continue to be collected, however their principal utility resides at the national level. The Management Authority should manage these data, on the basis that they are made available on request to the CITES Secretariat in the event there is a need to undertake a more detailed review (or audit) of a program or particular operation.

vi) Production, sales and exports of products;

Production and export information is routinely collected for other purposes (e.g. permit issuance, taxation, licensing, trade statistics). Common problems with this information are lack of uniformity of reporting units, timeliness and distortion to avoid taxation. When used in conjunction with ii) and v) above, these data assist evaluating compliance by an individual ranching operation compliance to the resolutions. The utility of sales data is not immediately apparent and not relevant to ensuring the two underlying principles of Resolution Conf. 11.16 are achieved.

vii) Conservation programs and scientific experiments carried out in relation to the ranching operation or the wild population concerned.

The purpose of this information is not clear, as much of the work undertaken to satisfy some of the preceding information requirements can reasonably be described as elements of a conservation program. Furthermore, there is no statutory requirement to undertake such programs, and the presence or absence of this information does not assist the Secretariat or the Standing Committee address non-compliance. Some experiments undertaken to improve production may be regarded as “commercial-in-confidence”, in which case it would be an unrealistic expectation for the results to be divulged. However, information of this nature does provide a Party with the opportunity to showcase successful conservation action. Where applicable, this information would be, more appropriately, reported in refereed literature, internal reports, press and media, etc.

Although Resolution Conf. 11.16 provides a mechanism by which a ranched population may be transferred back to Appendix I in cases (presumably serious) of non-compliance with the provisions of the Resolution, the seriousness of non-compliance circumstances that would “trigger” such action are not clear and open to interpretation. Both the CITES Secretariat and the Standing Committee, in consultation with the Party concerned, have roles in this process and some guidance would appear warranted.

Recommended simplified reporting requirement

From these analyses and considerations, the current reporting requirements on ranching operations that constitute a section of the annual report by a Party, can be reduced and simplified as follows:

i) Status of the wild population concerned. Established by monitoring at an appropriate frequency and with sufficient precision to allow recognition of changes in population trend due to ranching.

ii) Number of specimens (eggs, young or adults) taken annually from the wild; and,

iii) Production and exports of products.

This information is sufficient to assist Parties to evaluate their own programs, and allow the CITES Secretariat to monitor ranching programs sufficiently to activate the non-compliance provisions of Resolution Conf. 11.16 if problems arise. Parties should however be reminded that this reduced reporting is an obligatory requirement.

Information on the following topics would assist Management Authorities to assess the effectiveness of their own programs, and in conjunction with the information in i-iii) above, to effectively regulate ranching operations as well as facilitating non-detriment findings by the Scientific Authority. Provided this information is made available on request to the CITES Secretariat, there should be no requirement for it to be transmitted annually:

iv) Estimate of the percentage of the production of the wild population that is taken for the ranching operation;

v) Number of animals released and their survival rates estimated on the basis of surveys and tagging programs, if any;

vi) Mortality rate in captivity and causes of such mortality; and,

viii) Conservation programs and scientific experiments carried out in relation to the ranching operation or the wild population concerned.

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Annex 1 - Terms of Reference – CSG Review of Crocodile Ranching Programs

1. Compile a list of all species and populations that were downlisted pursuant to all proposals that included ranching under any Res. Conf. for each CSG Region (ranching proposals and ranching under unqualified Appendix-II listing).

2. Compile the history of operations subsequent to downlisting and the current status of all ranching operations.

3. Review crocodile management at a national level subsequent to downlisting.

4. Review the status of species and populations in terms of the criteria of Res. Conf. 9.24 (Rev CoP12) and Res. Conf. 11.16, and examine the relationship with ranching and the sustainability of programs where ranching is combined with a wild harvest.

5. Compile and harmonize national accounts for review and discussion by CSG in May 2004

Annex 2

Letter to CSG Chair concerning ranching and exports from Madagascar (dated 18th April 2005)

18 April 2005

The Chairman
IUCN/SSC Crocodile Specialist Group
PO Box 530 Sanderson, NT 0813
Australia.

Dear Prof. Webb

In my capacity as the Regional representative of the CSG in Africa, I would like to bring to your attention certain facts concerning crocodile producers from Madagascar, and their exports of crocodile skins.

I most recently visited Madagascar between 28th April and 8th May 2004 and during this time I was able to visit the premises of both of the registered commercial crocodile producers, namely Croco Ranch II and Reptel sarl BPon Wednesday 5th May 2004. There are a number of other establishments in Madagascar that hold a number of captive crocodiles but these are not active in either egg collection or in the production or export of skins.

During each of these visits I was accompanied by the owner or manager (Mrs Aline Ralimanana and Mr. Daniel Bessaguet, respectively). I was also accompanied by representatives of the Ministry of Environment, Water & Forests (Directorate of Water& Forests)(MEWF), which is the CITES Management Authority for Madagascar. The representatives were Mrs Rabesihanaka Sahoundra (Chef de Service CBD) and Mrs Malalationa Randriabao (Chef de Division CBD). A representative of the CITES Scientific Authority (Biology Department of the University of Antananarivo), known only to me as Mr Felix, but acting on the instructions of his superiors, Dr Rasamo Rasamizanamy and Mrs Olga Ravoahangimalala Ramilijaona also accompanied the visits as did Mr J. Ramandimbison, an active CSG member resident in Madagascar.

I would like to focus attention on the observations made during the visit to Croco Ranch II. This is a crocodile ranch in terms of CITES definition of "ranching" as only two adult animals are held that do not contribute eggs laid in captivity. All of the eggs for this ranch are collected from the wild. At the start of the visit Mrs Ralimanana indicated that their total stock at that time was approximately 1000 animals. At the time of the visit neither Mrs Ralimanana nor the representatives of the MA were able to produce any data or stock records from Croco Ranch II and the MA staff claimed the stock record book was lost. A partial stock record for this ranch was later shown to me by MA staff.

The facilities and stock observed during my visit to the ranch comprised;

- 6 yearling pens – empty at time of visit, apparently awaiting stocking with animals at 18 months old
- 2 rearing pens (approx. dimensions 12 x 10m and 12 x 15m including about 40% water area) containing a total of 70 animals (estimated from partial count) between 1.5 and 2.0m TL. These were said to be animals of three or more years old and that animals had been slaughtered from these pens recently.
- 3 pens (approx. dimensions 10 x 20m including 30% water area) containing 80, 90 and 95 animals respectively (estimated from partial counts) of 1.0 to 1.2m TL
- 1 pen (roughly circular 15m diameter) containing 85 animals of between 1.0 and 1.8m TL
- 1 pen (approximately 17 x 12m) containing 2 adult animals (said to be 1 male and 1 female)
- a hatchling/yearling shed comprising 13 heated pens. At the time of the visit only 7 pens were occupied, each with approximately 20 small yearling crocodiles
- an incubator containing 23 wooden nest boxes designed for medium free incubation and 8 post-hatching boxes.

The ranch is said to operate another incubation and hatchling facility at Diego in northern Madagascar and that stock are periodically transferred to main facility outside Antananarivo. No stock record for this second facility was available.

The total number of animals seen on this ranch, of a size suitable for slaughter during the remaining months of 2004, was therefore 420, with a further two adult animals and approximately 140 yearlings.

A stock of raw, crust and tanned (vegetable tannin and coloured) skins were observed in the skins store/cold room at Croco Ranch II. This included a small number of tanned and tagged skins originating from 1998 and 2000. Although these were not counted the owner indicated that there were between 600 and 700 raw salted skins of between 25 and 35cm belly width in the cold store from a recent slaughter of ranch stock. A sample of these was examined and nothing was observed that would identify their origin as being either ranched or wild.

Considering the total amount of pen space and other facilities at Croco Ranch II, as well as the records of wild egg collection by Croco Ranch II for the years 1992 to 1999, which show a maximum collection of 3119 eggs, I estimate that this ranch could produce up to 1500 relatively small skins each year.

During my visit I was provided by MEWF with a summary of the numbers of crocodile skins and related products exported from Madagascar by each of the companies for the years 2002 and 2003. I have subsequently attempted to reconcile these figures with those obtained from WCMC (see Table below). This analysis is complicated by the fact that Japan has not reported CITES listed imports for several years. This analysis therefore assumes that all of the exports reported by Madagascar to CITES Secretariat were indeed exported. Independent confirmation of the number of exports made by Reptel sarl BP between 2000 and 2003 have been obtained and the exports from Croco Ranch II calculated by subtraction.

Year	Total Exports reported by MG (reported to WCMC)	Ranched & farmed exports – Reptel (reported by Reptel)	Ranched skin exports – Croco Ranch II (calculated by subtraction)	Ranched & farmed exports – Croco Ranch II (reported by MEWF in May 2004)	Wild skins exported (reported to WCMC)
2000	6583	4000	2583		0
2001	9400	8700	700		530
2002	6974	6015	953	723	550
2003	7300	4550	2750	1400	700

This table highlights some discrepancies;

- the exports from Croco Ranch II reported by MEWF in May 2004 are less than those calculated by subtraction for 2002 and 2003
- exports in excess of 2500 skins per year from Croco Ranch II have occurred twice between 2000 and 2003. This is difficult to reconcile with the estimated production capacity of this establishment
- exports of wild skins have regularly exceeded the CITES export quota of 500 set in 2000
- the current reporting system does not include commercial exports of articles derived from crocodile products ("articles derive"). These total 3394 items from the two producers in 2002 and 2003
- the exports reported by Reptel do not reconcile exactly with the exports indicated from Reptel indicated by MEWF in May 2004.

It is also worth noting that the EU ban on imports of wild skins from Madagascar since 2000 (Jelden *pers.comm.*) does not appear to be effective as imports have been reported by France and Italy.

It has been reported that Croco Ranch II made exports of at least 1670 skins in the last six months of 2004. This exceeds the estimated total number of slaughter size stock on the farm and skins in stock when the farm was visited in May 2004 by 550 skins.

Your attention is also respectfully drawn to several other issues concerning the management of crocodiles in Madagascar highlighted in the 2004 Review of Crocodile Ranching Programmes.
Yours sincerely

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