

# Captive Breeding of Chelonians in Hainan Province, China

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Photos by Ting Zhou



View of a Hainan turtle farm



Chelonians have survived on Earth since the age of dinosaurs. For thousands of years, turtles have been highly valued in human cultures as sources of food and medicine, and to a lesser extent as pets. Today these primitive reptiles are also of great value for scientific research. In China, recent economic and political reforms have resulted in an ever-increasing demand by Chinese consumers for edible and medicinally valued turtles. More money is available to buy them, the infrastructure is better for getting them to the markets, and China has opened its doors to international commerce.

Softshell turtles have been bred on farms in China since the mid 1970s; hardshell turtles, since the late 1980s. Such captive-breeding efforts produce supplies of turtles for a variety of uses, relieving collecting pressure and thereby reducing the threat of

extinction faced by some wild turtle populations. Under the present circumstances, turtle farming could be seen as a conservation tool. With funding from the State Forestry Administration of the People's Republic of China, 11 turtle farms in Hainan Province were surveyed from February to November 2004.

Hainan, China's smallest and southernmost province, is an island in the South China Sea, separated from the mainland by a narrow strait. It has a land area of about 33,600 square kilometers, and a warm, wet, tropical climate. The island is rich in wildlife and has a long cultural history.

The turtle farms surveyed are generally located in the outskirts of cities — three in Haikou, three in Wenchang, and one each in Dongfang, Wuzhishan, Lingshui, Tunchang, and Chengmai. Four of the farm owners are from Hainan, two

from Taiwan, two from Shanghai, one from Hunan Province, and one from Guangdong Province, China; the owner of one farm is from Thailand. Eight of the farms are larger than 6 hectares (14.8 acres); the other three farms are smaller than 1 hectare (2.5 acres). The largest single breeding area on any of the 11 farms is 40 hectares (98.8 acres). The greatest number of turtle species maintained on any one farm is 19.

Breeding turtles on farms began on Hainan Island in 1988 (the same year the island became a separate province), working with only one species, the Chinese softshell, *Pelodiscus sinensis*. When this species declined in value, other species were brought to the farms to be bred. Currently 34 species are being farm-bred in Hainan Province. Nine of these are listed as CITES Appendix II species, five as CITES Appendix III and two are Class II of



Harvesting eggs from nesting areas



Ramps leading into nesting structure



Wooden incubation boxes



Crates full of incubating eggs



Plastic incubation tubs

China's list of National Protected Animals. Of the 34 species, 29 are hardshell turtles (eight of which are native to China) and 5 are softshell turtles (two of which are native to China). Of the 34 species, 29 are aquatic and 5 are considered semi-aquatic. No tortoises were found in this survey. No consistent or managed hybridization was noted.

We found the following species kept in greatest numbers on Hainan farms (numbers of adults in 2004): *Pelodiscus sinensis* (423,700), *Trachemys scripta elegans* (325,000), *Chinemys reevesii* (26,900), *Ocadia sinensis* (21,600), *Mauremys mutica* (11,400), and *Apalone spinifer* (11,000). To date, Hainan turtle farms have successfully produced first-generation (F1) captive-bred offspring of 15 species (seven of which are native to China); second-generation (F2) offspring of seven species; and third-generation (F3) offspring of three species. Most of the hatchlings are sold, but some are retained to eventually replenish breeding stock.

Occasionally new wild-caught animals are brought in to supplement the population.

Hainan turtle farms produced the most offspring of the following species (numbers for 2004 alone): *Pelodiscus sinensis* (25,024,000), *Trachemys scripta elegans* (3,350,000), *Ocadia sinensis* (226,100), and *Chinemys reevesii* (213,000).

Each turtle farm in Hainan has its own variety of five different types of breeding setups:

- Outdoor dirt pond with community feeding. This is usually the main setup, housing large numbers of turtles of the same size/age of a single species, and suits the breeding of softshell and most aquatic hardshell turtles.

- Outdoor cement pond with community feeding. The cement pond

enhances the feeding ability of aquatic hardshell, softshell, and semiaquatic turtles, making food more visible and accessible as it sinks to the bottom.

- Outdoor fish and turtle pond with community feeding. This setup is suitable for all aquatic turtles. The fish help



Locations of Hainan turtle farms

clean the water by eating turtle feces. Some of the fish are eaten by the turtles, and remaining fish are eventually harvested as a second crop from the same pond.

- Indoor glass-house (greenhouse). Suited to more controlled or individual feeding, this method is used mainly for high-value species. Hatchlings are kept in any of a variety of setups (from plastic tubs to small cement ponds) within the structure.

- The owner's family or workers' private home courtyard breeding setup, with individual feeding. This breeding arrangement, used for small groups of juveniles and adults, enhances human appreciation of the turtles. Although usually only temporarily, these turtles may be thought of as pets.

Considering the growth in volume of turtle production already achieved on the 11 currently functioning Hainan farms, numbers should continue to increase in 2005. *Pelodiscus sinensis* alone could reach a record 30 million hatchlings. *Trachemys scripta elegans* could increase to 7 million (twice that of 2004), and *Chinemys reevesii* is expected to reach 400 thousand offspring. Breeding of the "high-end" turtles, such as *Cuora trifasciata*, is also expected to increase.

The land and climate of Hainan Province suits it to turtle breeding, and the industry is certain to continue booming there. In addition, cap-

Table 1. Legal status, origin, and lifestyle of species found in Hainan turtle farms, 2004. (c.b. = captive born, f.b. = farm bred, w.c. = wild caught, ★ = aquatic, ● = semiaquatic)

No.	Scientific name	Legal protection		Current sources for supplying farms	Lifestyle
		CITES	China		
1	<i>Apalone ferox</i>			c.b. & w.c., USA	★
2	<i>Apalone spinifer</i>			c.b. & w.c., USA; f.b., China	★
3	<i>Carettochelys insculpta</i>	II		c.b. & w.c., Indonesia	★
4	<i>Chelodina siebenrockii</i>			c.b. & w.c., Indonesia	★
5	<i>Chelus fimbriata</i>			c.b. & w.c., South America (via Chinese markets)	★
6	<i>Chelydra serpentina</i>			c.b., f.b. & w.c., USA; f.b., China	★
7	<i>Chinemys reevesii</i>	III		f.b., China	★
8	<i>Chrysemys picta bellii</i>			c.b. & w.c., USA; f.b., China	★
9	<i>Cistoclemmys flavomarginata</i>	II	II	f.b. & w.c., Taiwan & mainland China	●
10	<i>Cuora trifasciata</i>	II		w.c., Vietnam; f.b. & w.c., China	●
11	<i>Cycllemys dentata</i>			w.c., Vietnam	★
12	<i>Emydura subglobosa</i>			w.c., Indonesia	★
13	<i>Emys orbicularis</i>			w.c., Europe & Russia (via Chinese markets)	★
14	<i>Graptemys kohnii</i>			c.b., f.b. & w.c., USA	★
15	<i>Graptemys nigrinoda</i>			w.c., USA	★
16	<i>Graptemys pseudogeographica</i>			f.b. & w.c., USA (via Chinese markets)	★
17	<i>Heosemys grandis</i>	II		w.c., Vietnam; f.b., China	★
18	<i>Kinostemon odoratum</i>	II		w.c., USA; f.b., China	★
19	<i>Kinostemon subrubrum</i>			w.c., USA; f.b., China	★
20	<i>Macrochelys temminckii</i>			f.b. & w.c., USA	★
21	<i>Malaclemys terrapin</i>			f.b. & w.c., USA; f.b., China	★
22	<i>Mauremys mutica</i>	II		w.c., Vietnam; f.b. & w.c., China	★
23	<i>Ocadia sinensis</i>	III		w.c., Vietnam; f.b., China	★
24	<i>Palea steindachneri</i>	II	II	f.b. & w.c., China	★
25	<i>Pelodiscus sinensis</i>	III		f.b., China	★
26	<i>Plistemys platycephala</i>			w.c., South America (via Chinese markets)	★
27	<i>Podocnemis unifilis</i>	II		w.c., South America (via Chinese markets)	★
28	<i>Pseudemys neisoni</i>			f.b. & w.c., USA	★
29	<i>Pyxisia mouhotii</i>	II		w.c., Vietnam	●
30	<i>Sacalia quadriocellata</i>	III		w.c., Hainan, mainland China, Vietnam; f.b., China	★
31	<i>Terrapene carolina triunguis</i>	II		w.c., USA	●
32	<i>Terrapene ornata ornata</i>	II	II	w.c., USA	●
33	<i>Trachemys scripta elegans</i>			f.b. & w.c., USA; f.b., China	★
34	<i>Trachemys scripta scripta</i>			f.b. & w.c., USA	★



Plastic tubs full of hatchlings



Preparing and feeding frozen fish



Table 2. Total numbers of turtles on all Hainan turtle farms in 2004. Greatest numbers of adults and subadults (some farmers counted these together) at any given time, and total numbers of hatchlings born during the year.

No.	Scientific name	Adults	Subadults	Hatchings	F1	F2	F3
1	<i>Apalone ferox</i>	—	1,000	200	*		
2	<i>Apalone spinifera</i>	11,000	—	—			
3	<i>Carettocheilus insculpta</i>	—	700	—			
4	<i>Chelodina siebenrockii</i>	—	2,000	—			
5	<i>Chelus fimbriata</i>	5	—	12	*		
6	<i>Chelydra serpentina</i>	1,300	—	3,100	*		
7	<i>Chinemys reevesii</i>	26,900	—	213,000	*	*	*
8	<i>Chrysemys picta bellii</i>	300	—	350	*		
9	<i>Cistoclemmys flavomarginata</i>	2,070	—	220	*		
10	<i>Cuora trifasciata</i>	225	—	110	*	*	
11	<i>Cyclemys dentata</i>	2	—	—			
12	<i>Emydura subglobosa</i>	—	80	—			
13	<i>Emys orbicularis</i>	20	—	5	*		
14	<i>Graptemys kohnii</i>	—	2,000	—			
15	<i>Graptemys nigrinoda</i>	—	200	—			
16	<i>Graptemys pseudogeographica</i>	5	2,000	—			
17	<i>Heosemys grandis</i>	160	—	—			
18	<i>Kinostemon odoratum</i>	90	10	98	*		
19	<i>Kinostemon subrubrum</i>	50	—	—			
20	<i>Macrolemys temminckii</i>	—	800	—			
21	<i>Malaclemys terrapin</i>	100	—	50	*		
22	<i>Mauremys mutica</i>	11,400	—	16,100	*	*	
23	<i>Ocadia sinensis</i>	21,600	—	226,100	*	*	
24	<i>Palearia steindachneri</i>	1,950	200	6,000	*	*	
25	<i>Pelodiscus sinensis</i>	423,700	—	25,024,000	*	*	*
26	<i>Platemys platycephala</i>	8	—	—			
27	<i>Podocnemis unifilis</i>	10	—	—			
28	<i>Pseudemys nelsoni</i>	10	100	—			
29	<i>Pyxisidea mouhotii</i>	4	—	—			
30	<i>Sacalia quadriocellata</i>	50	—	—			
31	<i>Terrapene carolina triunguis</i>	4	—	—			
32	<i>Terrapene ornata ornata</i>	2	—	—			
33	<i>Trachemys scripta elegans</i>	325,000	—	3,350,000	*	*	*
34	<i>Trachemys scripta scripta</i>	—	500	—			



Large dirt ponds with many turtles



Multiple dirt ponds with basking turtles



Multiple cement ponds with basking turtles



Turtles in shaded area of cement pond



*Mauremys mutica* babies

tive breeding of chelonians is well regarded as a means of reducing pressure on wild turtle populations by the Wild Fauna and Flora Conservation Department of the State Forestry Administration of the People's Republic, and is politically supported by the Hainan Wildlife Conservation Centre of the Hainan Forestry Department. We conclude that, with the continuing cooperation of nature and government, the turtle-breeding industry on Hainan Island is destined to enjoy a prosperous future. ■