

AGE DETERMINATION IN TURTLES

George R. Zug

A complete and detailed look at techniques used to determine the age of turtles, as well as a comparison of their effectiveness. The first section deals with known-aged samples via mark-release-recapture, and captive rearing; the second section looks at measures of size as a substitute for age, using body length or mass, and lens mass; a third area of this booklet addresses incremental growth markers for age determination with respect to scute growth zones, claws and rhamphotheca, and skeletochronology; and a fourth part covers age estimation through structural modifications as revealed by scute polishing, skeletal changes, and coloration changes. Bibliography. August 1991. 28 pages. ISBN 0-916984-24-9.

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THE FIRST REINTRODUCTION OF BLACK CAIMAN, *Melanosuchus niger*, INTO THE WILD

The black caiman (*Melanosuchus niger*) is a large crocodylian found throughout the Amazon River basin, the upper Essequibo and Berbice drainages in Guyana, and in coastal French Guiana. Owing to extensive commercial hide hunting which began in the 1940s, the black caiman has

suffered a dramatic decline in numbers and today is one of the most endangered of the New World crocodylians. Today, black caiman principally remain in small isolated populations and have been extirpated or are very rare over much of their former distribution (Plotkin et al. 1983). Other than the legal prohibition of hunting, which rarely has proven effective, virtually no conservation measures have been initiated in any of the countries where this species is found (Groombridge 1982). In Bolivia, the populations of black caiman have been described as being in danger of extinction (King and Videz-Roca 1989).

In 1989, a group of captive black caiman that were being maintained on the Hacienda El Caimán in northern Bolivia was offered for use in conservation programs. The black caiman on the hacienda had been collected during the late 1970s from the vicinity of Santa Rosa, Reyes and San Borja in the Bolivian Beni region. They were intended to form a breeding nucleus for a commercial farming operation. However, due to poor breeding success and financial difficulties, the owners were unable to keep the entire group and offered to donate a portion of the animals for a restocking project.

In August 1989, the German organization Aktionsgemeinschaft Artenschutz (AGA) offered financial support to transport the caiman for release back into the wild. The organization of the program in Bolivia was undertaken by the Asociación Boliviana Pro-Defensa de la Naturaleza (PRODNA). The Beni Biological Station, located in the Beni Department ca. 50 km east of San Borja, was chosen as a release site because it offered the best chances for protecting and monitoring the caiman after release. The area also provided an abundance of good habitat and was where some of the *Melanosuchus* stock kept on the Hacienda El Caimán originally came from.

The caiman were released in Normandia lagoon, a large (ca. 578 ha), shallow lagoon located close to the main biological station headquarters. Other release sites were considered to be unsuitable because of the possibility that natural black caiman populations may have been present and, without pre-release data from these lagoons, the subsequent conservation benefits of the release program could not be determined. Furthermore, the possibility of introducing unknown pathogens from the captive animals into the wild population had to be considered. Normandia lagoon was chosen because of its proximity to the park headquarters, facilitating control and population moni-

toring. The population of *Caiman crocodylus yacare* had been well studied over a three year period immediately prior to the planned release of *Melanosuchus*.

The operation began on 26 June 1990 on the Hacienda El Caimán. Twenty-five adult and subadult caiman (1.5 - 2.9 m long; 6 males and 19 females) and eleven hatchling and yearling caiman were captured, measured, and marked (monel foot tags and tail scute notching).

All the caiman except the hatchlings and yearlings were released in Normandia lagoon on 3-4 July 1990. Apart from a few minor scrapes, all caiman appeared to be in excellent shape when turned loose. Within days of the release the first nocturnal survey was conducted to begin the monitoring effort. Continued monitoring of Normandia lagoon will be conducted by personnel of the Beni Biological Station. Population trends of both *Caiman crocodylus yacare* and *Melanosuchus niger* will be determined, and there will be intensive nest monitoring during the reproductive season (late October to early March).

The hatchling and yearling *Melanosuchus* were placed in a small artificial lagoon at the Biological Station headquarters. They will be reared there until they reach a length of ca. 1 m and then released into the wild.

This reintroduction effort demonstrates the increasing interest of a number of Bolivian institutions in addressing the country's wildlife conservation problems.

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TECHNIQUES

IDENTIFYING INDIVIDUAL SPOTTED SALAMANDERS BY SPOT PATTERN

Conventional marking techniques for amphibians are not considered adequate for salamanders (Ferner 1979). Since Ferner's summary the only new marking technique that has been proposed for salamanders is that of fluorescent marking (Taylor and Deegan 1982; Nishikawa and Service 1988). This technique individually marks salamanders, but the markings usually do not last longer than a year (Nishikawa and Service 1988).

This paper describes a technique in which individual spotted salamanders (*Ambystoma maculatum*) can be recognized by their spot pattern. The spot pattern is described by the number of spots on defined areas of the animal, eliminating the need for drawings or photographs. For this technique to be valid, each salamander must have a unique spotting pattern and its pattern must not change ontogenetically. The advantages of using natural variation to identify individuals are that salamanders are not damaged in any way and that individuals can always be recognized once the spot patterns are recorded. These data can also provide detailed information on the natural variation of spot numbers.

In this identification technique, all individuals with the same "head patterns" are