REFERENCES

Eckert, S. & Sarti L.. 1997. Distant Fisheries Implicated in the Loss of the World´s Largest Leatherback Nesting Population. Marine Turtle Newsletter. 78: 2-7.

Fallabrino A., González A., Miranda L., Angeloni P., Calvo C., Ferreira V., Quiricci V., Lezama C., López M., Laporta M., & Bauza A..1999. Experiencias de Estudiantes del Cono Sur con Tortugas Marinas. V Congreso Latinoamericano de Herpetologia. 12 al 17 de diciembre, Facultad de Ciencias, Montevideo, Uruguay. pp 57.

Frazier J. & Salas S., 1982. Ecuador Closes Commercial Turtle Fishery. Marine Turtle Newsletter. 20:5-6.

González A., Miranda L. y Ortiz J. C., 1999. Presencia de Tortugas Marinas en la Costas de Chile. V Congreso Latinoamericano de Herpetologia. 12 al 17 de diciembre, Facultad de Ciencias, Montevideo, Uruguay. pp 67.

PRODUCTIVITY OF FEMALES LOGGERHEAD FROM CAPE VERDE ISLANDS

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INTRODUCTION

The nesting colony of *Caretta caretta* has been recently described for the island of Boavista (Cabo Verde, 500 km off the coast of Senegal, Western Africa, FIGURE 1). Although more data is needed, it represents one of the most important populations in the North Atlantic (Brongersma, 1982; López-Jurado & Andreu, 1998; Ross, 1995). Since 1998, a tagging and management campaign was established in Boavista to study this nesting population.

We present next data on reproductive biology of nesting females of *Caretta caretta* in Boavista during the year 2000 nesting season, in which we obtained twice as much than those tagged in 1998 and 1999 seasons; we also found some recaptures of females from preceding years, our first data on remigration interval. The data obtained were compared with those of other populations.

MATERIAL AND METHODS

During the summer of the year 2000, 17 km of beaches were surveyed daily in the southeastern part of the island. Night patrols were performed each night from 14 July to 27 October, searching for nesting turtles. When a turtle was met, and after she started to lay the eggs, it was measured (straight and curved carapace length and width), tagged with monel metal tags, and released. It was recorded the occurrence and position of a nest, the number of eggs laid, and the size of the eggs for comparisons; then the nest was marked for further research.

RESULTS

Nesting season begins in late June and ends in late October, whereas hatchlings are seen till late January. A total of 1487 emergences of females of *Caretta caretta* were recorded during the year 2000 nesting season in Boavista. From these, a total of 781 emergences belonging to new females tagged, apart of 277 emergences of females that could not be tagged. 408 recaptures of the same individuals emerged more than once in the year 2000 season were recorded. Therefore, we obtained 13 recaptures of individuals tagged in 1998, and 8 from 1999, some of them also emerging more than once in the year 2000 season.

Mean body size of females (TABLA I) was 81.1 cm of curve carapace length (SD=3.94, Range=70.0-104.0, N=940) and 75.8 cm of straight carapace length (SD=3.80, Range=60.2-96.5, N=933).

Internesting period for *Caretta caretta* in Boavista (FIGURE 2) averages 15.3 days (SD=1.76, Range=11-20, N=97, TABLE I). We excluded data on intervals more than 21 days of difference between two consecutive emergences of the same female, due to the doubt of a possible nesting event in the middle.

Mean clutch size of females is 82.7 eggs (SD=16.939, Range=24-143, N=353), and the mean diameter of egg size is 38.8 mm (SD=2.26, Range=30.8-43.1, N=79).

There exists a relationship between female body size (curve carapace length) and clutch size ($F_{1,232}=22.238$, $r^2=0.08$, $p<0.0001$), and also between female body size and egg size ($F_{1,52}=6.00$, $r^2=0.10$, $p=0.017$).

DISCUSSION

The number of nesting sea turtles on every season exhibit fluctuations, that is why it is necessary to cover several years of tagging effort to better know a population (Margaritoulis, 1982). In Boavista, the number of turtles tagged in the year 2000 compared to 1998 and 1999 is remarkably higher. In spite of that the sampling effort in this year has been most important than in preceding seasons, the number of females observed is higher than expected. It is necessary to continue research in further seasons to better know the population of *C. caretta* in Boavista. As a preliminary result, in this season we obtained first data on remigration interval.

Internesting period of *C. caretta* in Boavista averages 15.3 days, a value that results similar in other populations (Broderick & Godley, 1996), and see revision in Dodd Jr (1988), except in Turkey where the value is 23.4 days, more than any other (Geldiay et al., 1995).

In general, clutch size of loggerheads in Boavista is low, but if we compare this value with data obtained from other populations, we see that, for example, in Cyprus (Broderick & Godley, 1996) and Turkey (Erk'akan, 1993), the clutch size is lower, possibly due to the lesser mean female body size (see revision in Dodd Jr, 1988; Lutz & Musick, 1997). This agrees with our results because in Boavista female body size is positively correlated with clutch size. However, we can find different results concerning to this in other works, where there is no relationship between female body size and clutch size (see also Dodd Jr, 1988; Lutz & Musick, 1997). Likewise, egg size of loggerheads is also small compared to other populations,

except Turkey (Erk'akan, 1993). As in the case before, this could be related with the female body size.

Figure 1. Map showing Cape Verde Islands, and the position of Boavista.

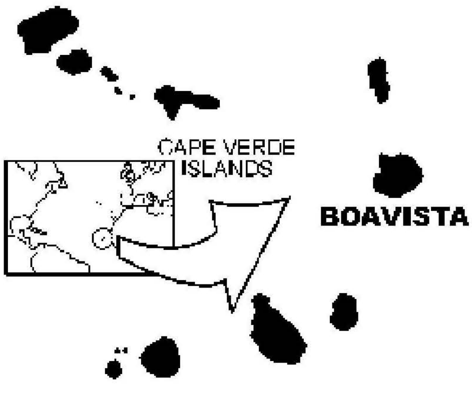
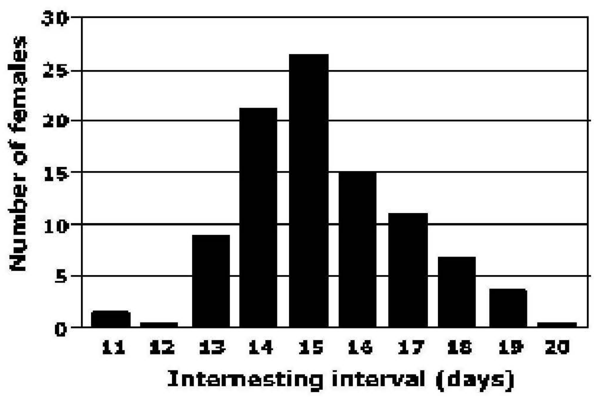


Figure 2. internesting interval of *C. caretta* in Boavista.



Acknowledgements:

We thank the David and Lucile Packard Foundation and Sea Turtle Symposium for travel support.

LITERATURE CITED

Broderick, A. C. & Godley, J. B. (1996). Population and nesting ecology of the Green Turtle, *Chelonia mydas*, and the Loggerhead Turtle, *Caretta caretta*, in northern Cyprus. Zoology in the Middle East, 13:27-46.

Brongersma, L. D. (1982). Marine Turtles of the Eastern Atlantic Ocean, pp. 407-416. In K. A. Bjorndal (eds.), Biology and conservation of sea turtles. Smithsonian Institution Press, Washington, D. C.

Dodd Jr, C. K. (1988). Synopsis of the Biological Data on the Loggerhead Sea Turtle *Caretta caretta* (Linnaeus 1758). Fish and Wildlife Service, U. S. Department of the Interior, Washington, DC. 111 pp.

Erk'akan, F. (1993). Nesting biology of loggerhead turtles *Caretta caretta* L. on Dalyan beach, Mugla-Turkey. Biological Conservation, 66:1-4.

Geldiay, R., Koray, T. & Balik, S. (1995). Status of sea turtle populations (*Caretta* caretta and *Chelonia mydas*) in the Northern Mediterranean Sea, Turkey, pp. 425-435. In K. A. Bjorndal (eds.), Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D. C.

López-Jurado, L. F. & Andreu, A. C. (1998). *Caretta caretta* (Linnaeus, 1758), pp. 44-56. In A. Salvador (eds.), Reptiles. Fauna Iberica, vol. 10. Museo Nacional de Ciencias Naturales, CSIC, Madrid.

Lutz, P. L. & Musick, J. A. (1997). The biology of sea turtles. Boca Raton, Florida, CRC Press. 432 pp.

Margaritoulis, D. (1982). Observations on loggerhead sea turtle *Caretta caretta* activity during three nesting seasons (1977-1979) in Zakynthos, Greece. Biological Conservation, 24:193-204.

Ross, J. P. (1995). Historical Decline of Loggerhead, Ridley, and Leatherback Sea Turtles, pp. 189-195. In K. A. Bjorndal (eds.), Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D. C.

Figure 3. Clutch size of *C. caretta* along the 2000 season.

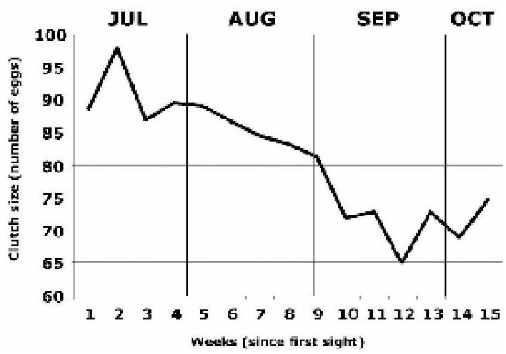


Table 1. Mean, range and sample size of CCL , SCL, clutch size, and internesting period of *C. caretta* in Boavista.

		CCL (cm)	SCL (cm)	CLUTCH SIZE	EGG SIZE*	INTERNESTING PERIOD (days)	SOURCE
	Mean	**81.1**	**75.8**	**82.7**	**38.8**	**15.3**	
Boavista	**SD**	**3.94**	**3.80**	**16.93**	**2.26**	**1.76**	
(Cabo Verde)	**Range**	**70-104**	**60.2-96.5**	**24-143**	**30.8-43.1**	**11-20**	
	N	**940**	**933**	**353**	**79/787**	**97**	
South Carolina	Mean		92.7	126	41.5	13.0	Caldwell (1959)
(USA)	Range		84.5-102.9	64-198	35-49	-	Talbert et al (1980)
	N		18	71	44/827	44	
Florida	Mean	98.9	93.9	149	42.3	14	Ehrhart & Witherington (1987)
(USA)	Range	87.9-108.9	82.5-104.4	70-165	40.2-44.8	11-17	Ehrhart (1979)
	N	119	114	26	6/702	18	Worth and Smith (1976)
Colombia	Mean		87.9	107.0	43.3	14.7	Kaufmann (1975)
	Range		70-100	58-163	39.7-47.5	13-17	
	N		78	185	3/370	7	
Tongaland	Mean	93.7	87.6	105.3	49.9	15	Hughes (1974, 1975)
(South Africa)	Range	82.0-106.5	76-98	39-154	36-44	13-17	Hughes et al. (1967)
	N	254	320	72	26/260	-	
Masirah Island	Mean		92	101	42.1	-	Ross (1979)
(Oman)	Range		79-101	72-130	38-46	14-16	Hirth (1980)
	N		-	29	29/_	-	
Queensland	Mean	95.8		127.0	40.1	13.9	Limpus (1985)
(Australia)	Range	80.0-113.5		48-190	37.6-42.3	9-23	
	N	2,207		1,056	29/290	2,959	
Zakynthos	Mean	80.4		100.2	-	14.6	Margaritoulis (1982, 1985)
(Greece)	Range	69.5-95.0		-	35-40	13-20	
	N	27		9	2-12	14	
Dalyan Beach	Mean		73.1	73.4	37	23.4	Erk'akan et al. (1993)
(Turkey)	Range		60.2-83.9	24-148	33-41	18-28	Geldiey et al. (1980)
	N		49	235	65	-	
Northern Cyprus	Mean	73.4		70.0		13.4	Broderick & Godley (1996)
	Range	65-86.5		-		11-17	
	N	78		323		67	

*N (sample size) in egg size separated by bars represents number of nests and total number of eggs