MARINE TURTLES IDENTIFICATION IN FRENCH GUIANA :
WHY, WHERE AND HOW ?

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Leatherback identification program began at the end of the 1960s in French Guiana. Many different methods have been used : plastic tags, titanium tags, Monel tags, PIT tags, photo-identification and branding. In total, more than 50,000 tags have been put on leatherbacks whereas the estimated number of females is much lower. Althought it initialy yielded important information the tagging program quickly became what Mrosovsky called the *tagging reflex*, because of the lack of objectives.

Since 1998, a new identification program has begun in French Guiana. The first step of this program has been to clearly identify why, where and how leatherback identification should be performed in this region.

Why ?
The first question we asked was not why identify, but what scientific data do we need to improve knowledge and conservation of this species. Identification is a suitable tool to perform some of the needed studies such as:
-   The delimitation of the leatherback population nesting in the Guianas. The coast of the Guianas (North of Brazil, French Guiana, Suriname, and Guyana) is the most important nesting zone for *Dermochelys coriacea* in the world (Spotila *et al.*, 1996). *Ya:lima:po* beach, in the western part of French Guiana, concentrates the large majority of the leatherback nesting activity in this region (Girondot & Fretey, 1996). The recent and important decline of French Guiana leatherback populations (cf fig. 1) is alarming for this already endangered species (Chevalier *et al.*, 1999). However, the frequent displacements or natural destruction of beaches in the Guianas lead turtles to shift their nesting sites and could mask another phenomenom at a larger geographic scale. Indeed, the shifting already documented involved beaches of French Guiana and Suriname but are suspected of occuring in other nearby countries.
-   The estimation of the size and following the population trends. Another alternative to the hyphtesis advanced to explain the decline of French Guiana leatherback population is that rather than the number of females declining the number of nests per female decreases because the trend is evaluated in number of nests per year. An identification program will help to establish the number of females per year which is the true index with which to characterize population trends.
-   The search of the life stage at the origin of the present decline. The reasons of the actual decline are not well identified but may rest with specific age cohorts within the population. This study will help us to focus the conservation actions on the main potential problems for the population.

Thanks to this program it will also be possible to reestimate the basic data on leatherback nesting ecology in the Guianas and to compare them with those of other nesting sites.

Where ?
We need to characterize the area where collaboration on both scientific and conservation programs is needed. The first step is to clarify the relationships between nesting beaches in this region using the results of tagging and genetic studies. Therefore the identification program should be performed first at large scale to establish the most appropriate scale to study and conserve the Guianese population. Since 1998, a new identification program

began in French Guiana (Chevalier & Girondot, 1999) and will begin in 1999 in Suriname. Contacts are taken with Guyana and Brazil for a common project.

How ?
We studied the intra and inter-seasonal retention rate for Monel tags located at the rear flippers which was the method used in French Guiana during the last 15 years. The daily tag retention rate during the first nesting season is 0.9983 (cf fig. 2). The expected cumulated tag retentions after two and three years using this daily tag retention rate are 0.25 and 0.17 respectively (cf fig. 3, curve A). However, the observed values are 0.75 and 0.55 respectively (cf fig. 3, points) and are significantly different to the expected ones (p<0.0001 for both). The best fit to the observed data with a constant daily tag retention rate at sea is obtained with 0.9996 (cf fig. 3, curve B). However, this curve does not fit also to the observed cumulated tag retention rate. Finally, the best fit is obtained when the daily tag retention rate decreased with time (cf fig. 3, curve C), a classical phenomenom called « tag senescence » (Nichols and Hines, 1993). In conclusion, tags are poorly retained just after the tagging, then the retention rate is higher at sea but decreased with time. After three years, which is close to the mean inter-nesting season interval, around half of the tags are lost. This tag loss rate lead to an important biais in the nesting ecology studies (cf fig. 4).

Therefore, we changed the identification method and use PIT tagging since 1998. Even if some leatherbacks had already been PIT tagged in the neck in French Guiana in 1995 and 1996 (Girondot & Fretey, 1996), the need for standardisation in identification methods and the good retention rate observed in other nesting beaches (Mac Donald & Dutton, 1996) lead us to PIT-tag females in the right shoulder (Dutton & Mac Donald, 1994). TROVANs material has been choosen because of its storage capacity which is very usefull on high density nesting beaches like *Ya:lima:po* beach.

The fact that PIT tags can't be read as easily as Monel tags, is not a real problem because we already get tag return from almost all of the North Atlantic Ocean (cf fig. 5). The next step in order to study the migration of the leatherbacks of the Guianas is telemetry, not tagging program.

Conclusion

This identification program is a part of larger conservation program focused on the marine turtles of the Guyana Shield region (Swinkels et al. 1999). In this region, collaboration between the different countries of the Guianese nesting zone is certainly the only suitable way to face the alarming decline of leatherback turtles.

References

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Acknowledgments

Figure 1 : Annual number of leatherback nests on *Ya:lima:po* beach (histogram bars) and 3-point moving average (line).
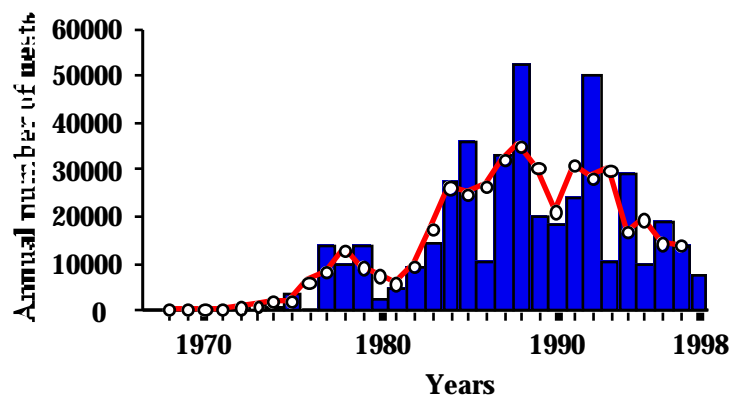

Figure 2 : Intra-seasonal retention rate of Monel tags at rear flipper location. Points are observed data (A, B) and the regression line in (B) corresponds to the best fit using ponderation by the number of observations.
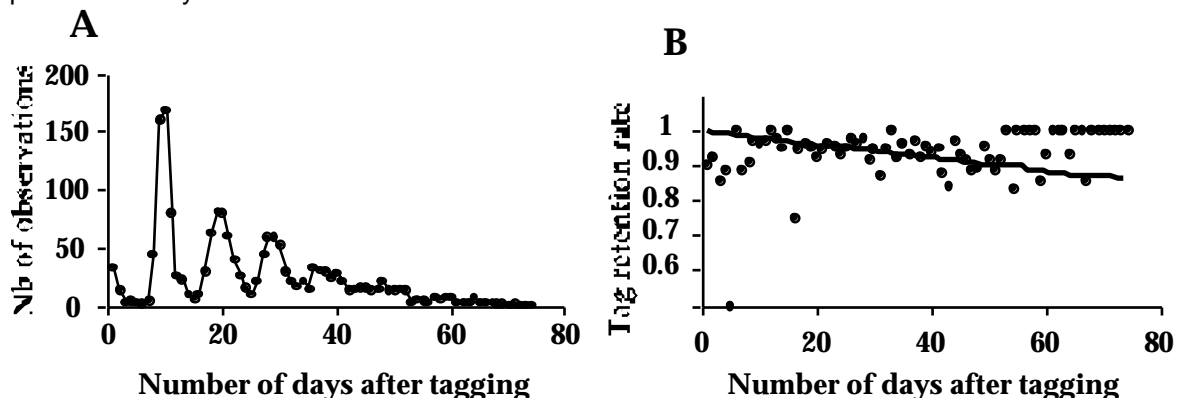
Figure 3 : Long-term Monel tag retention rate at rear flipper.

Intraseasonal tag retention rate

Cumulated tag retention rate

● Observed data

636 obs.

519 obs.

B — Best fit with constant tag retention rate a sea: 0.9996

C — Best fit with tag retention rate a sea decreasing with time: $0.999964-(days*8.4.10^{-7})$

A — Expected for a constant daily retention rate of 0.9983
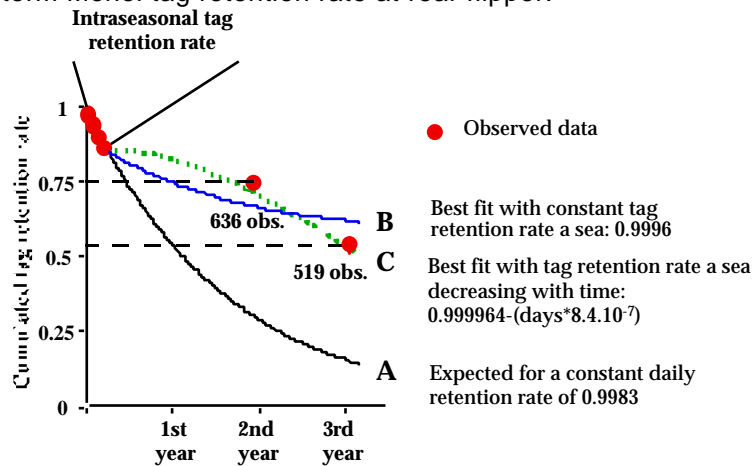
1st year 2nd year 3rd year

Figure 4 : Comparaison of the inter nesting season interval for leatherbacks in French Guiana, based on observed data and reestimated data with the tag retention rate.
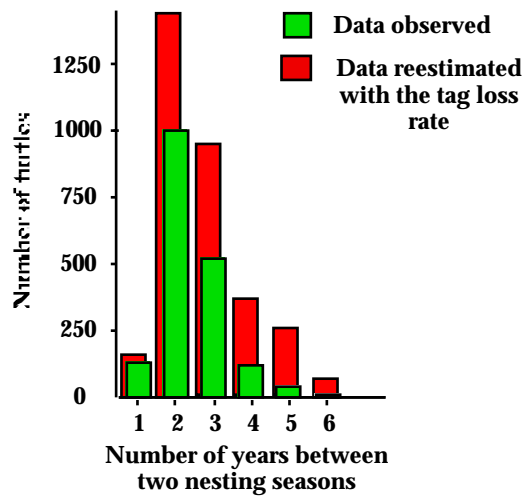

Number of turtles

■ Data observed

■ Data reestimated with the tag loss rate

Number of years between two nesting seasons

Figure 5 : Distribution leatherback tagged in French Guiana and recovered elsewhere in the Atlantic.

French Guiana

· Tag return