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**PRELIMINARY RESULTS OF THE EXPERIENCES DERIVED  
FROM THE USE OF EXPERIMENTAL CIRCULAR HOOKS IN  
SPANISH LONG LINERS IN THE SOUTHWEST INDIAN OCEAN  
DURING 2005 FOR PILOT ACTION RAI-AP-08-2004.**

By

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***Summary***

*One of the main objectives of this Pilot Action was to employ experimental hooks and different kinds of baits so to minimize the catch of sea turtles. That is why a special attention has been given to bycatch of these animals. Both ships have caught 25 specimens (belonging to four different species), which suppose a 0.089% of the total catch (28106 specimens). All the turtles were brought back to the sea in good conditions to survive. It is remarkable that only 4 turtles were caught because of biting the hook and most of them (19 turtles) were tangled in any other place of their body, mainly the front tips; the type of catch is unknown in the two turtles that last.*

*Low incidence of turtles catch leads a difficulty to make definitive statistical analysis about a specific type of hook or bait suitability to minimize these catches. The results obtained would indicate that, at least in this area, turtles catches come from long-line characteristics (size, shape, etc.) more than from the effect that the type of hook or bait has.*

***Resumen***

*Uno de los principales objetivos de esta AP era emplear anzuelos experimentales y diferentes tipos de cebo para minimizar la captura de tortugas marinas. Es por ello que se ha prestado una especial atención a la captura incidental de estos animales. Ambos barcos capturaron 25 ejemplares de las mismas (de cuatro especies distintas), lo que supone un 0.089% de la captura total (28.106 ejemplares). Todas las tortugas fueron devueltas al mar en buenas condiciones. Es de señalar que únicamente 4 de ellas fueron capturadas por morder el anzuelo; mientras que la mayoría (19 tortugas) lo fueron por quedar enganchadas en alguna otra parte de su cuerpo, fundamentalmente por las extremidades anteriores.*

*La baja incidencia que ha supuesto la captura de tortugas conlleva la dificultad de realizar análisis estadísticos definitivos sobre la idoneidad de un tipo de anzuelo y cebo para minimizar estas capturas, que era uno de los objetivos de la presente Acción Piloto. Estos resultados indicarían que, al menos en este área, la captura de tortugas se debe más a las características del propio palangre (dimensiones y configuración) y profundidad de trabajo del arte, que al efecto del tipo de anzuelo o cebo empleado.*

**Keywords:** *Sea turtles, long-line, tangled, hook, bait*

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## **Introduction**

In this paper preliminary results about the use of circular hooks and different types of bait in surface long line are presented. The main objective is to study and analyze the incidence of them in the catch of sea turtles.

In 2005, two Spanish surface long liners carried out an experimental fishing action named RAI-AP-08/2004 in the waters of the south-western Indian Ocean designed to analyze the selection of different types of hook and bait, particularly where sea turtles were concerned. Scientific observers were permanently on board, enabling the gathering of copious and important biological and fishing information about the different species caught.

Although the experiment was performed in the Indian Ocean, the data and results analyzed in this document are of turtle species that are widely distributed in the different oceans.

## **Material and methods**

Both ships used 4 types of hooks, two of them conventional "16 J" and the other ones circular "18 O", of different color (metallic or blue).

Configuration of long line was invariable in all sets and it was organized as it follows: 960 hooks (480 baited with mackerel and 480 with squid or like squid species). Both ships used 240 units of every type of hook, in sequences of 60 hooks of each type of bait, alternatively, with the different kinds of bait. Sometimes it was added a variable part with the same organization and a size that fluctuated between 60 and 240 hooks.

During this experience, observers took special precautions in collecting information about bycatch of specimens of sea turtles, whether for biting the hook (in this case, type of hook and bait was noted) or for being tangled in long line or if the hook hammered, accidentally, in any other part of their body (mainly in front tips).

Annex 1 gives the scientific names and common names in Spanish and English, and the codes of the different species studied in this document. It is also indicated the code of all the hooks and baits used during this AP.

## **Results**

Both ships have carried out 12 trips with a total of 539 sets using 531916 hooks. From the 28106 specimens caught, 25 were sea turtles, 3 were sea mammals and another 3 were sea birds. All of them supposed a 0.1% of the whole specimens caught. Turtles and mammals were brought back to the sea in good conditions to survive; only birds died because of fishing.

Table 1 shows the catch of the different individuals of these three groups, indicating the date, latitude and longitude, area of sampling, type of bait and hook used and depth of work for the long line. An important detail to be taken into account is that most of turtles (19) were caught owing to any part of their body, mainly front tips, had been hooked or were tangled by the line. Only four of them bit the hook. In this Table, specimens of turtles are shown per species, depending on the type of caught and they have been related to maximum depth of work of the long line.

In this case, and given the low number of specimens, it can not be established if there is any relationship between the number of individuals caught, the hooks, the type of bait and the depth of the set. From collected data, it is concluded that: 76% (19 individuals) were hooked in the tips or tangled by the long line (mainly leatherback turtle) while 16% (4 individuals) of turtles bit the hook and of 8% (2 individuals) is unknown the origin of their catch.

Data are totally not enough to get any conclusions.

Figure 1 shows the quantity of turtles caught by the long line during the year of sampling. Most of them were leatherback turtles (DKK or DCC). Length distribution is shown in Figure 2.

Annex 2 shows some of the photographs taken to the sea turtles caught during this AP.

Referring to the type of bait, the 68% (13 individuals) of the turtles tangled or hooked by their tips fell in that area of the long line baited with squid or like squid species and the 32% (6 individuals) in areas baited with mackerel. The two turtles whose way of caught is unknown fell in areas baited with mackerel while the 50% of the 4 that bit the hook were baited with squid or like squid species and the other 50% in hooks baited with mackerel.

## Discussion

*Judging observations done and data collected, it has not been the type of hook which has determined the catch of these specimens of sea turtles but the use of the long line which propitiates the catch of these species.* Thus, incidence would be higher as higher is turtle abundance in that area. In consequence, if it is necessary to protect this species, that zones of more abundance should be detailed to be regulated when long line fishing is used.

As the hook is not determinant, at least in this case, it may be that other parameters influence in the catch of these specimens, for instance the depth and the hours of “loosing” and “recovering” of the long line. These factors have to be analyzed in .future experiences. However, it would be suggested that the type of bait could have a higher incidence, as 15 of the 25 turtles bit hooks baited with squid or like squid species or were tangled or hooked in that part f the line baited this way.

**Table 1. ByCatch of sea turtles, mammals and birds during AP. It is indicated the date of match, latitude and longitude, area, bait and hook, and maximum depth read by sensors positioned in long line every set (at the head and before the middle of the line) depending on the type of caught.**

Group	SPECIES	DATE	Lat°	Lat'	Lon°	Lon'	Area	BAIT	HOOK	Depth_head (m)	Depth_end (m)	Type of caught
Sea Turtles	CCC	21/5/2005	30	29	46	23	7	C1	-	32	-	Tangled or hooked
		26/5/2005	29	59	47	2	3	C2	-	-	106	Tangled or hooked
	CMM	27/12/2004	29	59	40	0	2	C1	A4	36	-	Type of caught unknown ?
		15/1/2005	30	16	45	10	7	C1	A2	36	-	Bit the hook
	DCC	3/1/2005	31	23	34	55	4	C2	-	37	-	Tangled or hooked
		16/1/2005	29	35	42	40	2	C1	A4	-	-	Type of caught unknown ?
		13/2/2005	31	21	34	56	4	C2	-	37	70	Tangled or hooked
		14/2/2005	30	36	44	10	6	C2	A4	-	155	Bit the hook
		28/2/2005	29	35	45	1	3	C1	-	115	-	Tangled or hooked
		19/3/2005	29	58	38	39	1	C1	-	186	-	Tangled or hooked
		27/3/2005	31	0	34	42	4	C1	-	-	24	Tangled or hooked
		8/5/2005	29	18	40	31	2	C2	-	-	103	Tangled or hooked
		20/5/2005	27	58	38	33	1	C2	A2	125	-	Bit the hook
		25/7/2005	29	29	37	41	1	C2	-	-	56	Tangled or hooked
		3/8/2005	31	54	34	41	4	C2	-	43	-	Tangled or hooked
		29/8/2005	30	8	36	55	5	C1	-	29	41	Tangled or hooked
		4/9/2005	28	53	41	27	2	C2	-	32	-	Tangled or hooked
		10/10/2005	29	43	43	27	2	C2	-	44	91	Tangled or hooked
		13/10/2005	29	50	44	20	2	C1	-	27	41	Tangled or hooked
	23/10/2005	29	37	41	27	2	C2	-	128	46	Tangled or hooked	
27/10/2005	29	58	39	12	1	C2	-	28	31	Tangled or hooked		
LOL	13/7/2005	29	50	45	59	3	C2	-	-	26	Tangled or hooked	
TOE	8/3/2005	29	32	40	40	2	C2	-	36	-	Tangled or hooked	
	21/4/2005	32	50	35	5	5	C2	-	-	54	Tangled or hooked	
	11/9/2005	31	10	35	17	5	C1	A1	96	39	Bit the hook	
Sea Mammals	GME	10/5/2005	29	52	40	4	2	C1	A4	25	-	
	OTA	3/8/2005	31	54	34	41	4	C1	A3	43	-	
	STE	11/10/2005	28	45	37	26	1	C2	A3	-	32	
Sea Birds	ALT	16/10/2005	30	3	37	13	5	C1	A2	27	-	
		17/10/2005	30	52	37	19	5	C1	A3	22	-	
	PET	16/10/2005	30	3	37	13	5	C2	A3	27	-	

**Figure 1. Quantity of turtles caught bay the long line during the year of sampling in this AP.**

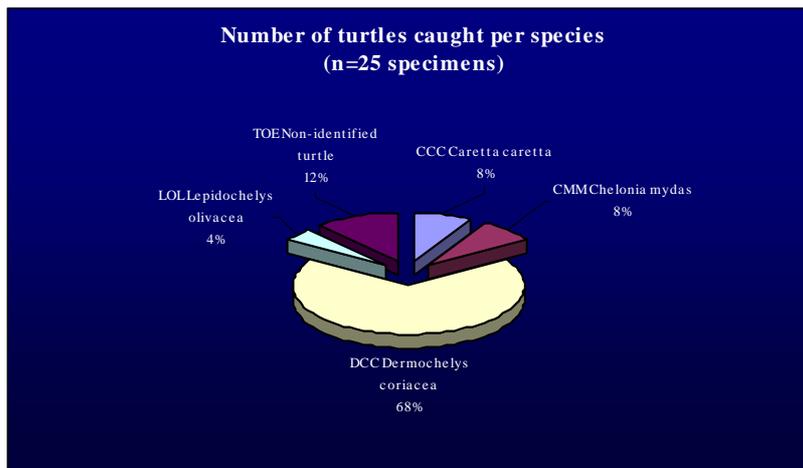
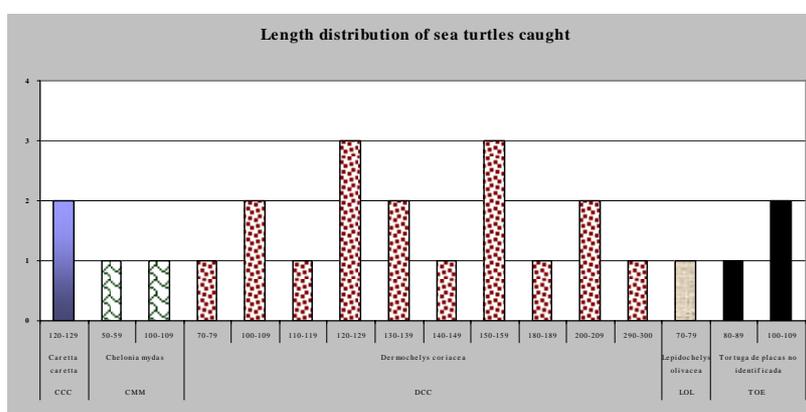


Figure 2. Length distribution of sea turtles caught.



## ANNEX 1

### List of species and codes:

CODE FAO	FAO SCIENTIFIC NAMES	COMMON NAMES (English / Spanish)	Code RAI-AP-08/2004
TTL	<i>Caretta caretta</i> (Linnaeus, 1758)	Loggerhead turtle / Caguama	CCC
TUG	<i>Chelonia mydas</i> (Linnaeus, 1758)	Green sea turtle / Tortuga verde	CMM
DKK	<i>Dermochelys coriacea</i> (Vandelli, 1761)	Leatherback turtle / Tortuga laúd, Baula	DCC
LKV	<i>Lepidochelys olivacea</i> (Eschscholtz, 1829)	Olive ridley turtle / Tortuga golfina	LOL
-	-	Turtle non-identified / Tortuga de placas no identificada	TOE

### Bait and hooks codes:

Type of bait or hook	Code
BAIT: Mackerel	C1
BAIT: Squid or like squids species	C2
HOOK: 16 J conventional metallic	A1
HOOK: 16 J conventional blue	A2
HOOK: 18 O circular metallic	A3
HOOK: 18 O circular blue	A4
HOOK: 18 O mixed	A5

**ANNEX 2**

**Some photographs of the sea turtles caught during RAI-AP-08/2004:**



**LOL** (*Lepidochelys olivacea*)



**DCC** (*Dermochelys coriacea*)



**CMM** (*Chelonia mydas*)