DESCRIPTION OF THE VENEZUELAN PELAGIC LONGLINE OBSERVER PROGRAM (VPLOP) SPONSORED BY THE ICCAT- ENHANCED RESEARCH PROGRAM FOR BILLFISH

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SUMMARY

The Venezuelan Pelagic Longline Observer Program (VPLOP) is sponsored by the Enhanced Research Program for Billfish of the International Commission for the Conservation of Atlantic Tunas (ICCAT). It started operations in 1991, and its main goal was to monitor billfish (including swordfish) catches from the Venezuelan pelagic longline (industrial) vessels targeting tuna species and swordfish in the Caribbean Sea and adjacent waters of the Atlantic Ocean. A description of the Program detailing the spatial distribution of the observer coverage, the number of operations monitored, and the information collected by the observers and recorded into a data-base is presented in the document.

RÉSUMÉ

Le Programme d'observateurs palangriers pélagiques du Venezuela est parrainé par le Programme de recherche intensive sur les istiophoridés de la Commission internationale pour la conservation des thonidés de l'Atlantique (ICCAT). Opérant depuis 1991, son principal objectif était de réaliser un suivi des prises d'istiophoridés (espadon compris) de la flottille industrielle palangrière pélagique du Venezuela qui ciblait les espèces de thonidés et l'espadon dans la mer des Caraïbes et les eaux adjacentes de l'océan Atlantique. Le document présente une description du Programme qui détaille la distribution spatiale de la couverture d'observateurs, le nombre d'opérations faisant l'objet d'un suivi, ainsi que les informations recueillies par les observateurs et consignées dans la base de données.

RESUMEN

El Programa de observadores de palangre pelágico de Venezuela (VPLOP) está auspiciado por el Programa de investigación intensiva sobre marlines de la Comisión Internacional para la Conservación del Atún Atlántico (ICCAT). El programa se puso en marcha en 1991 y su objetivo principal era realizar un seguimiento de las capturas de istiofóridos (pez espada incluido) de los palangreros pelágicos (industriales) venezolanos que dirigen su actividad a los túnidos y al pez espada en el mar Caribe y aguas adyacentes del océano Atlántico. En el documento se presenta una descripción del Programa en la que se detalla la distribución espacial de la cobertura de observadores, el número de operaciones objeto de seguimiento y la información recopilada por los observadores e integrada en la base de datos.

KEY WORDS:

Observer Program, Pelagic Longline, Venezuela, Caribbean Sea

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1. Introduction

The Venezuelan Pelagic Longline Observer Program (VPLOP) is sponsored by the Enhanced Research Program for Billfish of the *International Commission for the Conservation of Atlantic Tunas* (ICCAT). Initially developed in 1991, its main goal was to monitor billfish (including swordfish) catches from the Venezuelan pelagic longline (industrial) vessels targeting tuna species and swordfish in the Caribbean Sea and adjacent waters of the Atlantic Ocean. The VPLOP operates on a year round basis, although in late December and January fishing operations are less frequent. Regarding the information recorded, other than haul/gear information, the majority was on billfish and tuna species. However, other commercial by-catch species like, dolphinfish (*Coryphaena hippurus*), and wahoo (*Acanthocybium solandri*) were also recorded in the data forms. In the early years of the VPLOP, sharks were included in the data forms as 'sharks' but since their inclusion was not mandatory, the addition of any information on 'sharks' was dependent on the observer's duties on board. In 1994, concern for the increasing catch of pelagic sharks prompted the VPLOP coordinators to make mandatory the recording of information of pelagic sharks by species in the data forms. Encounters with air breathing vertebrates were occasional (sea-birds) and rare (marine mammals), and since it was not a mandate of the VPLOP, the details of encounters were not included in the forms. In the case of sea turtles, information was only recorded in the observer's note pads or the margins in any of the forms, but was never entered into the original data-base. In the revision undertaken in 2007, all information on sea turtles that appeared in the original data forms was included in the newly revised and updated digital data-base.

2. Data Collection

The VPLOP started placing observers on board industrial longline vessels in May 1991. However, from 1987 to 1990 collaborative agencies contributed in placing observers in a newly developed swordfish fishery off Venezuela; that information was merged into the VPLOP data-base after 1991. The VPLOP data-base has about 6250 longline sets recorded over a 20 year period, between 1991 and 2011. Observers use 2 data-entry forms (**Annex 1**), one form is used to record fishing operations information (ICCAT FORM C) and the other is used to record species information (ICCAT FORM D). Over the years, the data forms have undergone several changes, but the basic information on fishing operations (set and gear information) and species information which are needed for the estimation of relative abundance indices have remained the same.

Since the beginning of the VPLOP in 1991, the placement of observers on longline vessels has been voluntary on the part of the vessels owners. Until 2003, the Venezuelan fishery law did not provide guidance to place observers on board commercial fishing vessels. However, after passing the 2003 fishery law which allowed the placement of observers on board commercial vessels, the Law still lacked to offer specific guidance on observers, so through to 2011 observer placement by the VPLOP continued to be voluntary. Thus, the vessel selection process did not follow a statistical protocol due to the voluntary nature of the Program.

Observer coverage was based on the number of trips observed with respect to the overall number of trips made by the fleet every year, over the years it varied between 3 and 19.7% (**Table 1**); between 1992 and 2004 observer coverage was above 10% with a maximum coverage in 2003. After 2004, the VPLOP observer coverage began a steady drop reaching its minimum in 2011. The causes for the sustained drop in the observer coverage included the inability to train new observers due to the lack of funds, and the increase in the number of fishing trips per year due to the inclusion of new longline vessels into the fleet.

3. Description of VPLOP Data-Base

The VPLOP data-base was initially entered in a DBASE program format that was transformed into MS Access in 1999. Since then, the information added into the data-base has been done under the MS Access platform. The data is entered from the data forms into the computer using 3 entry windows running under MS Access. The first data entry window (**Figure 1**) contains all the information available in the ICCAT FORM C. Within the blue area of the data entry window, 2 additional buttons in bold lettered format open the **Resumen Lance** (Catch of Day) window, and the **Datos de Especies** (Species Data) window. These 2 secondary data entry windows will be explained in detail later.

Latitude and longitude hemisphere

In the VPLOP, all fishing activities took place in the northern and western hemispheres (N and W), because all observed fishing effort occurred in the northwestern Atlantic (**Figure 2**). All the values for the latitude field are "N" and for the longitude field are "W".

Definition of gear

In **Figure 3** is a diagram of a "section" of pelagic longline gear, with identification of the parts. Radio beacons may also be called "radio buoys", which emit radio signals that allow direction finding equipment on the fishing vessel to locate drifting gear. Radar reflectors are also commonly referred to as "high fliers", and show up as targets on the vessel's radar screen, enabling the vessel to locate drifting gear. Note the diagram is neither to scale, nor representative of normal fishing effort, many more hooks and floats are normally found in a section.

Gear deployment/retrieval, configuration, and spatial coverage

The following data fields refer to gear deployment/retrieval and gear configuration information collected by the observers on the ICCAT FORM C:

Data related to the Trip (top gray area)

VIAJE (TRIP NUMBER), **AÑO** (YEAR), **BARCO** (VESSEL CODE), **PAIS** (COUNTRY CODE) **CAPITAN_NOMBRE_APELLIDO** (CAPTAIN NAME), **OBSERVADOR_NOMBRE_APELLIDO** (OBSERVER NAME), **FECHA_DE_SALIDA , FECHA_DE_LLEGADA** (LANDING DATE).

Tipo de estudio, Buscar estudio (Study type, Look for study)

These 2 entry fields are for specific short term studies sponsored by other institutions with particular data requirements in addition to those normally required in the data-base, but the VPLOP is allowed to use the basic data and to include it in the overall data-base.

*Data related to the Set (*Datos del Lance*, blue area)*

LANCE (SET NUMBER); **ESPECIE_OBJETIVO** (TARGET SPECIES); **FECHA_ INICIO_LANCE** (BEGIN SET DATE); **HORA_INICIO_LANCE** (BEGIN SET TIME);
LAT_ INICIO_LANCE (BEGIN SET LATITUDE); **LON_ INICIO_LANCE** (BEGIN SET LONGITUDE); **TEMPERATURA_INICIO_LANCE** (BEGIN SET TEMPERATURE);
FECHA_FIN_LANCE, HORA_FIN_LANCE, LAT_FIN_LANCE, LON_FIN_LANCE, TEMPERATURA_FIN_LANCE (END SET DATE, END SET TIME, END SET LATITUDE, END SET LONGITUDE, END SET TEMPERATURE); **FECHA_INICIO_LEVADA, HORA_INICIO_ LEVADA, LAT_INICIO_ LEVADA, LON_INICIO_ LEVADA, TEMPERATURA_INICIO_ LEVADA** (BEGIN HAUL DATE, BEGIN HAUL_TIME, BEGIN HAUL LATITUDE, BEGIN HAUL LONGITUDE, BEGIN HAUL TEMPERATURE); **FECHA_FIN_LEVADA, HORA_FIN_ LEVADA, LAT_FIN_ LEVADA, LON_FIN_ LEVADA, TEMPERATURA_FIN_ LEVADA** (END HAUL DATE, END HAUL TIME, END HAUL LATITUDE, END HAUL LONGITUDE, END HAULTEMPERATURE); **DIRECCION_LANCE** (DIRECTION OF SET); **IRECCION_LEVADA** (DIRECTION OF HAUL).

Gear configuration data

CARNADA_1 (BAIT TYPE 1); **CONDICION** (BAIT CONDITION 1); **CARNADA_2, CONDICION** (BAIT KIND 2, BAIT CONDITION 2) ; **PALITO_FOSFORESCENTE** (WERE LIGHT STICKS USED); **BAÑO_FOSFORESCENTE** (WAS FLUORESCENT SOAK USED); **RENDAL** (GANGION MATERIAL); **ANZUELO_TIPO** (HOOK TYPE 1); **ANZUELO_TAMAÑO** (HOOK SIZE 1); **MARCA_ANZUELO** (HOOK BRAND 1, HOOK MODEL 1); **LONGITUD_PALANGRE** (MAINLINE LENGTH); **CESTAS** (NUMBER BASKETS); **ANZUELOSXCESTAS** (NUMBER HOOKS BETWEEN FLOATS); **DISTANCIA_ENTRE_BOYAS** (DISTANCE BETWEEN DROPLINES);

DISTANCIA_ENTRE_ANZUELOS (GANGION DISTANCE); **LONGITUD_RENDAL** (GANGION LENGTH); **DISTANCIA_BOYA-LINEA_MADRE** (DROPLINE LENGTH).

The **Resumen Lance** (Catch Summary of Set) is a secondary data entry window. Once opened, the display is like in **Figure 4**, where it will automatically reflect the Viaje (Trip Number) and Lance (Set number) for that particular entry. The other 3 fields will be entered from the ICCAT Form C. This table reflects a summary of the commercial catch of the set. It includes the species alpha code for all tuna species and all billfish, swordfish, dolphinfish, wahoo, and shark species, caught in the Caribbean Sea and adjacent waters of the Atlantic Ocean. The catch is registered in total number of fish (No.Ejemplares) by species and the estimated total whole weight (PESO, in kilograms) by species. In the early years of the program, this field only included tunas and billfish. However in the output file, 'estimated total whole weight' is expressed as PESO TOTAL.

The **Datos de Especies** (Species Data) is another secondary data entry window. Once opened, the display is like in **Figure 5**, where it will automatically reflect the Viaje (Trip Number) and Lance (Set number) for that particular entry. The other fields will be entered from the ICCAT Form D.

Descriptions of Data Fields in the Secondary Entry Window of the VPLOP (Datos de Especies)

The following is data documentation for species records collected by the Venezuelan Pelagic Longline Observer Program (VPLOP) from the Venezuelan pelagic longline (industrial) fleet. Fields labeled in bold format refer to the original Spanish name in the data-base; the name in parenthesis is the equivalent in English. The fields included are:

VIAJE (TRIP NUMBER); **LANCE** (SET NUMBER); **ESPECIES** (ALPHA SPECIES CODE)**; V/M** (FISH CONDITION) which indicates the condition of the animal as it is brought on board (or brought boat side in the case of animals that are not going to be brought aboard: Alive or Dead); **HORA** (TIME FISH BOARDED); **EQUIPO_USADO/Mtool** (LENGTH MEASUREMENT TAKEN CODE); **METRIC1** (LENGTH MEASUREMENT CODE 1, *e.g*., FL, LJFL, TL etc.); **CM1**(LENGTH MEASUREMENT 1); **METRIC2** (LENGTH MEASUREMENT CODE 2, *e.g*., PFL, CK, TRNK, etc.); **CM2**(LENGTH MEASUREMENT 2); **SEX; PESO MEDIDO?** (ESTIMATED WEIGHT); **OBSERVACION** (COMMENTS) this field contains information that clarifies or expands on information collected in other fields, or provides information that does not pertain to any other field. Note that use of comments by observers in the animal log data was rare before 2001, but was encouraged at that time. The information included in this field can be the TAG NUMBER of scientific tags from tag-recaptured fish or from tag-released fish, gonads weights of yellowfin tunas, etc.
IDNUM (CARCASS TAG NUMBER); this field generally indicates the number of a tag that is placed by the observer on swordfish that were going to be retained for sale. This field was used during the early period of the observer program; it has not been used since 1995. Presently, the field is used for 'NUMERO DE MUESTRA OBSV' in ICCAT FORM D, which is the number assigned to a biological sample collected from a particular fish.

4. Output Examples

In **Figure 6** a set of spatial and temporal maps of the total effort in number of sets observed in the VPLOP are displayed. Each map shows the total number sets observed over a period of 5 years beginning in 1991 through to 2011. In **Figure 7**, each map shows the total number of hooks observed over a period of 5 years beginning in 1991 through to 2011 displayed in 1°x1°.Other examples in which the data provided by the VPLOP was pivotal to a series of studies include: a study on demographic and relative abundance of blue shark in the Caribbean Sea and adjacent waters (Tavares *et al.*, 2012); a study on reproductive dynamics of white marlin in the northwestern Atlantic (Arocha and Barrios 2009); a study on length composition of albacore in the Caribbean Sea and adjacent North Atlantic (Arocha and Marcano 2004); as well as the estimation of standardized catch rates from industrial and artisanal fisheries (Arocha and Ortiz 2012; Arocha *et al.*, 2011), among others.

5. Protocol for Data Request

Scientists interested in the VPLOP data should contact Dr. Freddy Arocha (farocha@udo.ede.ve or farochap@gmail.com) for uses of the data base, stating their interest and purpose of use. Forms will be provided by email with detailed protocol.

References

AROCHA, F., Ortiz, M. 2012. Standardized catch rates for white marlin (*Tetrapturus albidus*) from the Venezuelan pelagic longline fishery off the Caribbean sea and the western central Atlantic: Period 1991-2010. ICCAT, Col. Vol. Sci. Pap., 68: 1408-1421.

AROCHA, F., Ortiz, M., Marcano, L.A. 2011.Catch rates for blue marlin (*Makaira nigricans*) from the small scale fishery off La Guaira, Venezuela: Period 1991-2009. ICCAT, Col. Vol. Sci. Pap., 66: 1675-1684.

AROCHA, F., A. Bárrios. 2009. Sex ratios, spawning seasonality, sexual maturity, and fecundity of white marlin (*Tetrapturus albidus*) from the western central Atlantic. Fisheries Research, 95: 98-111.

AROCHA, F., L.A. Marcano. 2004. Albacore (*Thunnus alalunga*) length composition from the Venezuelan longline fleet in the northwestern Atlantic: period 1987-2002. ICCAT, Col. Vol. Sci. Pap., 56; 1352-1359.

TAVARES, R., M. Ortiz, F. Arocha. 2012. Population structure, distribution, and relative abundance of the blue shark (*Prionace glauca*) in the Caribbean Sea and adjacent waters of the North Atlantic. Fisheries Research, 129-130: 137-152.

Table 1. Number of trips covered by observers of the VPLOP, total number of trips of the Venezuelan longline fleet, and annual observer coverage of the Venezuelan Pelagic Longline fleet from 1991 to 2011.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Tuna target trips	9	16	22	16	24	17	26	24	28	34	24	17	24	20	19	16	11	14	12	13	8
SWO target trips	8	16	12	14	13	18	11	19	8	-	-	-	-	-	-	-	-	-	-	-	-
Total observed	17	32	34	30	37	35	37	43	36	34	24	17	24	20	19	16	11	14	12	13	8
Total trips of fleet	209	197	239	252	298	299	279	230	226	216	236	117	122	164	218	230	225	275	298	377	477
Observer Coverage (%)	**8,1**	**16,2**	**14,2**	**11,9**	**12,4**	**11,7**	**13,3**	**18,7**	**15,9**	**15,7**	**10,2**	**14,5**	**19,7**	**12,2**	**8,7**	**7,0**	**4,9**	**5,1**	**4,0**	**3,4**	**1,7**

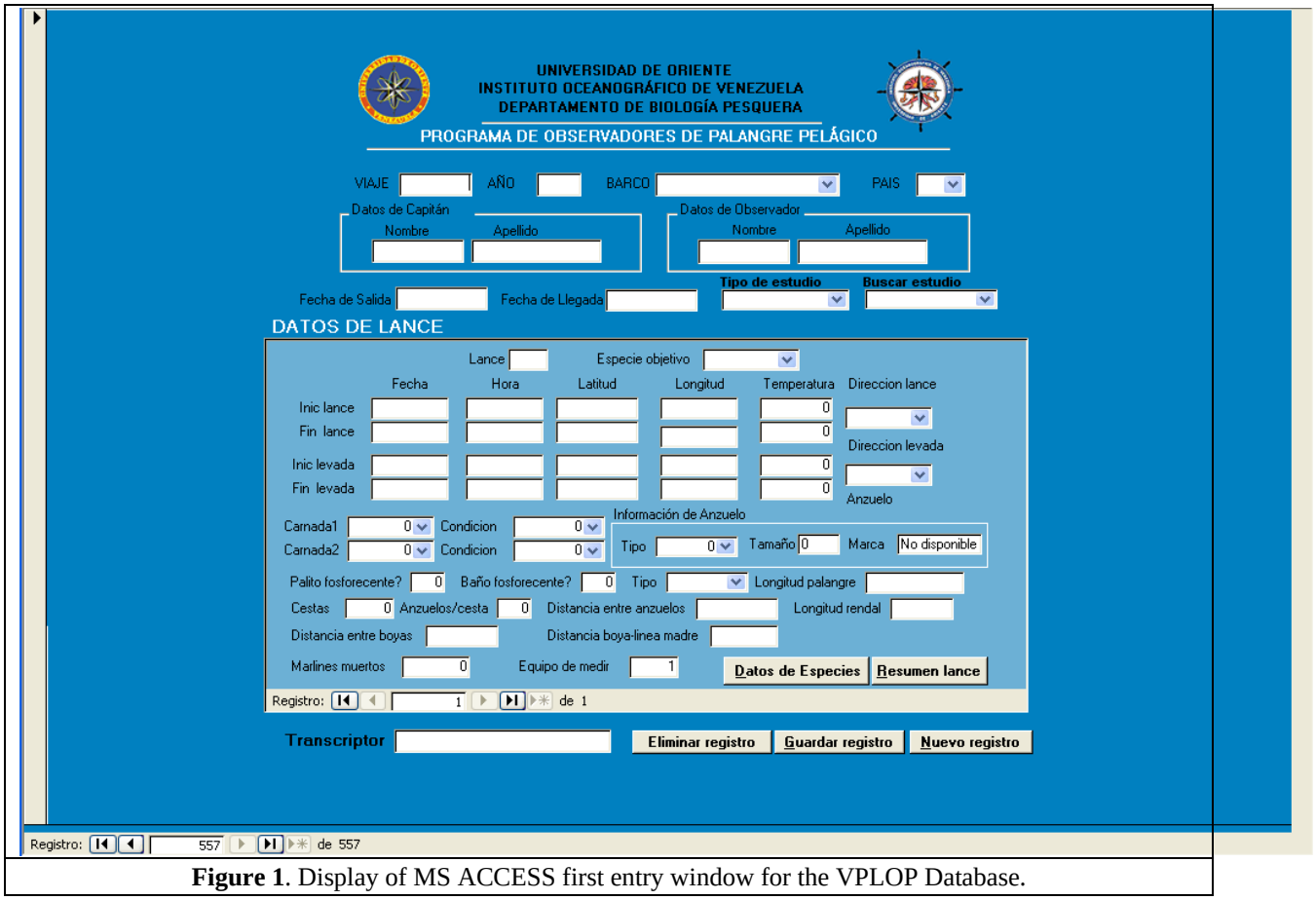


Figure 1. Display of MS ACCESS first entry window for the VPLOP Database.

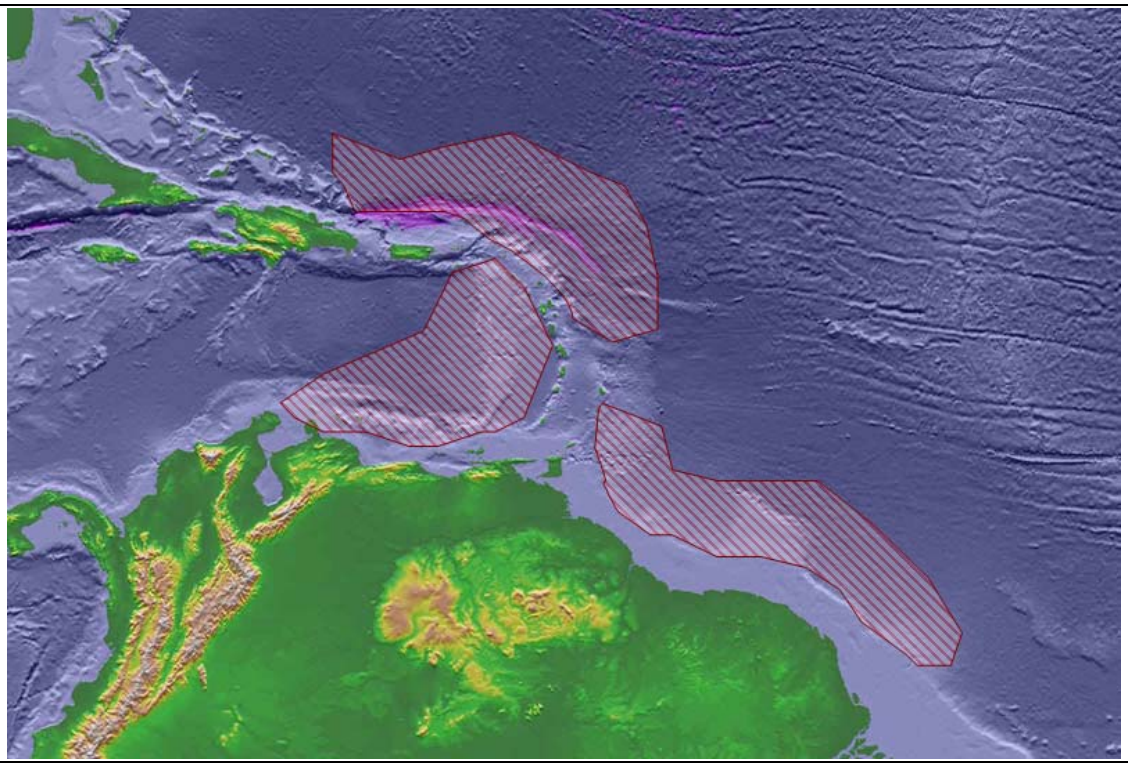


Figure 2. Main fishing areas of the Venezuelan pelagic longline fleet targeting tuna and tuna-like species in the Caribbean Sea and adjacent waters of the Atlantic Ocean.

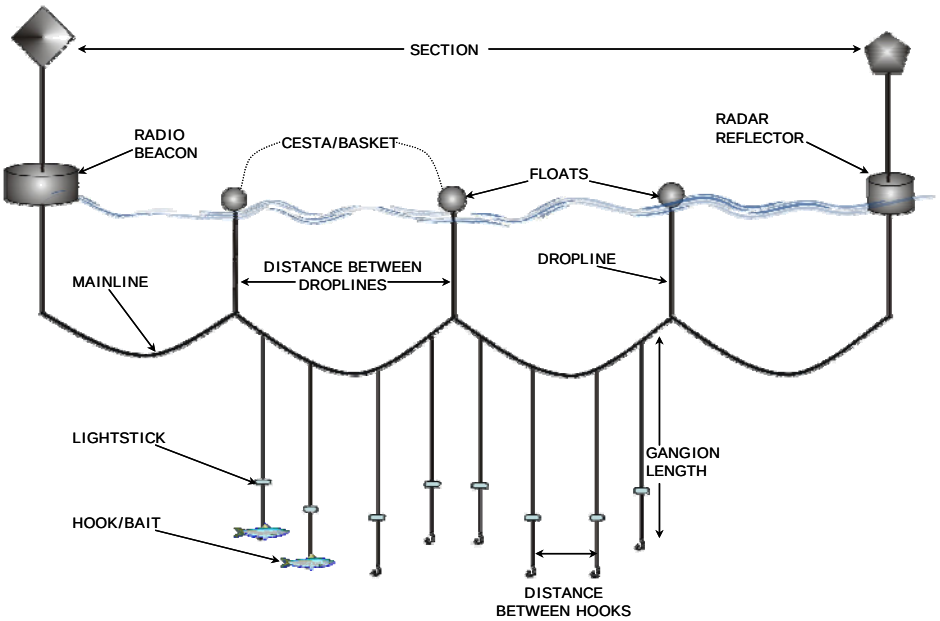


Figure 3. Diagram of section of the pelagic longlinr gear used by the Venezuelan longline fleet.

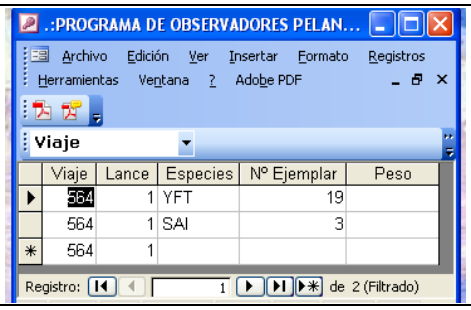
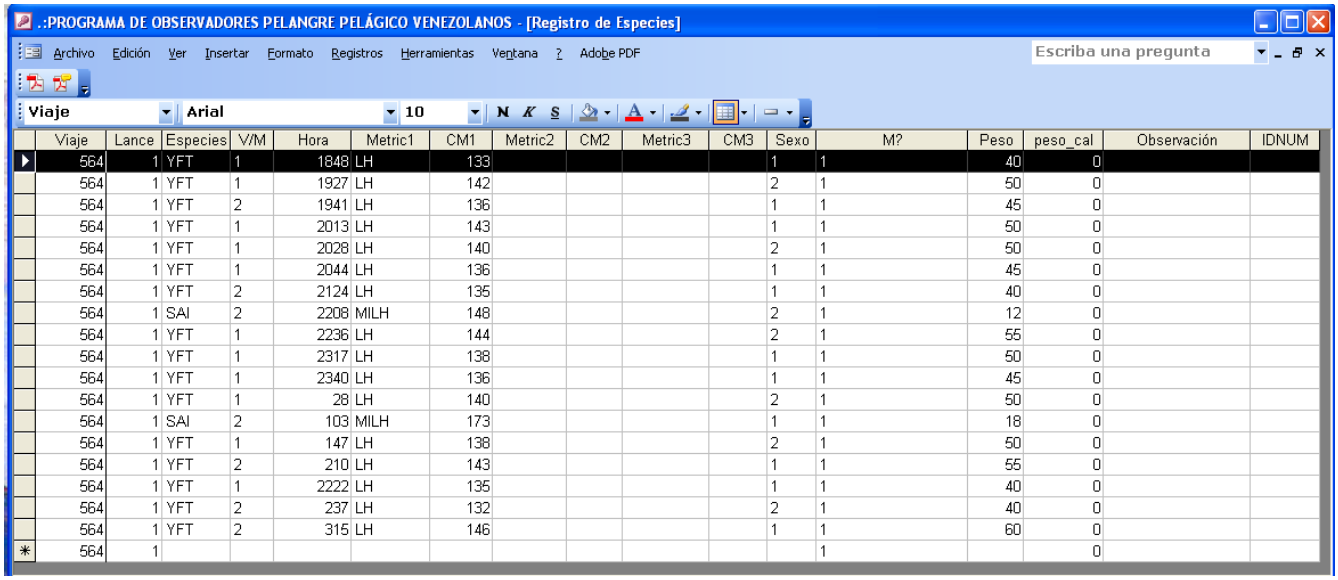


Figure 4. Display of MS ACCESS secondary entry window of CATCH SET for the VPLOP Data-base.



Viaje	Lance	Especies	V/M	Hora	Metric1	CM1	Metric2	CM2	Metric3	CM3	Sexo	M?	Peso	peso_cal	Observación	IDNUM
564	1	YFT	1	1848	LH	133					1	1	40	0		
564	1	YFT	1	1927	LH	142					2	1	50	0		
564	1	YFT	2	1941	LH	136					1	1	45	0		
564	1	YFT	1	2013	LH	143					1	1	50	0		
564	1	YFT	1	2028	LH	140					2	1	50	0		
564	1	YFT	1	2044	LH	136					1	1	45	0		
564	1	YFT	2	2124	LH	135					1	1	40	0		
564	1	SAI	2	2208	MILH	148					2	1	12	0		
564	1	YFT	1	2236	LH	144					2	1	55	0		
564	1	YFT	1	2317	LH	138					1	1	50	0		
564	1	YFT	1	2340	LH	136					1	1	45	0		
564	1	YFT	1	28	LH	140					2	1	50	0		
564	1	SAI	2	103	MILH	173					1	1	18	0		
564	1	YFT	1	147	LH	138					2	1	50	0		
564	1	YFT	2	210	LH	143					1	1	55	0		
564	1	YFT	1	2222	LH	135					1	1	40	0		
564	1	YFT	2	237	LH	132					2	1	40	0		
564	1	YFT	2	315	LH	146					1	1	60	0		
564	1											1		0		

Figure 5. Display of MS ACCESS secondary entry window of SPECIES DATA for the VPLOP Data-base.

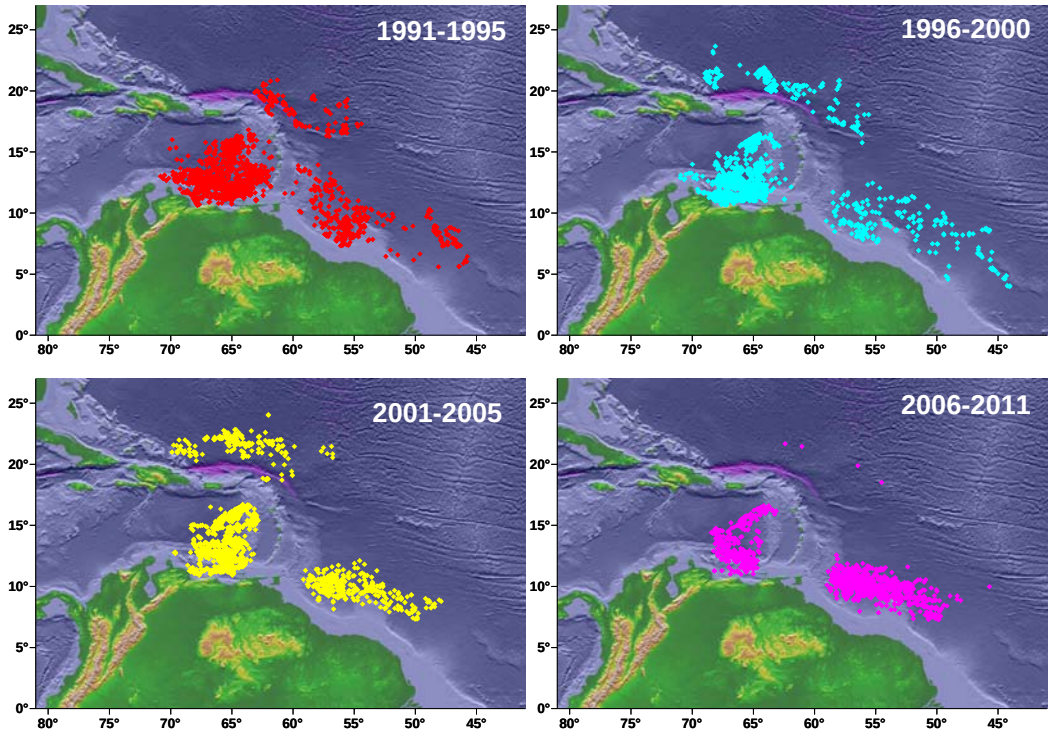


Figure 6. Spatial and temporal distribution of observed VPLOP sets.

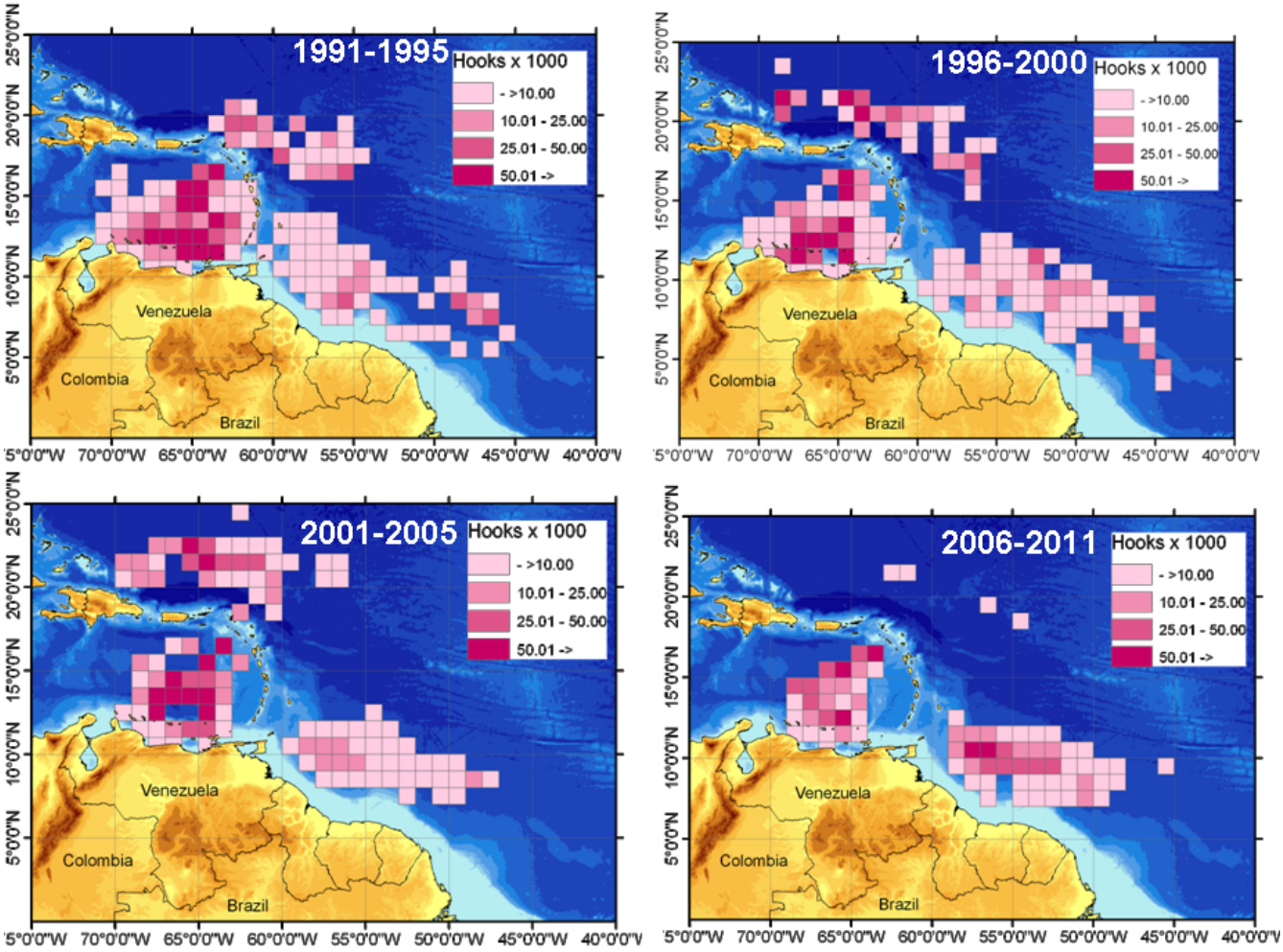


Figure 7. Spatial and temporal distribution of observed effort in total number of hooks (x1000) in the VPLOP in 1°x1°.

Annex 1

ICCAT FORM C and ICCAT FORM D
currently used in the Venezuelan Pelagic Longline Observer Program (VPLOP)

ICCAT FORMA C BITACORA DIARIA DE OBSERVADORES (palangre)

Fecha de Salida:_____ Fecha de Llegada:_____ AÑO: 2011

Nombre del Barco:	Número de Viaje
Nombre del Capitan:	
Nombre del Observador:	

NUMERO DEL LANCE: ESPECIE OBJETIVO:

	Mes	Dia	Hora	Latitud	Longitud	Temp (°C)
Comienzo del lance						-
Fin del lance						-
Comienzo de recoger						-
Fin de recoger						-

Carnada1 _____ Condición (V/M):

Carnada2_____

Rendal de acero SI ☐ No ☐

Tipo de Anz : Circular ☐ "J" ☐ Tamño.

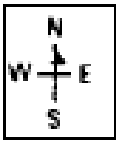
Palito fosforesnte. SI ☐ No ☐

Baño fosforesnte. SI ☐ No ☐

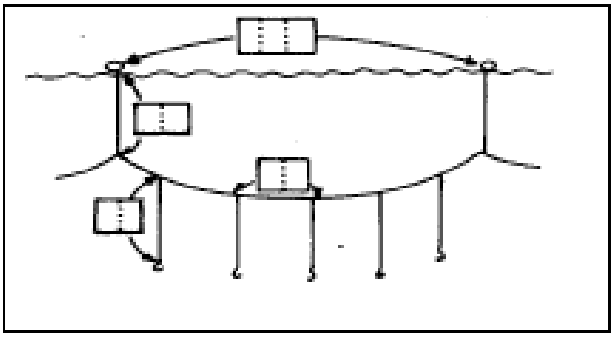
Marca anzuelo

Longitud del palangre (m):

Dirección del lance



Dirección de recogida



Indique dimensiones de la unidad en metros

Número total de unidades:
Número de anzuelos por unidad:
Número total de anzuelos:

CAPTURA DEL DIA

ESPECIES	Numero	kg
Atun aleta amarilla (YFT)		
Atun albacora (ALB)		
Atun ojo gordo (BET)		
Pez espada (SWO)		
Aguja blanca (WHM)		
Aguja azul (BUM)		
Pez vela (SAI)		
Pez lanza (SPF)		
Aguja (SPG)		
TIB:		
TIB:		
TIB:		
Dorado (DOL)		
Peto (WAH)		

ICCAT FORMA D **MUESTREO DE ESPECIES (observadores abordo)**

Rev. 2009 (SIRVE PARA TODAS LAS ESPECIES) **# Viaje:** **# LANCE:**

NOMBRE DEL BARCO	FECHA DE MUESTRA	OBSERVADOR	EQUIPO USADO
			☐ Vernier ☐ Cinta

Codigo	ESPECIES	Muerto	Vivo	Hora embarq		Medidas de longitud (om1)		Medidas de longitud (om2)			Especie LIBERADA		NUMERO DE MUESTRA OBSV	Peso (kg)		Sexo M/H/J	Observaciones
				hrs	min	MILH(LJFL)	LH(FL)	PFL	LT	TRNC	Si	No		Est.	Med.		
1											☐	☐		☐	☐		
2											☐	☐		☐	☐		
3											☐	☐		☐	☐		
4											☐	☐		☐	☐		
5											☐	☐		☐	☐		
6											☐	☐		☐	☐		
7											☐	☐		☐	☐		
8											☐	☐		☐	☐		
9											☐	☐		☐	☐		
10											☐	☐		☐	☐		
11											☐	☐		☐	☐		
12											☐	☐		☐	☐		
13											☐	☐		☐	☐		
14											☐	☐		☐	☐		
15											☐	☐		☐	☐		
16											☐	☐		☐	☐		
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24											☐	☐		☐	☐		
25											☐	☐		☐	☐		