STRENGTHENING GHANAIAN INDUSTRIAL PURSE SEINE FISHERY MONITORING IN THE GULF OF GUINEA

Emmanuel Chassot[1], Sylvia Ayivi[2], Laurent Floch[3], Laurent Dubroca[3], Pascal Cauquil[3], Alain Damiano[3]

SUMMARY

A 5-day workshop was held in Sète, France during May 27-31st 2013 between MFRD and IRD to improve the quality of Ghanaian fisheries data and define the methodological steps aimed at processing the time-series of data available for 2006-2012. The workshop was first dedicated to solving some technical problems in installing the AVDTH software and understanding some error messages generated by the tool AKADO used for checking and controlling data quality and consistency. In a second step, some specificity of the Ghanaian fisheries with regards to collaboration between purse seiners and baitboats and the availability of well plans were considered. The AVDTH referential of 'operations' was extended to include some particular activities linked to the transfer of fish from purse seiners to baitboats at-sea and a protocol of data entry was established. Finally, a full aggregated database for 2008-2011 was developed and converted into AVDTH v3.3. format after making vessel codes consistent with the IRD referential. Preliminary SQL and R codes which are available in appendix were developed to describe the fishing activities through several indicators such as the number of active vessels, the total annual catch, and total annual landings. Next steps will aim at extending the aggregated database to fully cover 2006-2012 and processing the data so as to provide Tasks 1 and 2 to the ICCAT.

RÉSUMÉ

Un atelier de cinq jours a été tenu à Sète (France) du 27 au 31 mai 2013, à l'initiative conjointe du MRFD et de l'IRD, dans le but d'améliorer la qualité des données halieutiques ghanéennes et de définir des approches méthodologiques destinées à traiter les séries temporelles de données disponibles pour la période 2006-2012. L'atelier s'est tout d'abord penché sur la résolution de quelques problèmes techniques dans l'installation du logiciel AVDTH et sur le déchiffrage de quelques messages d'erreur générés par l'outil AKADO dans le cadre de la vérification et du contrôle de la qualité et de la cohérence des données. Dans un second temps, les scientifiques examineront certaines caractéristiques spécifiques aux pêcheries ghanéennes en ce qui concerne la collaboration entre les senneurs et les canneurs et la disponibilité des plans. Le référentiel AVDTH de "opérations" a été étendu pour inclure quelques activités particulières liées au transfert en mer des poissons des senneurs aux canneurs et un protocole de saisie des données a été établi. Finalement, une base de données complètement agrégée pour 2008-2011 a été développée et convertie en version AVDTH format 3.3, une fois que les codes navires ont été rendus compatibles avec le référentiel de l'IRD. Les codes préliminaires SQL et R qui sont disponibles en appendice ont été développés afin de décrire les activités de pêche par le biais de plusieurs indicateurs, tels que le nombre de navires actifs, la prise annuelle totale et le total des débarquements annuels. La prochaine étape visera à étendre la base de données agrégées afin qu'elle englobe complètement la période 2006-2012 et à traiter les données dans le but de fournir à l'ICCAT les Tâches I et II.

RESUMEN

Se celebraron en Sète, Francia, unas Jornadas de trabajo de cinco días, del 27 al 31 de mayo de 2013, entre el MFRD y el IRD, para mejorar la calidad de los datos de las pesquerías de Ghana y definir los pasos metodológicos para procesar las series temporales de datos

[1] Institut de Recherche pour le Développement, Seychelles Fishing Authority, Fishing Port, BP570, Victoria, SEYCHELLES
[2] Directorate of Fisheries, Marine Fisheries Research Division, Ministry of Food & Agriculture, P.O. Box BT62, Tema, GHANA
[3] Institut de Recherche pour le Développement, CRH, Avenue Jean Monnet, BP171, 34203 Sète cedex, FRANCE

disponibles para 2006-2012. En un primer momento las jornadas se centraron en resolver algunos problemas técnicos en la instalación del programa AVDTH y descifrar algunos mensajes de error generados por la herramienta AKADO, utilizada para comprobar y controlar la coherencia y la calidad de los datos. En una segunda fase, se consideraron algunas especificidades de las pesquerías ghanesas en lo que concierne a la colaboración entre cerqueros y barcos de cebo vivo y la disponibilidad de los planos de cubas. El referencial AVDTH de "operaciones" se amplió para incluir algunas actividades vinculadas con la transferencia de peces desde los cerqueros hasta los barcos de cebo vivo en el mar y se estableció un protocolo para la introducción de datos. Finalmente, se desarrolló una base de datos totalmente agregada para 2008-2011 y se convirtió al formato AVDTH versión 3.3 tras hacer que los códigos de los buques fueran coherentes con el referencial del IRD. Se desarrollaron de forma preliminar los códigos R y SQL, que están disponibles en apéndice, para describir las actividades de pesca mediante varios indicadores como el número de buques activos, la captura anual total y los desembarques anuales totales. Las siguientes fases tendrían como objetivo ampliar las bases de datos agregadas para cubrir totalmente el periodo 2006-2012 y procesar los datos para proporcionar la Tarea I y la Tarea II a ICCAT.

KEYWORDS

Catch statistics, High seas fisheries, Purse seining,

1. Introduction

A workshop was held between IRD and MFRD from the 27th to the 31st of May 2013 within the framework of the action 4 of the project "Strengthening Ghanaian industrial purse seine fishery monitoring in the Gulf of Guinea". The main objectives of the workshop were (i) to assess the quality of the datasets available for processing the baitboat (BB) and purse seine (PS) fishery data over the period 2006-2012, (ii) to define specific modifications of softwares (AVDTH, AKADO, T3 +) adapted to the Ghanaian fishery and its sampling procedures.

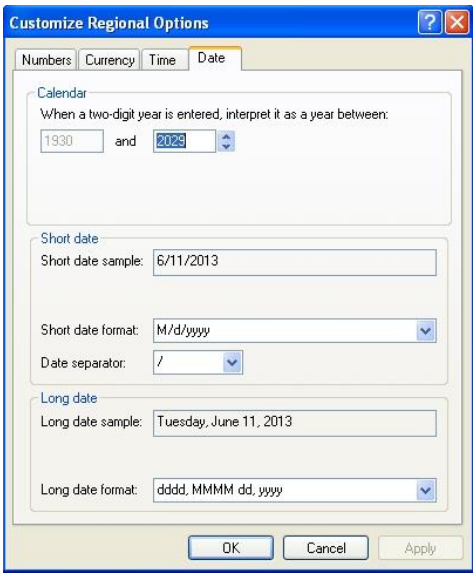
2. Some technical aspects

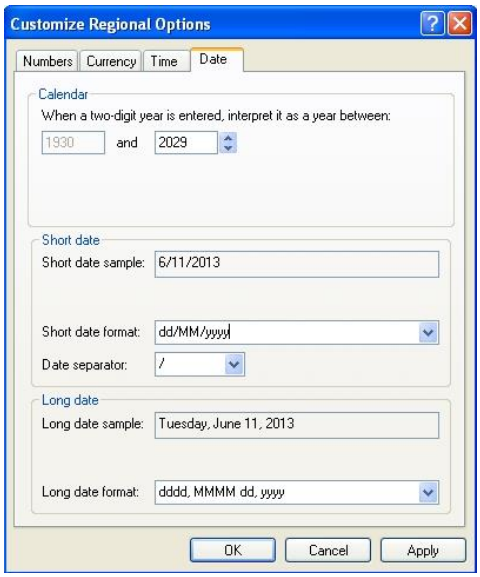
2.1 AVDTH v3.3 installation and date formats

A technical solution was provided to MFRD for installing the most recent version of AVDTH (v3.3) on Windows 7. In addition, a problem was detected with date format on operating system of Sylvia Ayivi's computer. The following process was used to declare the date format when using AVDTH and other softwares of the "Observatoire Thonier" on Windows operating system:

-> Start -> All Programs -> Control Panel -> Date, Time, Language, and Regional Options -> Change the format of numbers, dates, and times -> Customize -> Date

Modify short date format M/d/yyyy by -> dd/MM/yyyy following:





2.2 TunaLetter

An introduction to the TunaLetter which consists of a suite of SQL queries implemented in a MS ACCESS database that can be linked to any AVDTH database was made. Queries enable to extract several indicators and statistics such as annual landings by gear, list of active vessels, etc.

2.3. AKADO software

Based on the example of the 2006 AVDTH database, MFRD provided IRD with a list of the different errors (screen prints) arising when running the AKADO software associated with their interpretation of the errors (**Appendix 1**). For each error message, IRD will write a proper "log" message explaining the error cause in order to help the user to make appropriate corrections to the data when needed. Message errors in French will be included in the AKADO manual that will be improved and provided to the ICCAT secretariat for English translation.

3 Some precisions in Ghanaian fisheries data

3.1. Collaboration between purse seiners and baitboats

Collaboration between Ghanaian PS and BB occurs when a baitboat asks for the assistance of a purse seiner to catch a tuna school. Recently, about 80% of BB operations on drifting fish aggregating devices (FADs) would involve collaboration with a PS. The PS catch is shared between both vessels, generally equally (i.e. 50%), but the portion of catch transferred at-sea to the BB can reach 100% in some cases. The information on collaboration (i.e. name of the vessel and magnitude of catch shared) is generally present in the logbooks but it has not been recorded until now in AVDTH because of missing dedicated fields for data entry. When the transfer of fish is 100% of the catch, the information is generally not recorded in the logbook of the PS, which can result in an underestimation of the number of sets and catch. Also, even if the baitboat started to fish on the school before the arrival of the purse seiner, the information on this initial activity and associated catch is generally not recorded in the logbook in which only the collaborative activity is present.

CASE 1. The BB started to fish on the FAD and recorded the information before collaboration started.

- Two activities for BB must be entered into AVDTH: (1) the positive catch [C_OPERA = 1 AND C_ASSOC = 20-24 AND C_TBANC = 1], (2) the transfer of fish from the purse seiner to the baitboat [C_OPERA = 12[4] AND C_ASSOC = 100[5] AND C_TBANC = 1]

[4] Fish transfer from a purse seiner
[5] Collaboration with purse seiner for sharing the catch

CASE 2. No information on catch of the BB is recorded before the collaboration started. We assume that the "potential" initial catch of the baitboat was negligible:

- One activity for BB must be entered into AVDTH: the transfer of fish from the purse seiner to the baitboat [C_OPERA = 12[6] AND C_ASSOC = 100[7] AND C_TBANC = 1]

- Two activities for PS must be entered into AVDTH: (1) the positive catch [C_OPERA = 1 AND C_ASSOC = 20-24]. The catch recorded in ACTIVITE.V_POIDS_CAP would only correspond to the catch retained by the purse seiner, (2) the transfer of part of the PS catch to the baitboat [C_OPERA = 19[8] AND C_ASSOC = 98[9] AND C_TBANC = 1). The catch transferred from the PS to the BB would be indicated in the fields V_POIDS_CAPT of the table CAPT_ELEM.

Note that the coding is generic so that collaboration between PS and BB on free-swimming schools would follow the same scheme (C_TBANC=2 or 3). It was proposed that information on the collaborative vessels (i.e. codes of PS or BB) available from the logbooks could be entered as a comment in AVDTH. This information might reveal useful for future analyses.

3. 2. Well maps and information on the sets

Although the well maps, i.e. plans that describe where the catch of the fishing sets is stored, have become recently available for most Ghanaian PS, discussions with fishermen crews indicated that some shifting (i.e. fish transfer between wells) occurs at-sea to ensure vessel equilibrium. This results in the loss of information on the catch (i.e. time, area, and fishing mode) when sampling a well. Some Ghanaian PS (i.e. TTV Company) might not perform such shifting practices and MFRD will identify in a near future the vessels for which well maps accurately reflect the origin of the fishing sets.

For size-samples conducted on BB, the whole vessel is considered as 1 unique well and information on the catch (i.e. time, area, and fishing mode) is derived from all fishing activities reported in the logbook. The species and size composition might however be a mix of PS and BB catch in the case of transfer of catch at-sea (see Section 3.1). The distribution of catch per set for each fishing mode did exhibit several outliers with 4.4% of the sets with catch larger than 40 t corresponding to the 95% quantile value (**Figure 1**). Following MFRD, catches of Ghanaian BB during 1 operation could reach a maximum of 200 t. It appeared therefore not possible to identify the catches related to collaborations from the distribution of the BB catch.

4 Developing an aggregated AVDTH database for 2006-2012

A common vessel reference list was agreed between IRD and MFRD in 2011 and implemented in 2012. All vessel codes in the AVDTH databases available for the period 2008-2011 were corrected according to the new referential for consistency over time. The corrections concerned the tables trip (table MAREE), activities (table ACTIVITE), wells (table CUVE), and samples (table ECHANTILLON) and resulted in several changes in vessel codes and associated names. For instance, ACE1 and GBESE8 would become ACE1 in 2009, DELALI would be split between DELALI and LAURENT, etc. The databases were then merged and converted to the most recent version of AVDTH, i.e. v3.3.

In order to finalize a full Ghanaian fisheries database for 2006-2012, it was agreed that the following work would be conducted before July 2013:

- MFRD will make modifications in vessel codes for 2006 that could not be made during the WG due to a lack of information, and convert the 2006 database to v3.3,
- IRD will manage the entry of the fisheries data available for 2007 in MS Excel file,
- MFRD will finalize the 2012 database and convert it to v3.3.

[6] Fish transfer from a purse seiner
[7] Collaboration with purse seiner for sharing the catch
[8] Fish transfer toward a baitboat
[9] Collaboration with a baitboat for sharing the catch

5 Preliminary analyses of landing and logbook data for 2008-2011

5.1 Ghanaian task 1

The total yearly landings and catches in the 2008-2011 AVDTH database were compared with the data available in the current ICCAT database. **Table 1** indicates that the current ICCAT task 1 includes some inconsistencies: (i) the PS task 1 in 2008 and 2009 underestimates the AVDTH landings by about 90% and 11%, respectively, (ii) the BB task 1 in 2011 underestimates the AVDTH catches by 46%. These underestimates are certainly conservative as the AVDTH databases likely do not cover 100% of the Ghanaian fishing vessels activities.

It is noteworthy from **Table 1** that landings and catches for PS and BB in 2009 and for BB in 2010 were very similar while the catches for PS in 2010 and 2011 only represented 66% and 50% of the landings, respectively. This might indicate either an improvement in the collection of tuna sale records or on the other hand could reveal a decrease in the collection of logbook data, e.g. 41,000 t recorded in 2009 vs. 27,000 t in 2011.

5.2 Ghanaian active vessels

The corrections made with regards to vessel codes allowed to derive the numbers of active vessels from the 2008-2011 AVDTH database. **Table 2** shows that some Ghanaian purse seiners did not provide any logbook data to MRFD in 2010 and 2011 while their landings were monitored: PANOFI MASTER, PANOFI DISCOVERER, PANOFI PATHFINDER, PANOFI FORERUNNER, and PANOFI FRONTIER.

Conclusions

The workshop was a success for (i) understanding some specificity of the Ghanaian surface fisheries and sampling operations, (ii) improving the consistency in the Ghanaian fisheries datasets through correction of the vessel codes to create a reference database for the period 2006-2012, and (iii) starting exploring the Ghanaian data. The availability of a unique AVDTH database in v3.3 format from July 2013 will facilitate the following steps of the work to process the time series so as to correct for the species-specific composition of the catch and produce the ICCAT task 2 data. Special effort will be dedicated to provide the maximum of information about the analyses conducted through the description of all SQL queries and R codes used to extract and process the data.

Table 1. Comparison between the total catches for the Ghanaian fishing vessels ICCAT task 1 (May 2013) by year and gear group with landings and catches* as available in the 2008-2011 AVDTH database. Note that the year of landing does not exactly correspond to the year of catch due to overlap of some trips between 2 successive years. BB = baitboat; PS = purse seiner.

YearC	GearGrp	ICCAT	Landings	Catch
2008	BB	43932	25259	22330
2008	PS	20162	38624	18545
2009	BB	31126	27284	27809
2009	PS	35344	39405	40977
2010	BB	23885	21733	22035
2010	PS	56335	56132	36778
2011	BB	16410	16574	23918
2011	PS	53395	54005	26998

* SQL queries and R codes are given in appendix

Table 2. Number of distinct active vessels by year and gear group. A vessel was considered to be active if it was recorded at least once in the tables MAREE (fish sale records) or ACTIVITE (logbooks) of AVDTH. N_maree and N_activite indicate the numbers of active vessels from the tables MAREE ACTIVITE, respectively. BB = baitboat; PS = purse seiner

YearC	GearGrp	N_maree	N_activite
2008	BB	19	19
2008	PS	9	7
2009	BB	19	19
2009	PS	12	12
2010	BB	20	19
2010	PS	16	12
2011	BB	15	15
2011	PS	16	12

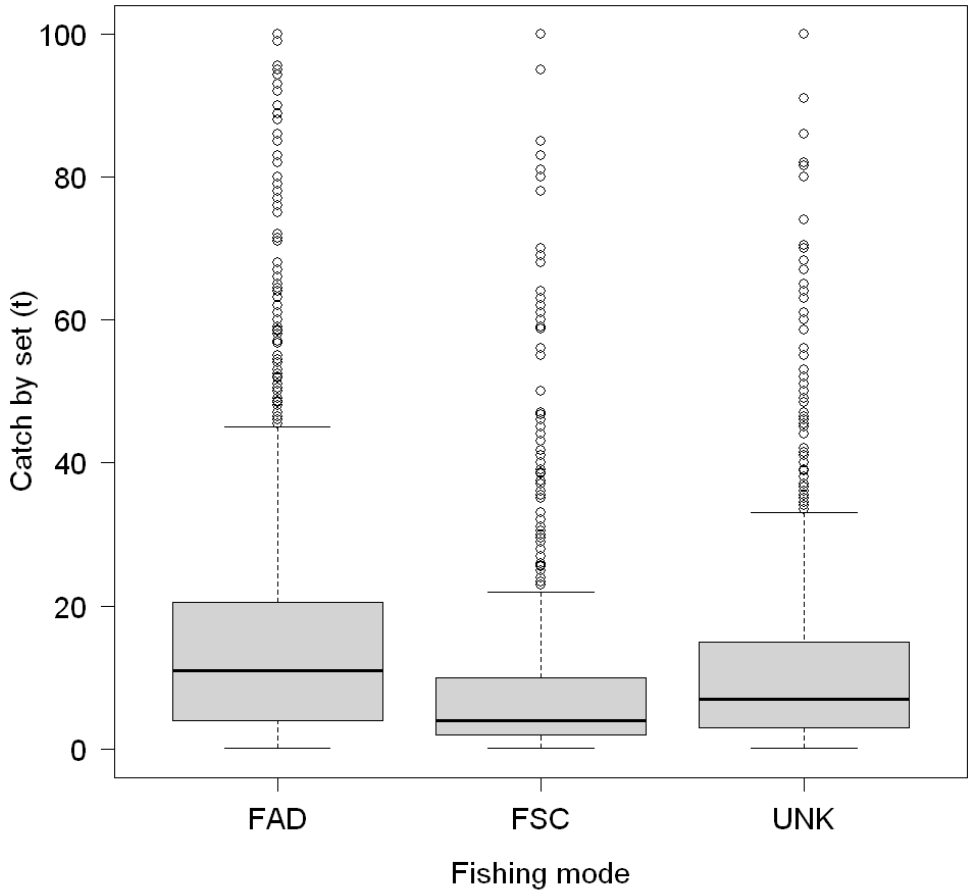
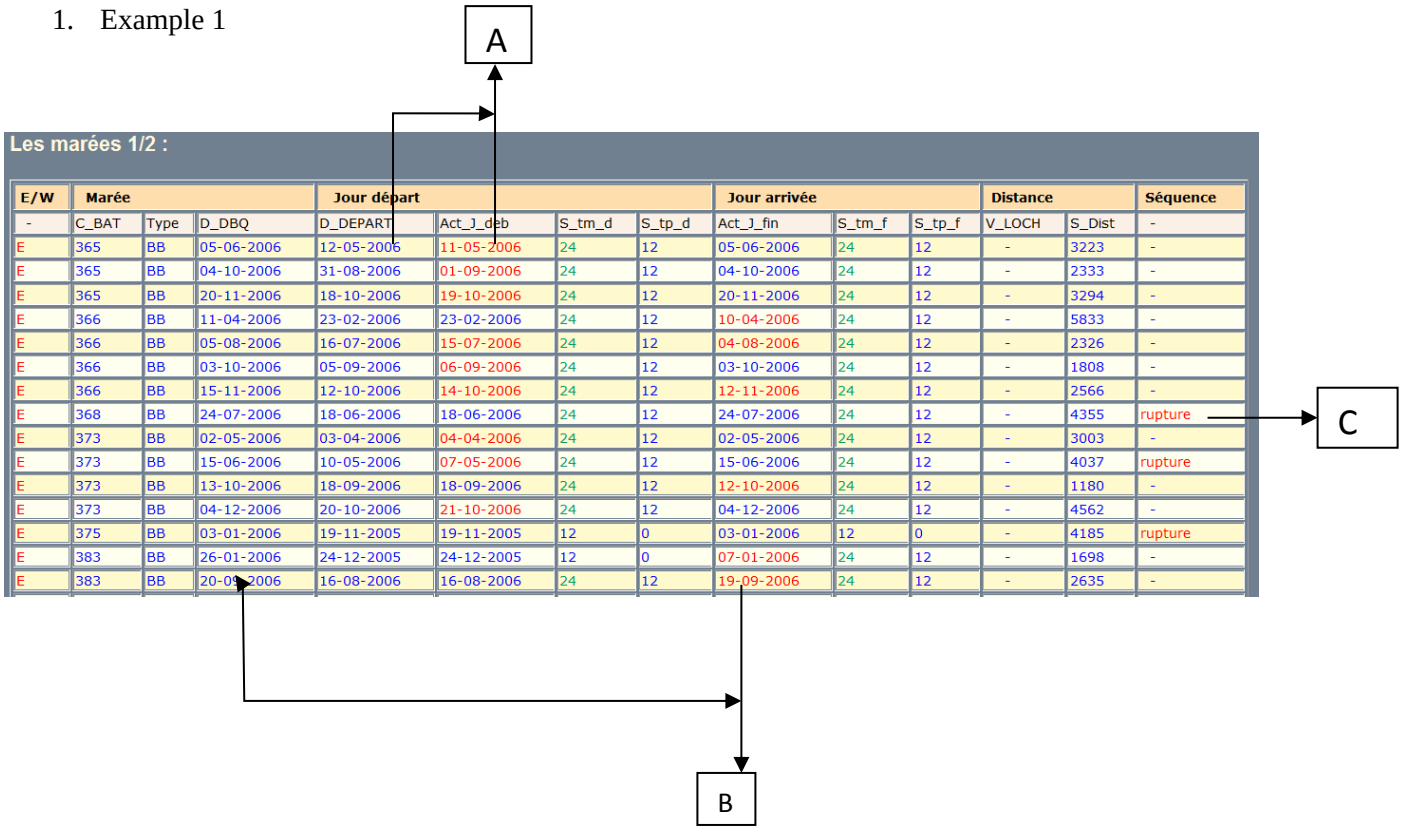


Figure 1. Distribution of the catch per set for the Ghanaian baitboats during 2008-2011. FAD = fish-aggregating device; FSC = free-swimming school; UNK = unknown fishing mode. Note that the y-axis was restricted to a maximum of 100 t but 54 of the 6,884 activities showed catch > 100 t.

Appendix 1. Case studies of AKADO errors with interpretation from MFRD and IRD

MAREES (Landing)

1. Example 1



Les marées 1/2 :

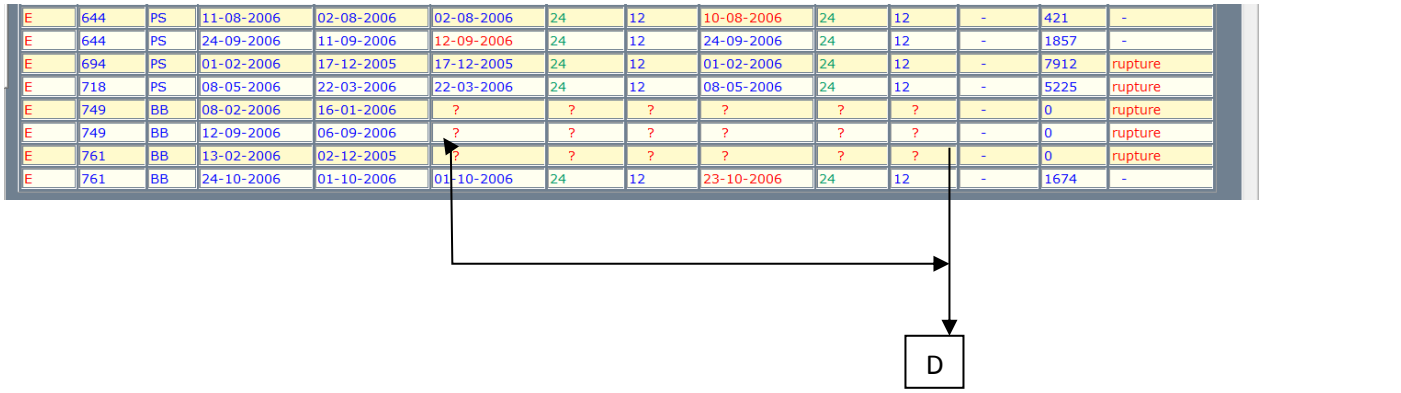
E/W	Marée			Jour départ				Jour arrivée			Distance		Séquence
-	C_BAT	Type	D_DBQ	D_DEPART	Act_J_deb	S_tm_d	S_tp_d	Act_J_fin	S_tm_f	S_tp_f	V_LOCH	S_Dist	-
E	365	BB	05-06-2006	12-05-2006	11-05-2006	24	12	05-06-2006	24	12	-	3223	-
E	365	BB	04-10-2006	31-08-2006	01-09-2006	24	12	04-10-2006	24	12	-	2333	-
E	365	BB	20-11-2006	18-10-2006	19-10-2006	24	12	20-11-2006	24	12	-	3294	-
E	366	BB	11-04-2006	23-02-2006	23-02-2006	24	12	10-04-2006	24	12	-	5833	-
E	366	BB	05-08-2006	16-07-2006	15-07-2006	24	12	04-08-2006	24	12	-	2326	-
E	366	BB	03-10-2006	05-09-2006	06-09-2006	24	12	03-10-2006	24	12	-	1808	-
E	366	BB	15-11-2006	12-10-2006	14-10-2006	24	12	12-11-2006	24	12	-	2566	-
E	368	BB	24-07-2006	18-06-2006	18-06-2006	24	12	24-07-2006	24	12	-	4355	rupture
E	373	BB	02-05-2006	03-04-2006	04-04-2006	24	12	02-05-2006	24	12	-	3003	-
E	373	BB	15-06-2006	10-05-2006	07-05-2006	24	12	15-06-2006	24	12	-	4037	rupture
E	373	BB	13-10-2006	18-09-2006	18-09-2006	24	12	12-10-2006	24	12	-	1180	-
E	373	BB	04-12-2006	20-10-2006	21-10-2006	24	12	04-12-2006	24	12	-	4562	-
E	375	BB	03-01-2006	19-11-2005	19-11-2005	12	0	03-01-2006	12	0	-	4185	rupture
E	383	BB	26-01-2006	24-12-2005	24-12-2005	12	0	07-01-2006	24	12	-	1698	-
E	383	BB	20-09-2006	16-08-2006	16-08-2006	24	12	19-09-2006	24	12	-	2635	-

A. Departure date in landing is different from departure date in Activity (logbook) for corresponding trip.
Logbook and landing forms should be checked to cross-check the data.

B. Arrival date in landing is different from Arrival date in Activity (logbook) corresponding trip.

Change departure date of landing to what is indicated in logbook

C. No total landing but logbook entered into Activity form
Modify F_CAL_VID (Partial landing) declaration and run again AKADO

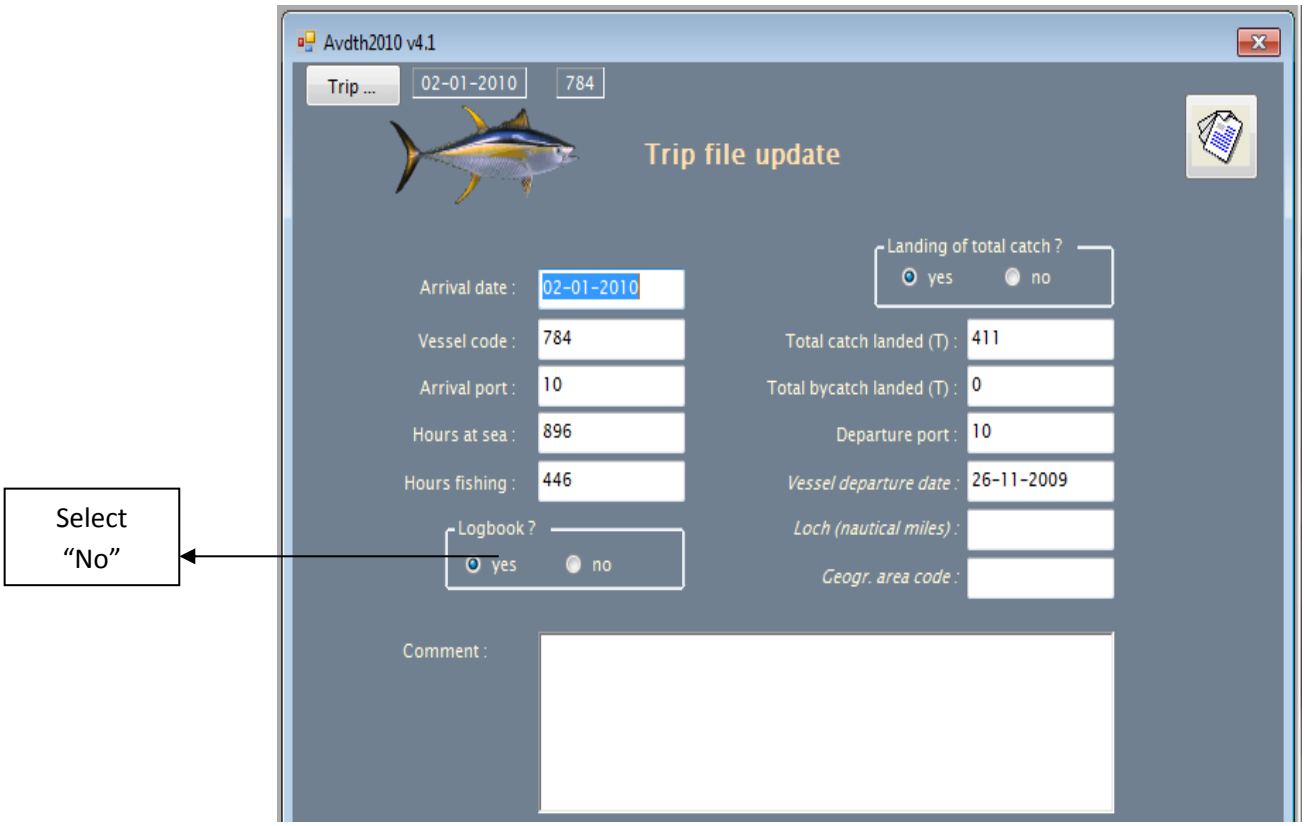


E	644	PS	11-08-2006	02-08-2006	02-08-2006	24	12	10-08-2006	24	12	-	421	-
E	644	PS	24-09-2006	11-09-2006	12-09-2006	24	12	24-09-2006	24	12	-	1857	-
E	694	PS	01-02-2006	17-12-2005	17-12-2005	24	12	01-02-2006	24	12	-	7912	rupture
E	718	PS	08-05-2006	22-03-2006	22-03-2006	24	12	08-05-2006	24	12	-	5225	rupture
E	749	BB	08-02-2006	16-01-2006	?	?	?	?	?	?	-	0	rupture
E	749	BB	12-09-2006	06-09-2006	?	?	?	?	?	?	-	0	rupture
E	761	BB	13-02-2006	02-12-2005	?	?	?	?	?	?	-	0	rupture
E	761	BB	24-10-2006	01-10-2006	01-10-2006	24	12	23-10-2006	24	12	-	1674	-

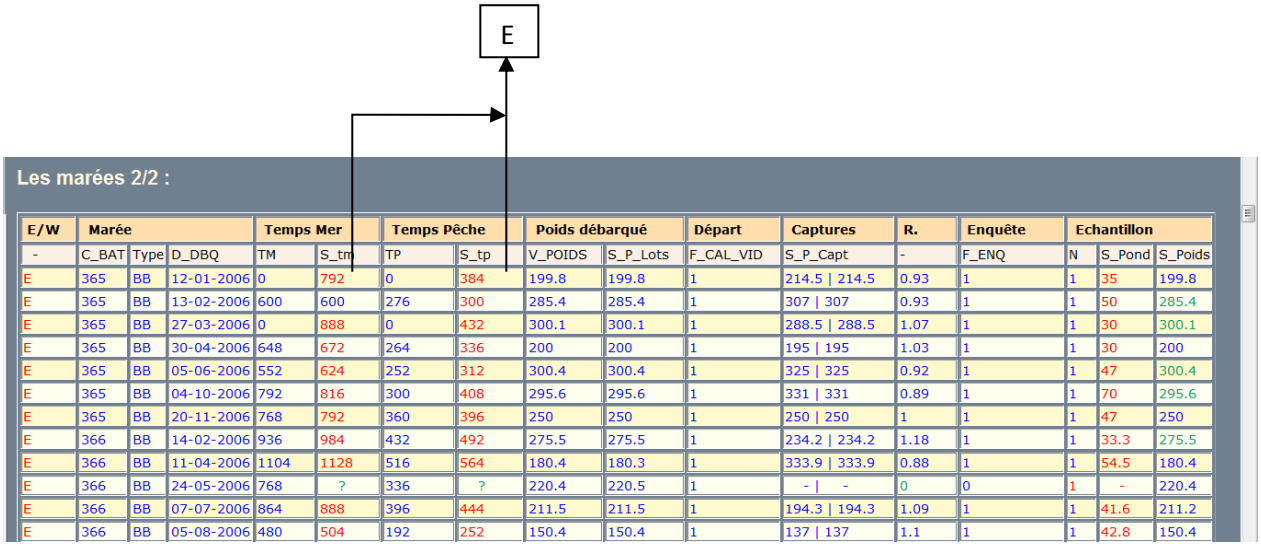
First step: Modify F_CAL_VID (Partial landing) declaration and run again AKADO.

D. No logbook entered

Select 'No logbook' button on the Landing dialogue box

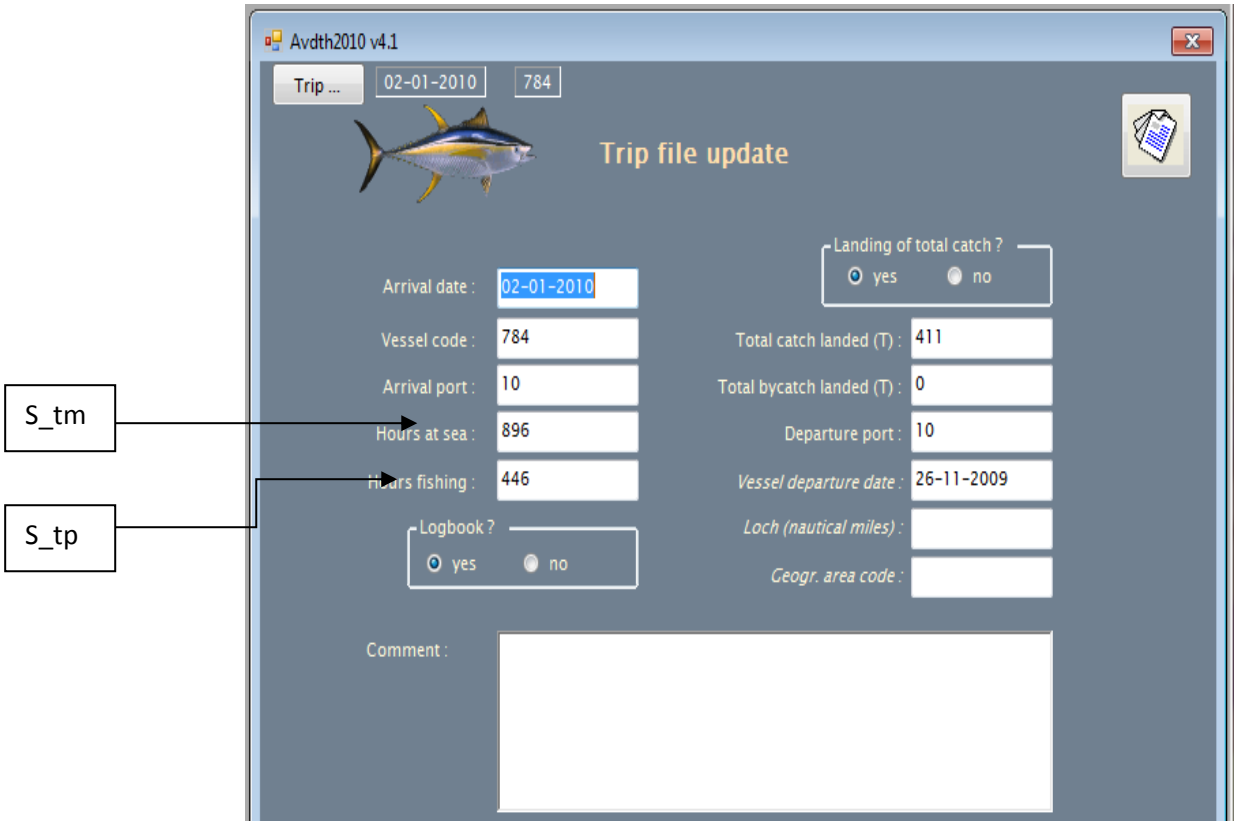


MAREE 2/2



E/W	Marée			Temps Mer		Temps Pêche		Poids débarqué		Départ	Captures	R.	Enquête	Echantillon		
-	C_BAT	Type	D_DBQ	TM	S_tm	TP	S_tp	V_POIDS	S_P_Lots	F_CAL_VID	S_P_Capt	-	F_ENQ	N	S_Pond	S_Poids
E	365	BB	12-01-2006	0	792	0	384	199.8	199.8	1	214.5 | 214.5	0.93	1	1	35	199.8
E	365	BB	13-02-2006	600	600	276	300	285.4	285.4	1	307 | 307	0.93	1	1	50	285.4
E	365	BB	27-03-2006	0	888	0	432	300.1	300.1	1	288.5 | 288.5	1.07	1	1	30	300.1
E	365	BB	30-04-2006	648	672	264	336	200	200	1	195 | 195	1.03	1	1	30	200
E	365	BB	05-06-2006	552	624	252	312	300.4	300.4	1	325 | 325	0.92	1	1	47	300.4
E	365	BB	04-10-2006	792	816	300	408	295.6	295.6	1	331 | 331	0.89	1	1	70	295.6
E	365	BB	20-11-2006	768	792	360	396	250	250	1	250 | 250	1	1	1	47	250
E	366	BB	14-02-2006	936	984	432	492	275.5	275.5	1	234.2 | 234.2	1.18	1	1	33.3	275.5
E	366	BB	11-04-2006	1104	1128	516	564	180.4	180.3	1	333.9 | 333.9	0.88	1	1	54.5	180.4
E	366	BB	24-05-2006	768	?	336	?	220.4	220.5	1	- | -	0	0	1	-	220.4
E	366	BB	07-07-2006	864	888	396	444	211.5	211.5	1	194.3 | 194.3	1.09	1	1	41.6	211.2
E	366	BB	05-08-2006	480	504	192	252	150.4	150.4	1	137 | 137	1.1	1	1	42.8	150.4

E. Input the values from the columns S_tm and S_tp into the fields Hours at Sea and Hours Fishing respectively.
Usually, when entering the Trip file update you need not entering hours at sea and fishing hours. After having entered the whole activities for one trip, just run Akado: it will calculate the sum of hours at sea (S_tm) and fishing hours (S_tp) entered for each day of activity and just report them into the adequate fields.



Activity (Logbook)

2.

Les activités :

E/W	Activité					Opération	Poids			Associations		Position					T °C
-	BAT	Type	D_DBQ	D_ACT	N_ACT	OPERA	POIDS_CAP	S_capt_elem	S_pond_act	TBANC	Assoc	Q	LAT	LON	A terre	OA/OI	N_Ech	-
E	365	BB	12-01-2006	06-01-2006	1	1	35	35 | 35	-	3	-	3	4	1404	non	1	4	-
E	365	BB	27-03-2006	23-03-2006	1	1	30	30 | 30	-	3	-	2	312	328	non	1	27	-
E	365	BB	30-04-2006	19-04-2006	1	1	30	30 | 30	-	3	-	2	257	415	non	1	11	-
E	365	BB	05-06-2006	17-05-2006	1	1	47	47 | 47	-	3	-	3	430	259	non	1	8	-
E	365	BB	04-10-2006	24-09-2006	1	1	70	70 | 70	-	3	-	1	328	227	non	1	6	-
E	365	BB	20-11-2006	14-11-2006	1	1	47	47 | 47	-	3	-	2	157	846	non	1	8	-
E	366	BB	14-02-2006	08-02-2006	1	1	33.3	33.3 | 33.3	-	3	-	4	124	23	non	1	16	-
E	366	BB	11-04-2006	09-04-2006	1	1	54.5	54.5 | 54.5	-	3	-	4	32	233	non	1	4	-
E	366	BB	07-07-2006	14-06-2006	1	1	41.6	41.6 | 41.6	-	3	-	3	127	859	non	1	5	-
E	366	BB	05-08-2006	31-07-2006	1	1	42.8	42.8 | 42.8	-	3	-	3	159	801	non	1	3	-
E	366	BB	03-10-2006	29-09-2006	1	1	47.1	47.1 | 47.1	-	3	-	1	359	205	non	1	3	-
E	366	BB	15-11-2006	23-10-2006	1	1	1.7	1.7 | 1.7	-	3	-	4	536	24	oui	1	-	-
E	366	BB	15-11-2006	08-11-2006	1	1	85	85 | 85	-	3	-	4	411	651	non	1	4	-
E	368	BB	20-02-2006	14-02-2006	1	1	41.5	41.5 | 41.5	-	3	-	4	117	109	non	1	8	-
E	368	BB	22-04-2006	21-04-2006	1	1	24	24 | 24	-	3	-	4	405	43	non	1	5	-
E	368	BB	05-06-2006	11-05-2006	1	1	34	34 | 34	-	3	-	4	29	1222	non	1	9	-
E	368	BB	24-07-2006	12-07-2006	1	1	81	81 | 81	-	3	-	4	347	1506	non	1	7	-
E	368	BB	27-10-2006	15-10-2006	1	1	50	50 | 50	-	3	-	3	124	915	non	1	12	-
E	373	BB	15-02-2006	08-02-2006	1	1	60	60 | 60	-	3	-	1	535	119	non	1	13	-

On land

Error indicates the position of activity is on Land

Check and update the position of activity

3.

Associate code

E	564	BB	25-06-2006	29-05-2006	1	1	79.5	79.5 | 79.5	-	3	-	3	149	846	non	1	11	-
E	564	BB	16-08-2006	11-08-2006	1	1	65	65 | 65	-	3	-	3	313	700	non	1	8	-
E	564	BB	01-10-2006	27-08-2006	1	9	?	- | -	-	3	-	4	530	27	oui	1	-	-
E	564	BB	01-10-2006	28-08-2006	1	9	?	- | -	-	3	-	4	530	25	oui	1	-	-
E	564	BB	01-10-2006	26-09-2006	1	1	50	50 | 50	-	3	-	4	14	1501	non	1	7	-
E	564	BB	21-11-2006	13-11-2006	1	1	80.5	80.5 | 80.5	-	3	-	4	4	1315	non	1	5	-
E	577	BB	16-04-2006	11-04-2006	1	1	21.7	21.7 | 21.7	-	3	-	3	108	509	non	1	12	-
E	577	BB	24-07-2006	09-07-2006	1	1	12.2	12.2 | 12.2	-	2	21 29	1	518	321	non	1	-	-
E	577	BB	24-07-2006	17-07-2006	1	1	28.7	28.7 | 28.7	-	2	24 29	1	538	122	non	1	-	-
E	577	BB	19-11-2006	08-11-2006	1	1	48.6	48.6 | 48.6	-	3	-	2	311	757	non	1	10	-
E	636	BB	22-02-2006	17-02-2006	1	1	44	44 | 44	-	3	-	1	333	447	non	1	12	-
E	636	BB	26-09-2006	18-09-2006	1	1	32.6	32.6 | 32.6	-	3	-	1	401	106	non	1	9	-
E	642	PS	06-01-2006	19-12-2005	1	1	55	55 | 55	55	3	-	4	209	1654	non	1	2	-
E	642	PS	15-04-2006	20-02-2006	1	1	40	40 | 40	40	1	24	1	202	602	non	1	1	-
E	642	PS	01-06-2006	20-05-2006	1	1	100	100 | 100	100	1	24	4	444	450	non	1	7	-
E	642	PS	01-08-2006	18-06-2006	1	1	85	85 | 85	85	1	24	1	534	226	non	1	1	-
E	642	PS	29-09-2006	08-09-2006	1	1	135	135 | 135	135	1	24	3	200	1848	non	1	12	-
E	642	PS	15-11-2006	10-11-2006	1	1	210	210 | 210	210	1	21	4	120	1310	non	1	9	-
E	642	PS	14-12-2006	06-12-2006	1	1	70	70 | 70	70	1	21	3	7	1236	non	1	8	-
E	643	PS	11-02-2006	28-01-2006	1	1	70	70 | 70	70	3	-	3	115	1454	non	1	11	-
E	643	PS	11-02-2006	08-02-2006	2	1	30	30 | 30	-	1	?	1	130	6	non	1	-	-
E	643	PS	21-03-2006	25-02-2006	1	1	35	35 | 35	-	1	?	3	244	205	non	1	-	-
E	643	PS	21-03-2006	21-03-2006	1	1	40	40 | 40	40	3	-	1	444	18	non	1	24	-
E	643	PS	23-05-2006	18-05-2006	1	1	66	66 | 66	66	1	24	3	243	1144	non	1	7	-
E	643	PS	24-06-2006	11-06-2006	1	1	65	65 | 65	65	1	24	3	57	534	non	1	1	-

Check and correct the Association Code for the corresponding activity in the logbook

The declaration of fishing mode (fad, fsc, unk) is inconsistent with associations (context of fishing: birds, DCP, etc.). If you have only one association with C_ASSOC_G=2 (fad), then you must declare the set with fishing mode 'fad'.

TYPE_BANC		
C_TBANC	L_TBANC4L	L_TBANC
1	BO	Banc sous objet
2	BL	Banc libre
3	IND	Indéterminé

ASSOC			
C_ASSOC	L_ASSOC	C_ASSOC_R	C_ASSOC_G
21	EPAVE NATURELLE (tas de paille, bille de bois ....)	1	1
22	EPAVE NATURELLE BALISEE	1	1
23	EPAVE ARTIFICIELLE (caisse , bouée, cordage ....)	1	1
24	EPAVE ARTIFICIELLE BALISEE (radeau)	1	1
25	EPAVE ANCREE (D.C.P)	1	1
26	POISSON SOUS LE THONIER OU LE SKIFF	5	1
27	PECHE AVEC UN CANNEUR COMME AGREGATEUR	5	1
28	PECHE AVEC SUPPLY OU AUTRE BATEAU (autre que canneur) COMME AGREGATEUR	5	1
29	PECHE A LA SENNE AVEC APPATS	2	2

Echantillon (Sampling)

4.

Les échantillons :

E/W	Echantillon					Poids					Espèce				
-	C_BAT	Engin	D_DBQ	N_ECH	TYP_ECH	M10	P10	P_E	S_Poids	S_Pond	C_ESP	LDLF	NB_MES	%Petits	%Gros
E	365	BB	12-01-2006	4	1	166.1	33.7	0	199.8	35	1	2	67	100	0
E	365	BB	12-01-2006	4	1	166.1	33.7	0	199.8	35	2	2	30	100	0
E	365	BB	12-01-2006	4	1	166.1	33.7	0	199.8	35	3	2	88	100	0
E	365	BB	13-02-2006	14	1	248.8	36.6	0	285.4	50	1	2	77	100	0
E	365	BB	13-02-2006	14	1	248.8	36.6	0	285.4	50	2	2	60	100	0
E	365	BB	13-02-2006	14	1	248.8	36.6	0	285.4	50	3	2	46	100	0
E	365	BB	13-02-2006	14	1	248.8	36.6	0	285.4	50	6	2	30	100	0
E	365	BB	27-03-2006	27	1	283.7	16.4	0	300.1	30	1	2	100	100	0
E	365	BB	27-03-2006	27	1	283.7	16.4	0	300.1	30	2	2	60	100	0
E	365	BB	27-03-2006	27	1	283.7	16.4	0	300.1	30	3	2	26	100	0
E	365	BB	30-04-2006	11	1	188.6	11.4	0	200	30	1	2	127	100	0
E	365	BB	30-04-2006	11	1	188.6	11.4	0	200	30	2	2	60	100	0
E	365	BB	30-04-2006	11	1	188.6	11.4	0	200	30	3	2	50	100	0
E	365	BB	05-06-2006	8	1	272.6	27.8	0	300.4	47	1	2	66	100	0
E	365	BB	05-06-2006	8	1	272.6	27.8	0	300.4	47	2	2	60	100	0
E	365	BB	05-06-2006	8	1	272.6	27.8	0	300.4	47	3	2	54	100	0
E	365	BB	05-06-2006	8	1	272.6	27.8	0	300.4	47	6	2	49	100	0
E	365	BB	04-10-2006	6	1	282.1	13.5	0	295.6	70	1	2	126	100	0
E	365	BB	04-10-2006	6	1	282.1	13.5	0	295.6	70	2	2	60	100	0
E	365	BB	04-10-2006	6	1	282.1	13.5	0	295.6	70	3	2	15	100	0

???

A comprehensive and accurate position of the sets should be given in the well plan.
In addition, getting the scans of the original documents would be very useful to understand why such figures have been entered

Appendix 2. R and SQL codes to compute the yearly total landings and catches from the AVDTH 2008-2011 database

```
#Connect to the database
require(RODBC)
database <- "Merged_data_2008_2011_V3.3.mdb"
chemin <- odbcConnectAccess(database)

# TABLE "MAREE" FROM AVDTH
# Get the total landings by year, gear, and species
qry_yearly_landings_species <- "SELECT tt.gear AS [GearGrp], tt.year AS [YearC], tt.species AS
[Species], ROUND(SUM(tt.weight),3) AS [Landings]
FROM (SELECT IIf(BATEAU.C_TYP_B In (4,5,6),'PS',IIf(BATEAU.C_TYP_B In
(1,2,3),'BB','OTHER')) AS gear,DatePart('yyyy',MAREE.D_DBQ) AS year, ESPECE.C_ESP_3L AS
species,LOT_COM.v_poids_lc AS weight
FROM TYPE_BATEAU INNER JOIN (PAYS INNER JOIN ((CAT_BATEAU INNER JOIN
(BATEAU INNER JOIN (PORT INNER JOIN MAREE ON PORT.C_PORT =
MAREE.C_PORT_DBQ)
ON BATEAU.C_BAT = MAREE.C_BAT) ON CAT_BATEAU.C_CAT_B = BATEAU.C_CAT_B)
INNER JOIN (ESPECE INNER JOIN (CAT_COM INNER JOIN LOT_COM ON
(CAT_COM.C_CAT_C = LOT_COM.C_CAT_C)
AND (CAT_COM.C_ESP = LOT_COM.C_ESP)) ON ESPECE.C_ESP = CAT_COM.C_ESP) ON
(MAREE.D_DBQ = LOT_COM.D_DBQ) AND (MAREE.C_BAT = LOT_COM.C_BAT))
ON PAYS.C_PAYS = BATEAU.C_PAYS) ON TYPE_BATEAU.C_TYP_B = BATEAU.C_TYP_B
) AS tt GROUP BY tt.gear, tt.year,tt.species;"

yearly_landings_species <- sqlQuery(channel=chemin,query=qry_yearly_landings_species)
sum_landings <-
aggregate(yearly_landings_species$Landings,by=list(YearC=yearly_landings_species$YearC,GearGr
p=yearly_landings_species$GearGrp),sum)
names(sum_landings)[2:3] <- c("GearGrp","Landings")

# TABLE "CAPT_ELEM" FROM ADVTH
qry_yearly_catches_species <- "SELECT tt.gear AS [GearGrp], tt.year AS [YearC], tt.species AS
[Species], ROUND(SUM(tt.catch),3) AS [Catches]
FROM (SELECT IIf(BATEAU.C_TYP_B In (4,5,6),'PS',IIf(BATEAU.C_TYP_B In
(1,2,3),'BB','OTHER')) AS gear, YEAR(ACTIVITE.D_ACT) AS [year], ESPECE.C_ESP_3L AS
species,CAPT_ELEM.V_POIDS_CAPT AS catch
FROM ((TYPE_BATEAU INNER JOIN (ACTIVITE INNER JOIN BATEAU ON
ACTIVITE.C_BAT = BATEAU.C_BAT) ON TYPE_BATEAU.C_TYP_B = BATEAU.C_TYP_B)
INNER JOIN CAPT_ELEM ON (ACTIVITE.N_ACT = CAPT_ELEM.N_ACT) AND
(ACTIVITE.D_ACT = CAPT_ELEM.D_ACT) AND (ACTIVITE.D_DBQ = CAPT_ELEM.D_DBQ)
AND (ACTIVITE.C_BAT = CAPT_ELEM.C_BAT)) INNER JOIN ESPECE ON
CAPT_ELEM.C_ESP = ESPECE.C_ESP
) AS tt GROUP BY tt.gear, tt.year,tt.species;"
yearly_catches_species <- sqlQuery(channel=chemin,query=qry_yearly_catches_species)

# Get the total catches by year, gear, and species
sum_catches <-
aggregate(yearly_catches_species$Catches,by=list(YearC=yearly_catches_species$YearC,GearGrp=y
early_catches_species$GearGrp),sum)
names(sum_catches)[2:3] <- c("GearGrp","Catches")
```

Appendix 3. R and SQL codes to compute the yearly number of active vessels from the AVDTH 2008-2011 database

```
### Libraries
require(RODBC)

#Connect to the database
setwd(rep.data)
database <- "Merged_data_2008_2011_V3.3.mdb"
chemin <- odbcConnectAccess(database)

# TABLE "MAREE" FROM AVDTH
# Get the list of active vessels by year and gear
qry_yearly_vessels_maree <- "SELECT NB1.gear, NB1.year, c_quille AS keel_code,c_bat AS
vessel_code,l_bat AS vessel_name
FROM (          SELECT IIf(b.c_typ_b In (4,5,6),'PS',IIf(b.c_typ_b In (1,2,3),'BB','OTHER')) AS
gear, year(m.d_dbq) AS [year], IIf(DatePart('q',m.d_dbq) In (1,2),1,2) AS semester,
DatePart('q',m.d_dbq) AS QUARTER, m.c_bat, b.c_quille,b.l_bat FROM (maree AS m INNER JOIN
bateau AS b ON m.c_bat = b.c_bat) GROUP BY b.c_typ_b, year(m.d_dbq), DatePart('q',m.d_dbq),
m.c_bat, b.l_bat,b.c_quille) AS NB1
GROUP BY NB1.gear,NB1.year,c_bat,c_quille,l_bat
ORDER BY NB1.gear,NB1.year,c_bat,c_quille,l_bat;"
yearly_vessels_maree <- sqlQuery(channel=chemin,query=qry_yearly_vessels_maree)

### Compute the number of active vessels by year from MAREE
vessels_maree <-
aggregate(yearly_vessels_maree$keel_code,by=list(YearC=yearly_vessels_maree$year,GearGrp=year
ly_vessels_maree$gear),function(x) length(unique(x)))
names(vessels_maree)[3] <- "n_maree"

# TABLE "ACTIVITE" FROM AVDTH
# Get the list of active vessels by year and gear
qry_yearly_vessels_activite <- "SELECT NB1.gear, NB1.year, c_quille AS keel_code,c_bat AS
vessel_code,l_bat AS vessel_name
FROM (SELECT IIf(b.c_typ_b In (4,5,6),'PS',IIf(b.c_typ_b In (1,2,3),'BB','OTHER')) AS gear,
year(a.D_ACT) AS [year], IIf(DatePart('q',a.D_ACT) In (1,2),1,2) AS semester, DatePart('q',a.d_act)
AS QUARTER, a.c_bat, b.c_quille,b.l_bat FROM (activite AS a INNER JOIN bateau AS b ON
a.c_bat = b.c_bat) GROUP BY c_typ_b, year(a.d_act), DatePart('q',a.d_act), a.c_bat,
b.l_bat,b.c_quille) AS NB1
GROUP BY NB1.gear,NB1.year,c_bat,c_quille,l_bat
ORDER BY NB1.gear,NB1.year,c_bat,c_quille,l_bat;"
yearly_vessels_activite <- sqlQuery(channel=chemin,query=qry_yearly_vessels_activite)

### Compute the number of active vessels by year from MAREE
vessels_activite <-
aggregate(yearly_vessels_activite$keel_code,by=list(YearC=yearly_vessels_activite$year,GearGrp=y
early_vessels_activite$gear),function(x) length(unique(x)))
names(vessels_activite)[3] <- "n_activite"
```