THE ICCAT META-DATABASE: CURRENT STATUS, FUTURE DEVELOPMENTS AND DISSEMINATION

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SUMMARY

In order to improve and better coordinate the knowledge and information available for by-catch species, the ICCAT Meta-database was developed in 2010. The Meta-database was populated with information regarding bycatch species contained within the ICCAT collected volumes as well as the ASFA database. The information in the database can be extracted in a variety of ways of use in different analyses. The database contains a wide variety of information on bycatch species within the Atlantic region. Although the database is well designed and very useful, it has several limitations. These limitations could largely be overcome by migrating the Metadata base from its current format to an open source platform and made available online. In particular, the online reference management solution Zotero, is a promising candidate for the migration of this database.

RÉSUMÉ

Afin d'améliorer et de mieux coordonner les connaissances et l'information disponibles sur les espèces accessoires, la base de métadonnées de l'ICCAT a été mise au point en 2010. La base de métadonnées a été alimentée d'informations relatives aux espèces accessoires contenues dans les séries de documents scientifiques de l'ICCAT et la base de données de l'ASFA. L'information de la base de données peut être extraite sous diverses formes pour être utilisée dans différentes analyses. La base de données intègre une vaste gamme d'informations sur les espèces accessoires à l'intérieur de la région atlantique. Même si la base de données est bien conçue et très utile, elle a plusieurs limitations. Ces limitations pourraient en grande partie être surmontées si l'on migrait la base de métadonnées de son format actuel vers une plateforme open source à laquelle on pourrait accéder en ligne. En particulier, la solution de gestion de référence en ligne Zotero est un candidat prometteur pour la migration de cette base de données.

RESUMEN

En 2010 se desarrolló la base de metadatos de ICCAT con el fin de mejorar y coordinar mejor los conocimientos y la información disponibles sobre las especies de captura fortuita. La base de metadatos contiene la información sobre las especies de captura fortuita incluida en la colección de documentos científicos de ICCAT, así como en la base de datos de ASFA. La información de la base de datos puede extraerse de varios modos para utilizarla en diferentes análisis. La base de datos integra una amplia variedad de información sobre especies de captura fortuita dentro de la región atlántica. Aunque la base de datos está bien diseñada y es muy útil, tiene varias limitaciones. Estas limitaciones podrían superarse migrando la base de metadatos desde su formato actual a una plataforma de código abierto a la que se pueda acceder en línea. En particular, la solución de gestión de referencias en línea Zotero, es un candidato prometedor para la migración de esta base de datos.

KEYWORDS

Bycatch, Meta-data, Atlantic Ocean, Biology, Catch data, database, Zotero, MySQL

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1. Introduction

The 1995 Code of Conduct for Responsible Fisheries (the Code) of the Food and Agriculture Organization of the United Nations (FAO) calls for the sustainable use of aquatic ecosystems and requires that fishing be conducted with due regard for the environment. The Code also promotes the maintenance, safeguarding and conservation of biodiversity of ecosystems by minimizing fisheries impacts on non-target species and the ecosystem in general. A great deal of concern has been expressed by fishery managers and conservation/environmental groups that bycatch and discards may be contributing to biological overfishing and altering the structure of marine ecosystems. Such claims are frequently based on observations of large numbers of discards and high discard ratios or rates, but infrequently on detailed population assessments of impacted stocks. This is perhaps because comprehensive and historical datasets involving discards have generally been unavailable to demonstrate such claims, although a growing body of literature does support the conclusion that for some species and regions of the world, biological and ecological impacts are discernible Alverson et al. [1994]. For this reason there has been increasing interest in addressing bycatch issues, and a joint meeting of the tuna Regional Fisheries Management Organistaions (tRFMOs) in Brisbane 2010 as part of the KOBE process, specifically focused on this topic.

Bycatch issues have become particularly important for long-lived marine megafauna such as sharks, sea turtles, seabirds, and marine mammals Lewison et al. [2004a]. Individual fishers often underestimate the cumulative effect of all fishing activities because bycatch of these species may be a relatively rare event and represents a small fraction of the total bycatch biomass. However, given the life history characteristics of most marine megafauna (slow growth, low reproductive rates, high adult survival), relatively low levels of bycatch can have a large effect on population viability Heppell et al. [2000]. Many of these species are threatened (sensu International Union for Conservation of Nature, IUCN), having suffered declines as a result of excessive incidental mortality caused by fisheries [Lewison et al., 2004b, Arnold et al., 2006, Jaramillo-Legorreta et al., 2007]

In order to improve the knowledge on bycatch species the SCRS recommended that a short-term by- catch coordination study be conducted with the objectives of: (a) creating a meta-database of reports and publications providing information about by-catch species from tuna and related fisheries; (b) developing a database for unprocessed and aggregated by-catch data for priority species such as marine mammals, turtles, sea birds, and many sharks, rays and teleost fish that are not subjected to stock assessment by ICCAT; (c) establishing interaction with scientists leading national observer programs to obtain previously unreported data and to make an inventory of past and current observer programs; and (d) developing forms and protocols for the collection of more and higher quality by-catch data in the future.

2. Development of the Meta-database

FishWorld Science Ltd was the contractor for the short-term by-catch coordination study. The contract was signed on 3 November 2009, became effective 30 days later, and finished on 3 June 2010.

Briefly, the tasks ncluded:

1. Development of a meta-database of reports and publications concerning by-catch (meaning unin- tended catch and sometimes including species targeted in other fisheries).
2. Development of a database of information on priority species (meaning those for which few or no data are currently submitted to ICCAT, e.g. seabirds, mammals, turtles, rays, some sharks and teleosts).
3. Obtaining relevant national observer data and developing rules for their use, for example, concern- ing confidentiality.
4. Developing by-catch data collection forms and protocols. e.g. adding species ID sheets for observer data collection forms.

A draft final report, prepared 21 May, was presented and discussed at ICCATs Sub-committee on Ecosystems (SCECO) held in Madrid from 31 May to 4 June 2010. Section 5 of the agreed minutes of the 2010 meeting summarizes the discussion, available from http://www.iccat.int/en/meetingscurrent.htm. A comprehensive final report on the compilation of the ICCAT meta-database is presented by Cotter [2011] including many of the discussions and meetings that led up to its development as well as the technical specifications and instructions for use of the database. The meta-database and the database of tasks 1 and 2

were developed jointly (and amalgamated as the contractor felt this facilitated better link- ing of data and metadata, easier learning of the system, and less maintenance in future through sharing of reference information and input and retrieval systems) as a single database system using Microsoft Access 2007.

3. Summarized review of the current contents of the Meta-database

The primary data tables hold data on publications, projects, grouped results (e.g. from multiple fishing trips reported together), and ungrouped results for individual species. The types of results that can be stored include CPUEs, biological measures, frequency distributions, counts and simple presence/absence, the latter used to keyword species for which no measures were made. The bibliographic data and selected results from more than 370 publications (ICCAT CVSP series back to 2003, plus journals indexed in ASFA) were loaded onto the By-catch database during the contract period and are available for retrieval. More than 100 new by-catch species were added to the list of by-catch species downloaded from the ICCAT site Cotter [2011]. **Table 1** presents an overview of the information included in the ICCAT metadata base. Subsequent to the completion of the contract, a limited number of additional publications have been added to the meta-database. A short term contract to assess the impact of ICCAT fisheries on sea turtle populations is currently underway, and this project is adding to the database, although as the current MS Access version of the meta-database is not easily synchronized, it is not clear how many new documents have been added to date.

During the creation of the meta database, reports in the ICCAT Collective Volumes of Scientific Papers (CVSP) published from 2009 backwards were examined and those of potential interest to studies of by-catch or biology archived. The many papers on stock assessment, management, and related issues concerning the principal target species were mostly excluded since they are not included in the term 'by- catch' and, for the most part, can be retrieved with the existing ICCAT Bibliographic database using the 'species' filter Cotter [2011]. Abstracts and summary information about relevant papers presented in the Aquatic Sciences and Fisheries Abstracts (ASFA) were also examined and many of direct relevance to oceanic fishery by-catches included in the By-catch database even if they were not exclusively related to the Atlantic Ocean.

An example of a retrieved publication is shown in **Figure 1**. The most recent publications are shown first. Output includes bibliographic information in bold, the title underlined, the abstract, a web or email address for obtaining the publication, details from the RESULTGROUPS record including region, gear group, the years spanned by results, the project, the flag of the fleet, all assigned values of keywords, and all species reported on. The database can also be queried by species group (e.g. Elasmobranchs). Information can also be obtained in a spreadsheet format. An example of retrieved results for the sandbar shark is shown split into 3 panels in **Figure 2.** It retrieves all information that complies with the criteria queried. In this way, two different outputs can easily be obtained from the database and the information exported into a variety of programs for further analysis. Again, all the information that can be obtained from this meta-database comes from the 103 unique references listed in Appendix 1.

Table 2 shows the number of strata available for each species within each category of information. For example for *Carcharhinus falciformis*, in column 3 (which is Total length information) the table shows a value of 24. In this case this corresponds to 12 length bins for which data have been input, across two sexes giving a combined total of 24. This is a crude method for demonstrating availability of information, but clearly shows that the species for which the most information is available are *Prionace glauca* and *Isurus oxyrinchus* and that most of the information for these two species is related to standardized CPUEs. It is also clear to see that column 17 (Catch presence or absence) has entries for almost all species. As this is the most basic form of data collection, this indicates the generally poor data availability for most species. **Table 3** shows the number of strata available for each species within each region. The same method has been used to sum the amount of information available per species as is demonstrated in table 2. From this it is clear that the most information is available for column 11 which corresponds to the Atlantic North-West.

4. Suggestions for improvement and the way forward

The utility and design of the ICCAT By-catch metadata base has been demonstrated above. It is clear that it is a very useful tool and has been well designed to accommodate the variety of data sources available to the secretariat and CPC scientists. It does however have a few limitations that have delayed its widespread use and activation. One of these limitations has been the difficulty in distributing the database due to the security signature requirements for MS Access applications. The By-catch database uses simple macros or Visual Basic

programs to help users perform routine tasks. Microsoft has installed security features in Access 2007 which prevent all macros and Visual Basic code by default. This requires that a series of steps need to be taken to ensure that this problem is resolved. Although these steps are not exceptionally complicated they do deter first time users, especially those who may not have administrator privileges for the computer they are using (such is the case with many company/work machines). Another fairly obvious problem is the amount of work required to keep the database up- to-date. Related to this problem is a lack of availability to the latest updates in the database. As the database is currently a self contained file, any updates would need to be constantly redistributed amongst interested parties either. As the data base is already a fairly large file, this could be problematic, particularly for scientists with slow or limited internet connectivity.

4.1 Possible alternatives

In order to resolve these problems, there are a number of actions that can be taken. Firstly, the database could be migrated to an open source database structure, such as MySQL. This would more than likely be effective in overcoming the security issues described for MS Access applications. The migration of the database to this platform would also facilitate the option of making it available online.

Another option would be to use an online bibliographic reference management tool such as Zotero (www.zotero.org). Zotero is free, open source reference management software to manage bibliographic data and related research materials (such as PDFs, images, audio and video files). Notable features include web browser integration, online syncing, generation of in-text citations, footnotes and bibliographies, as well as integration with the word processors Microsoft Word, LibreOffice, OpenOffice.org Writer and NeoOffice. Zotero collects research in a single, searchable interface. On many websites such as library catalogs, PubMed, Google Scholar, Google Books, Amazon.com, Wikipedia, and publisher's websites, Zotero shows an icon when a book, article, or other resource is being viewed. By clicking this icon, the full reference information can be saved to the Zotero library. Zotero can also save a copy of the webpage, or, in the case of academic articles, a copy of the full text PDF. Users can then add notes, tags, attachments, and their own metadata. Selections of the local reference library data can later be exported as formatted bibliographies. Furthermore, all entries including bibliographic information and user-created rich-text memos of the selected articles can be summarized into an HTML report. This would allow the active management of the documents (and other relevant file types) and meta-data for the compiled bycatch information. Zotero can be installed on a computer as a standalone program, or as a plugin to a web browser. These two methods allow the information to be easily updated and the updates would be available in real time for any interested parties. This would also allow CPC scientists to actively contribute to the database. The increase in actively collaborating and contributing scientists would improve the amount of information included in the database ensuring that more relevant literature and data is referenced. The secretariat would then be able to moderate the contributions to ensure the data is relevant and correctly submitted ensuring the contents remain of a suitably high quality. Another potential option along this line is Mendeley (www.mendeley.com) which includes a newsfeed option to keep registered group members informed of changes and modifications to the reference database.

The migration of the database from MS Access to an open source database platform would require additional coding and development, however, the long term benefits of making the database easily accessible and customizable should be seriously taken into consideration. Alternatively, the use of Zotero would require no additional programming, but would require setting up a a correct system for user control and migrating the documents to the new file structure. The latter can be accomplished relatively simply as Zotero can import citations directly from most websites including the ASFA publications list. Although Zotero is not strictly a meta-database, it is an effective document and meta-data management tool.

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Table 1: Summary of types of information found and stored in the By-catch database during the by-catch project. The totals are approximate; e.g. the animal groupings may include unidentified treated as a species.

Item	Number of records	Of which:
Countries	159	
Journal titles	61	
Species codes with results	269	Birds: 39
		Elasmobranchs: 77
		Invertebrates: 1
		Mammals: 38
		Teleosts (not tunas): 70
		Tunas: 36
		Turtles: 6
Authors	444	
Projects	39	
Publications	372	1991: 1
		1996: 2
		1997: 11
		1999: 2
		2000: 1
		2001: 3
		2002: 4
		2003: 32
		2004: 12
		2005: 44
		2006: 27
		2007: 53
		2008: 104
		2009: 45
		2010: 31
ResultGroups	394	
Results	4505	Age results: 26
		Catches and CPUEs: 3129
		Geographic results: 111
		Lengths: 956
		Population results: 179
		Reproductive measures: 33
		Trophic results: 15
		Weights: 51
		Birds: 427
		Elasmobranchs: 1546
		Invertebrates: 1
		Mammals: 111
		Teleosts (not tunas): 319
		Tunas: 1692
		Turtles: 401

Table 2: Summary of information available per data type for each elasmobranch species

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Alopias pelagicus																		1					
Alopias sp.		1									7					1	4	28	1			1	
Alopias superciliosus			13							1	10			7	16	1	8	1	1	3		1	1
Alopias vulpinus			3							1	6				9		8	1		2		1	1
Carcharhinidae											7						4						
Carcharhiniformes											1											1	
Carcharhinus acronotus																	1						
Carcharhinus altimus								1	1	1													
Carcharhinus brevipinna								1	1	1					8		2						
Carcharhinus falciformis			24	23				2	2	1	8	1	1		8	1	9	1		1		1	1
Carcharhinus galapagensis																	1	1					
Carcharhinus leucas										1							1						
Carcharhinus limbatus								1	1	1						1	2	1					
Carcharhinus longimanus			3					1	1		11	1	1		6		9	1	1	2		2	1
Carcharhinus melanopterus										1													
Carcharhinus obscurus								1	1	1						1	3	1					
Carcharhinus plumbeus			12					1	1	1						1	2	1					
Carcharhinus signatus								1	1	1						1	4	1		2			
Carcharias taurus										1							1						
Carcharodon carcharias											1						2					1	
Centrophorus uyato										1													
Cetorhinus maximus										1													
Galeocerdo cuvier								1	1	1	10				2	1	4	1		1		1	
Galeorhinus galeus																	4	1					
Ginglymostoma cirratum										1							1						
Heptranchias perlo										1													
Isurus oxyrinchus	9	2			2	1	1	1	1		14			89	23	2	18	1	1	3	1	2	1
Isurus paucus										1	6				4	1	3	1	1	1		1	1
Isurus spp														58	52	1						1	
Lamna nasus		1									12				4		9	28	1	2		1	1
Lamnidae											1						1						
Mustelus canis								1	1														
Mustelus mustelus																	2						
Mustelus spp										1													
Negaprion brevirostris										1							1						
Odontaspis ferox																	1						
Odontaspis noronhai															4								
Paragaleus pectoralis																	1						
Pelagic Sharks nei																			1				
Prionace glauca	16	1	6			1	1	2	10	1	15			195	75	2	26	2	49	5	1	3	1
Pseudocarcharias kamoharai										1	8				4		7	1		1			
Rhincodion typus											1	1	1				1						
Rhizoprionodon acutus																	1						
Rhizoprionodon porosus																	1						
Rhizoprionodon terraenovae								1	1	1													
Sharks (unidentified)											1	1	1		1		8		1	1			
Somniosus microcephalus										1													
Sphyrna couardi																	2						
Sphyrna lewini				1				1	1	1	7				8	1	7	1		1		1	1
Sphyrna mokarran								1	1	1							1						
Sphyrna sp.										1						1	3	1				1	
Sphyrna tiburo								1	1														
Sphyrna zygaena								1	1	1	7	1	1		12		8	1		1		1	1
Sphyrnidae											6						4						
Squalidae																	2						
Squaliformes																	1						
Squalus spp										1													
Zameus squamulosus										1	6				4		5						

1 Biol: Age: individual fish
2 Biol: Length: snout to fork
3 Biol: Length: total
4 Biol: Length: unspecified measure
5 Biol: Length@maturity, snout to fork
6 Biol: LengthWeight: allometric growth coeff.
7 Biol: LengthWeight: allometric growth power
8 Biol: Weight: ratio dressed to total fin weight
9 Biol: Weight: ratio round to total fin weight
10 Fishing: Catch: alive alongside
11 Fishing: Catch: number, total
12 Fishing: Catch: occurrence, FAD
13 Fishing: Catch: occurrence, free school
14 Fishing: Catch: per unit effort, standardized
15 Fishing: Catch: per unit effort, unstandardized
16 Fishing: Catch: positive trips
17 Fishing: Catch: Presence-absence
18 Fishing: Catch: weight, total
19 Fishing: Discards
20 Fishing: Discards, survival of
21 Population: natural mortality rate
22 Population: rate of increase, productivity
23 Population: susceptibility (PSA analysis)

Table 3: Summary of information available per region for each elasmobranch species

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Alopias pelagicus		1																			
Alopias sp.	1	2	3			28		1		1	5		1				1				
Alopias superciliosus	1	5	6					1		3	7	8	1	19	4		8				
Alopias vulpinus		5	3							1	4	7	1	5	1		1			1	3
Carcharhinidae		1	3							1	3		1				2				
Carcharhiniformes											1						1				
Carcharhinus acronotus					1																
Carcharhinus altimus			2								1										
Carcharhinus brevipinna			2								1			1	9						
Carcharhinus falciformis	1	5	5					1	1	1	5		1	1	11		52				
Carcharhinus galapagensis		2																			
Carcharhinus leucas											1				1						
Carcharhinus limbatus		2	2		1			1			1										
Carcharhinus longimanus	1	5	5							1	9		1	7	3		8				
Carcharhinus melanopterus											1										
Carcharhinus obscurus		2	2					1	1		1			1							
Carcharhinus plumbeus		1	2					1			1			1		12					1
Carcharhinus signatus		2	2					1	1		1			1	1		2				
Carcharias taurus											1			1							
Carcharodon carcharias			1								1									1	1
Centrophorus uyato											1										
Cetorhinus maximus											1										
Galeocerdo cuvier		2	7					1		1	7		1		1		3				
Galeorhinus galeus		2												1						1	1
Ginglymostoma cirratum					1						1										
Heptranchias perlo											1										
Isurus oxyrinchus	1	5	23					1	12	5	54	11	2	30	14		10			1	3
Isurus paucus	1	4	1					1		1	5		1				6				
Isurus spp			38					1	26		21	26									
Lamna nasus	1	5	7			28			2	3	7		1	1	1		2				1
Lamnidae																	1				1
Mustelus canis			2																		
Mustelus mustelus															1						1
Mustelus spp											1										
Negaprion brevirostris					1						1										
Odontaspis ferox															1						
Odontaspis noronhai																	4				
Paragaleus pectoralis															1						
Pelagic Sharks nei											1										
Prionace glauca	1	6	78	1		1		1	62	6	101	36	35	48		15	15			1	5
Pseudocarcharias kamoharai	1	2	5							1	4		1		1		7				
Rhincodon typus			1												2		1				
Rhizoprionodon acutus															1						
Rhizoprionodon porosus					1																
Rhizoprionodon terraenovae			2								1										
Sharks (unidentified)	1		1		1		1		1		1		1		2			3	2		
Somniosus microcephalus											1										
Sphyrna couardi									1						1						
Sphyrna lewini	1	5	4							1	4		2	1	9		4				
Sphyrna mokarran			2								1				1						
Sphyrna sp.		1	1		1			1			2										1
Sphyrna tiburo			2																		
Sphyrna zygaena	1	5	3							1	4		1	1	11		9				
Sphyrnidae	1	1	2							1	3		1				1				
Squalidae																		2			
Squaliformes			1																		
Squalus spp											1										
Zameus squamulosus	1		3							1	4		1				6				

1 Arctic Ocean
2 Atlantic + Mediterranean
3 Atlantic Ocean
4 Atlantic: Azores +/-5° Long&Lat
5 Atlantic: Caribbean Sea
6 Atlantic: Celtic Sea
7 Atlantic: Gulf of Guinea
8 Atlantic: Gulf of Mexico
9 Atlantic: N, > 0°Lat
10 Atlantic: NE, > -30°Long, > 0°Lat
11 Atlantic: NW < -30°Long, > 0°Lat
12 Atlantic: S, < 0°Lat
13 Atlantic: SE, > -30°Long, < 0°Lat
14 Atlantic: SW, < -30°Long, < 0°Lat
15 Atlantic: trop E, < -30°Long, +/-23°Lat
16 Atlantic: trop W < -30°Long, +/-23°Lat
17 Atlantic: tropics +/-23°Lat
18 Mediterranean Sea
19 Mediterranean: Aegean Sea
20 Mediterranean: E, > 15°Long
21 Mediterranean: W, < 15°Long

Retrieved record# 1

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A simulation study of the results of using different levels of observer coverage to estimate dead discards for the U.S. pelagic longline fleet in the Gulf of Mexico

A simulation study was conducted to estimate the coefficient of variation of the estimated number of dead discards at different levels of observer coverage. The study used data collected by the U.S. Pelagic Observer Program in the Gulf of Mexico during the 2007-2009 bluefin tuna spawning seasons. Results were obtained for twenty seven different species and indicated that the CV of estimated dead discards depends on the frequency of occurrence of each species and the variability in the number of discards observed in each trip.

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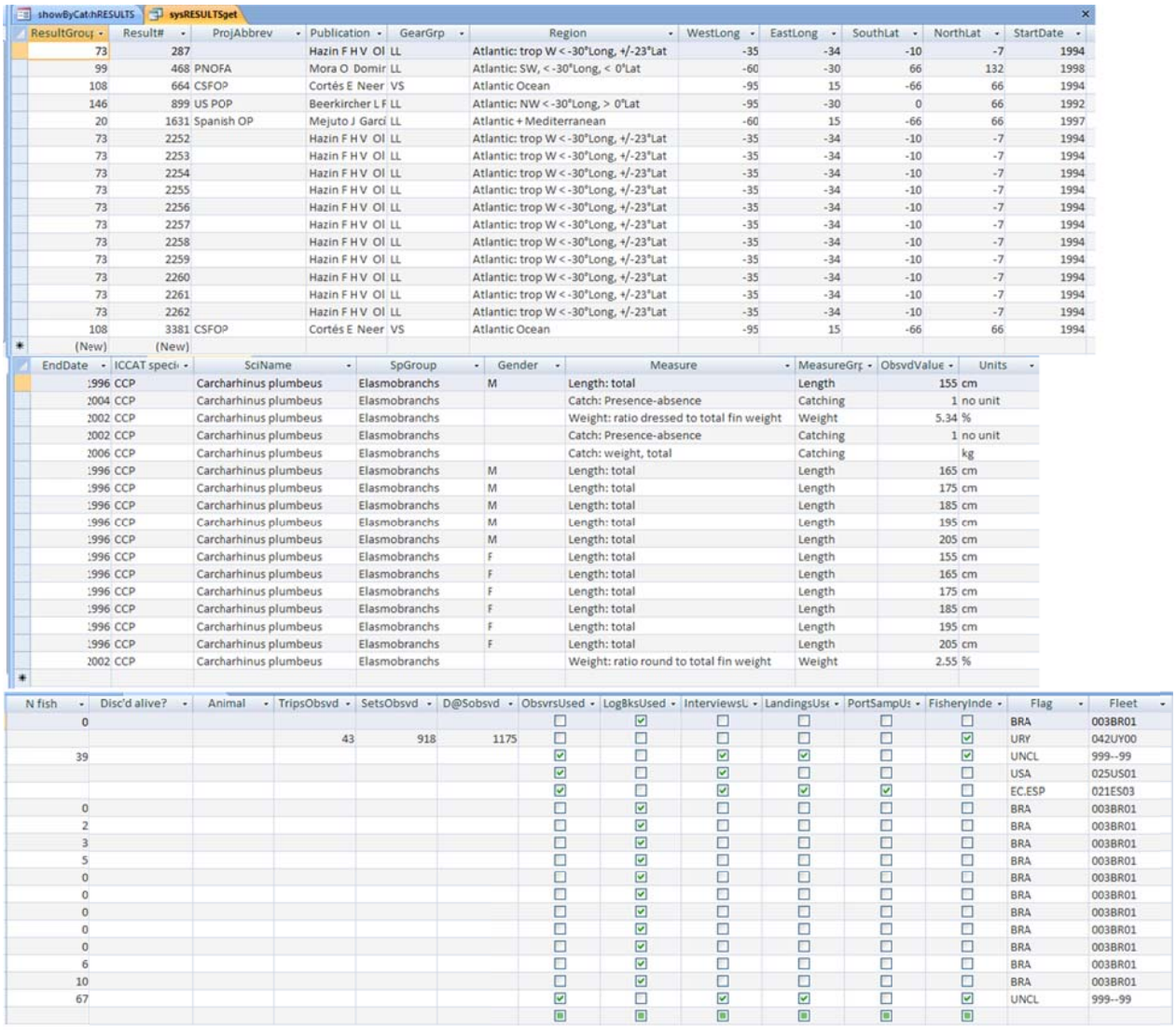
Region of study:	Atlantic: Gulf of Mexico
Gear group:	Longline
1st year of results:	2007
Last year of results:	2009
Project:	
Estimated observer effort:	0 person yr
Fleet flag code:	

Pub#	Topic
316	Fishing: By-catch: modelling
316	Stats: observer surveys
316	Stats: simulation method

RGpub#	RG#	Group	Code	Scientific name	English name
316	388	Elasmobranchs	THR	Alopias sp.	Thresher shark sp.
316	388	Elasmobranchs	BTH	Alopias superciliosus	Bigeye thresher
316	388	Elasmobranchs	FAL	Carcharhinus falciformis	Silky shark
316	388	Elasmobranchs	CCL	Carcharhinus limbatus	Blacktip shark
316	388	Elasmobranchs	DUS	Carcharhinus obscurus	Dusky shark
316	388	Elasmobranchs	CCP	Carcharhinus plumbeus	Sandbar shark
316	388	Elasmobranchs	CCS	Carcharhinus signatus	Night shark
316	388	Elasmobranchs	TIG	Galeocerdo cuvier	Tiger shark
316	388	Elasmobranchs	SMA	Isurus oxyrinchus	Shortfin mako
316	388	Elasmobranchs	LMA	Isurus paucus	Longfin mako
316	388	Elasmobranchs	MAK	Isurus spp	Mako sharks

Figure 1: By-catch database; example of a report on PUBLICATIONS with results for Mako sharks



showByCatchRESULTS | sysRESULTSget

ResultGroup	Result#	ProjAbbrev	Publication	GearGrp	Region	WestLong	EastLong	SouthLat	NorthLat	StartDate
73	287		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
99	468	PNOFA	Mora O Domir	LL	Atlantic: SW, < -30°Long, < 0°Lat	-60	-30	66	132	1998
108	664	CSFO?	Cortés E Neer	VS	Atlantic Ocean	-95	15	-66	66	1994
146	899	US POP	Beerkircher L F	LL	Atlantic: NW < -30°Long, > 0°Lat	-95	-30	0	66	1992
20	1631	Spanish OP	Mejuto J Garcí	LL	Atlantic + Mediterranean	-60	15	-66	66	1997
73	2252		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2253		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2254		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2255		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2256		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2257		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2258		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2259		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2260		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2261		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
73	2262		Hazin F H V Ol	LL	Atlantic: trop W < -30°Long, +/-23°Lat	-35	-34	-10	-7	1994
108	3381	CSFO?	Cortés E Neer	VS	Atlantic Ocean	-95	15	-66	66	1994
(New)	(New)									

EndDate	ICCAT speci	SciName	SpGroup	Gender	Measure	MeasureGrp	ObsvdValue	Units
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	M	Length: total	Length	155	cm
2004	CCP	Carcharhinus plumbeus	Elasmobranchs		Catch: Presence-absence	Catching	1	no unit
2002	CCP	Carcharhinus plumbeus	Elasmobranchs		Weight: ratio dressed to total fin weight	Weight	5.34	%
2002	CCP	Carcharhinus plumbeus	Elasmobranchs		Catch: Presence-absence	Catching	1	no unit
2006	CCP	Carcharhinus plumbeus	Elasmobranchs		Catch: weight, total	Catching		kg
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	M	Length: total	Length	165	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	M	Length: total	Length	175	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	M	Length: total	Length	185	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	M	Length: total	Length	195	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	M	Length: total	Length	205	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	F	Length: total	Length	155	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	F	Length: total	Length	165	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	F	Length: total	Length	175	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	F	Length: total	Length	185	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	F	Length: total	Length	195	cm
1996	CCP	Carcharhinus plumbeus	Elasmobranchs	F	Length: total	Length	205	cm
2002	CCP	Carcharhinus plumbeus	Elasmobranchs		Weight: ratio round to total fin weight	Weight	2.55	%

N fish	Disc'd alive?	Animal	TripsObsvd	SetsObsvd	D@Sobsvd	ObsvrsUsed	LogBksUsed	InterviewsU	LandingsUse	PortSampUs	FisheryInde	Flag	Fleet
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
			43	918	1175	☐	☐	☐	☐	☐	☑	URY	042UY00
39						☑	☐	☑	☑	☐	☑	UNCL	999--99
						☑	☐	☑	☐	☐	☐	USA	025US01
						☑	☐	☑	☑	☑	☐	EC.ESP	021ES03
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
2						☐	☑	☐	☐	☐	☐	BRA	003BR01
3						☐	☑	☐	☐	☐	☐	BRA	003BR01
5						☐	☑	☐	☐	☐	☐	BRA	003BR01
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
0						☐	☑	☐	☐	☐	☐	BRA	003BR01
6						☐	☑	☐	☐	☐	☐	BRA	003BR01
10						☐	☑	☐	☐	☐	☐	BRA	003BR01
67						☑	☐	☑	☑	☐	☑	UNCL	999--99
						▣	▣	▣	▣	▣	▣		

Figure 2: By-catch database; example of an output datasheet with results of all types for the sandbar shark caught anywhere. The long output records were subdivided into 3 panels to fit this page.