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SIOFA Databases Structure and Data Submission Processing

SIOFA Secretariat

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Abstract

This paper provides an overview and a snapshot of the databases and their structures that have been developed and that are maintained at the SIOFA Secretariat. The databases evolve continuously. This information allows CCPs members and external parties to understand how the data is set up at the Secretariat, and better address data requests to the Secretariat.
Another part of this paper describes how is processed the data submitted by the CCPs under CMM 02. The datasets are recorded, checked and then collated into the SIOFA databases.

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[2] Documents available only to members invited to closed sessions.

SIOFA Databases Structure and data submission processing.

1. Introduction

The SIOFA Secretariat receives CCPs and other parties' fisheries data according to the requirements set in CMM 02 (Data Standard). The data is stored in a structured data relational systems or databases. At its 9th meeting the SC requested the Secretariat to provide a description of the structure of the databases (ref SC9 report, para 325) which is presented in section 2 of this paper.

The main aims of the SIOFA databases are to (1) store SIOFA fisheries data, (2) harmonize, optimize and organize the data in a simple, efficient and centralized way (no duplication) and (3) enable easy retrieval of datasets for feeding customized reports, specific analyses and scientific projects.

An important part of the databases' related work is the processing of inbound datasets that are received under CMM 02 (Data Standards). This process varies depending on the nature of the datasets (catch & effort data, observer data, etc.). The datasets processing includes several steps: completeness control, data consistency checking, reorganisation, insertion and tracing. The final aim of the process is to add verified data into SIOFA databases.

2. Main Structures of the SIOFA database

The SIOFA databases consist in 3 main technical databases that have been developed for accommodating historical fisheries data and recent data submissions following the obligations described in CMM 02 (Data Standards).

The three main SIOFA databases are:

1. Aggregated catch and effort (AGG)
2. Haul by Haul catch and effort (HBH)
3. Observer (OBS)

The AGG and HBH databases store the data originating from the industry and provided by the fishing flags, while the OBS databases store the data collected by on-board scientific observers, that data is also provided by the fishing flag to the Secretariat.

Besides these databases other structures have been developed and are used for accommodating data and information that is common to the 3 above databases:

1. Vessel's registry (Fishing vessels and flags)
2. Contacts register (People and Organisations)
3. Standard codes lists (such as FAO species, fishing gears, vessel types, etc.) sourced from other organisations.

Note that the above systems are also used in other non-scientific databases, like the SIOFA Register of Authorized vessels or the Entry-Exit notifications register.

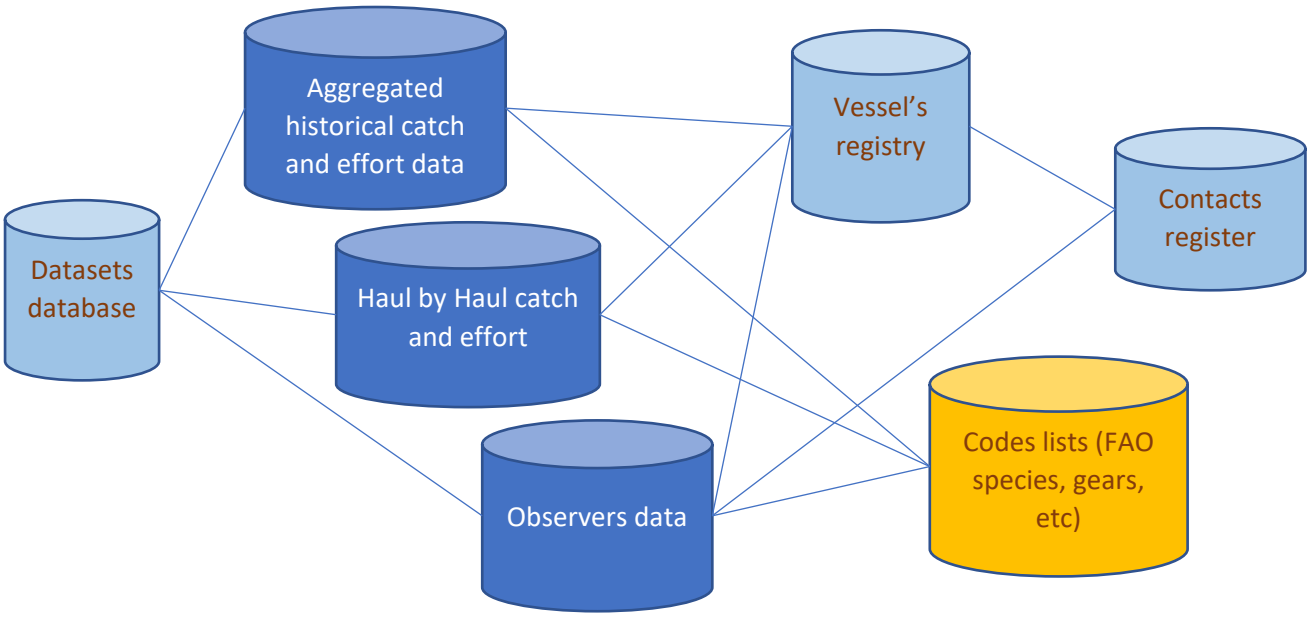

Figure 1: Main databases in uses at the Secretariat for catch & effort and observer data management

The datasets database contains the records and metadata of all datasets received at the Secretariat. Datasets are defined as one consistent dataset submitted by a CCP to the Secretariat according to

CMM 02. Typically, the submission of the yearly catch and effort data by one CCP will generate one dataset, and the observer data submission will generate another dataset.

Each database has its own tables and links to other shared databases/tables. Table 1 below summarize which tables are present in each main database.

Table 1. Main database tables in the SIOFA databases. X stands for main tables, S stands for shared tables.

		Database		
Table name	Content/Record	AGG	HBH	OBS
tbl_activities	Aggregated fishing activities (e.g. monthly aggregate of operations)	X		
tbl_activities_catches	Catch reported for the activity	X		
tbl_activities_geardetails	Details of the gear used for the activity	X		
tbl_vessels	Vessels list, notably name, flag and main gear.	S	S	S
tbl_codes_gears	List of fishing gears (ref ISCFG)	S	S	S
tbl_codes_species_ASFIS	List of species maintained by FAO/ASFIS	S	S	S
tbl_countries	List of countries (used for vessel flag)	S	S	S
tbl_fishops	Single fishing operations provided by the fishing flag (e.g. longline set)		X	S
tbl_fishops_catches	Catch of each species made by the operation		X	
tbl_fishops_bycatches	ByCatch of ETP species made by the operation		X	
tbl_fishops_gearsdetails	Metrics of the gear used for the operation (e.g. longline length and hooks number)		X	
tbl_observers_trips	Trips made by observer (boarding of a vessel between 2 dates)			X
tbl_persons	People (including all observers)			S
tbl_fishing_operations	Single fishing operations recorded by the observer (e.g. longline set)			X
tbl_fishing_operations_catches	Catch details of each fishing operation			X
tbl_fishing_operations_birds	Bird abundance observation during an operation			X
tbl_fishing_operations_incidental_bc	Observed ByCatch of ETP species made by the operation			X

tbl_fishing_operations_benthos	Observed ByCatch of benthos organisms (including VME taxa) made by the operation			X
tbl_fishing_operations_dahndropline	Details and metrics of the operation (dates, positions)			X
tbl_fishing_operations_handline	Details and metrics of the handline operation (dates, positions, nb fishermen)			X
tbl_fishing_operations_longline	Details and metrics of the LL operation (dates, positions, depth)			X
tbl_fishing_operations_tags_recaptures	Record of tags recaptured in the SIOFA area			X
tbl_fishing_operations_tags_releases	Record of tags released in the SIOFA area			X
tbl_fishing_operations_trawl	Details and metrics of the trawl operation (dates, start/end positions, depth)			X
tbl_fishing_operations_whales_int	Record of mammal observations and interactions during operations			X
tbl_geardetails_longline	Technical specifications of longline used			
tbl_geardetails_dahndroplinehandline	Technical specifications of dahn line, drop line or handline used			X
tbl_geardetails_trappot	Technical specifications of traps used			X
tbl_geardetails_trawl	Technical specifications of trawl used			X
tbl_biological_sampling	Individual caught fish measurements and other biological parameters			X
tbl_streamerlines	Technical details of streamer line used for bird bycatch mitigation			X

Each of these tables contains different fields for a total of about 400 fields.

Fields and tables evolve to follow the needs and the requirements of the data that need to be stored. This document is a snapshot of the database structure in early 2025, the structure is likely to have slight changes in the future.

Several ID fields occur in multiple tables as they are primary key to one table, and foreign key to other tables, this is how the links are set between tables. A full list of all the fields used in the databases as in January 2025 is provided in Appendix 1.

2.1. Aggregated catch and effort database

This database has been developed mostly for collecting and storing historical catch and effort for fishing activities that happened prior to the SIOFA era, and that do not match the recent SIOFA data standards requirements set in CMM 02 (Data Standards). Before SIOFA's fishing countries had to comply with CMM 02, several countries had kept records of past fishing activities that occurred in the area that is now in SIOFA. Generally, the catch and effort data were available at lower definitions (i.e. monthly report and/or large spatial resolution), that could not fit in a haul-by-haul resolution database.

The operational resolution in the Aggregated database is the "activity", which is defined by:

- a fishing flag
- an area (from FAO area 51/57 to a 20' cell)
- a period (from one year to one day) and
- a main gear.

The main tables and fields of the Aggregated Catch and Effort (AGG) database are described in the figures below.

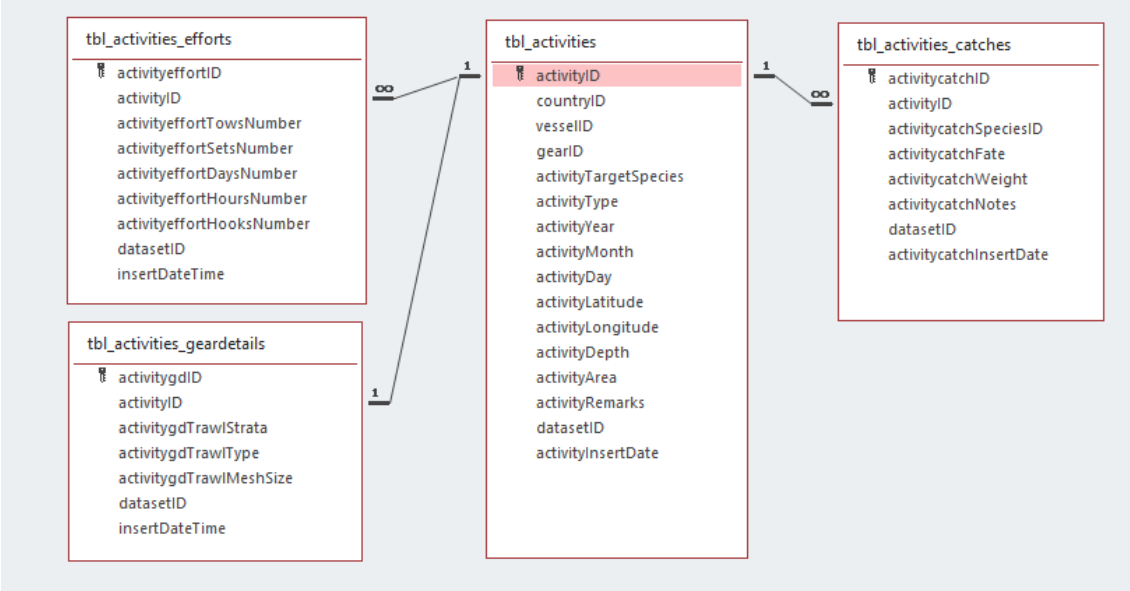

Figure 2: Main table relationships in AGG database

2.2. Haul-by-haul catch and effort database

This database stores the catch and effort data submitted under CMM 02 (Data Standards), where the data is provided on an operation basis (tow-by-tow for trawl, set-by-set for lines, etc.). This database is mostly used to retrieve catch and effort figures, these figures are associated with numerous other parameters: fishing flag, vessel names, positions, species, gears, etc.

The resolution in the haul-by-haul database is the fishing operation which is defined by:

- a vessel
- the operation's start and end location (coordinates)
- the operation's start and end time
- a main gear.

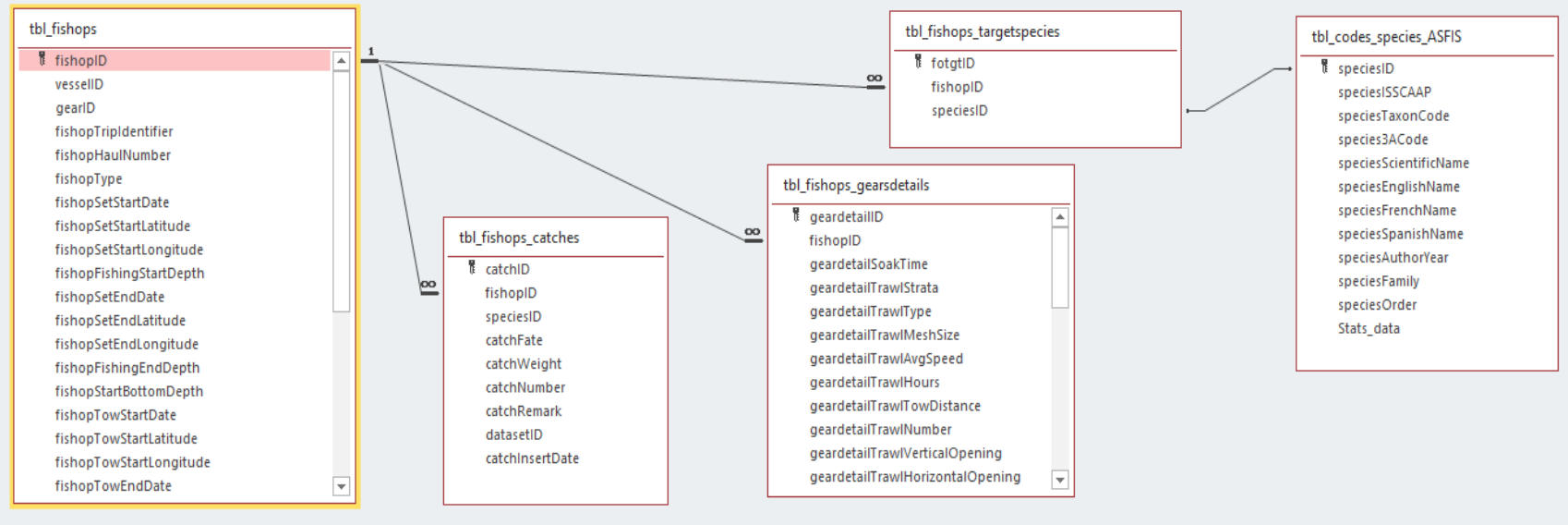

Figure 3: Main table relationships in HBH database

2.3. Observer database

This database stores the observers' data submitted under CMM 02 (Data Standards). This database completes the catch and effort data and provide biological information on the species caught. Observers' data is also provided on an operation basis, with more details relevant to the fishing gears, bycatches, observation of birds, observation of mammals, specimen biological metrics (length, etc.) and tagging information.

Observer data (OBS)

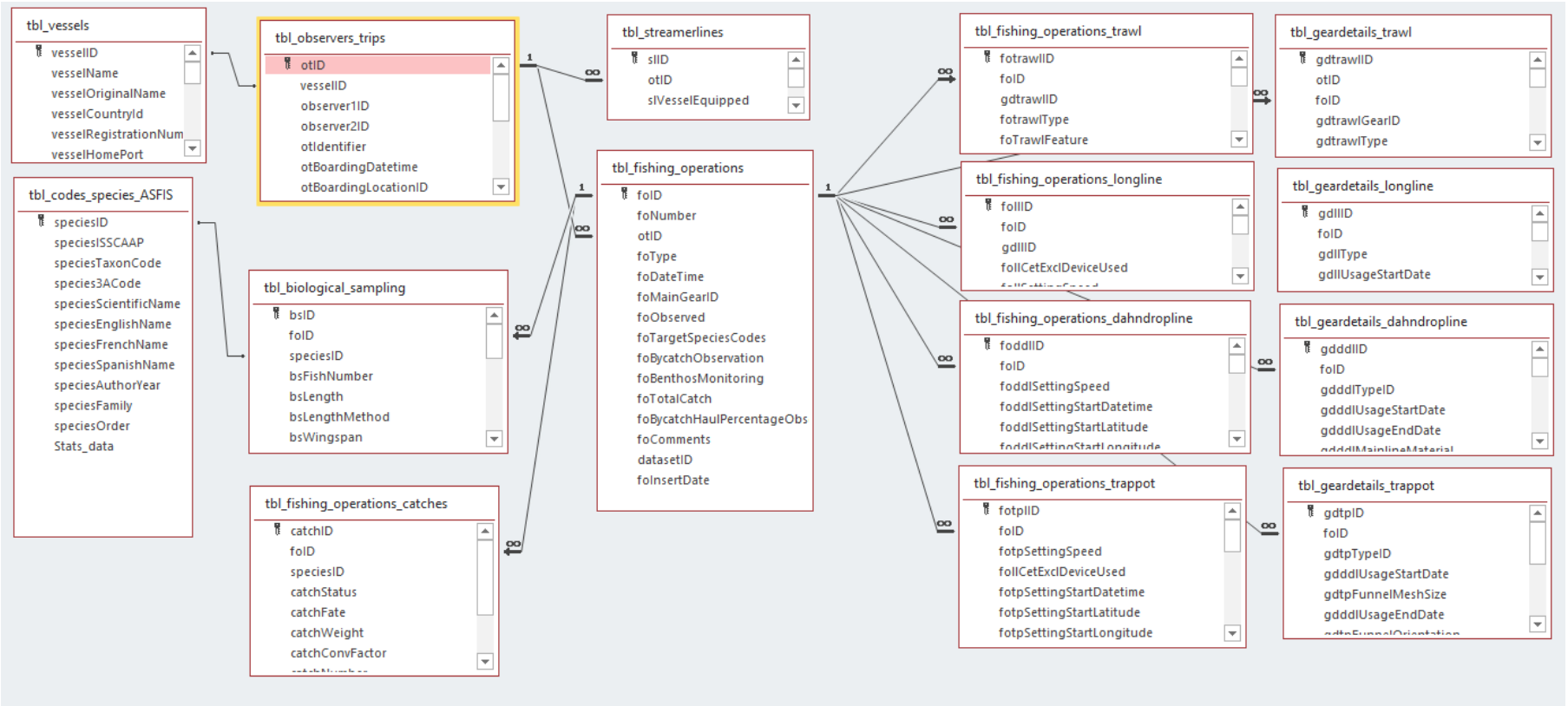

Figure 4: Main table relationships in the three main database tables (provided by the SIOFA Secretariat).

3. Processing of submitted datasets

SIOFA CMM 02 requires that CCPs submit annually Catch and Effort and Observer data. The processing of the data submission into SIOFA database follows 4 steps:

3.1. Step1: Registration of the dataset in the datasets database

Once a dataset is received at the Secretariat, it is recorded and registered into the datasets databases where several additional information are recorded:

- file(s) name
- sender
- recipient
- date received
- data type (catch and effort data, observer data)
- processing status

The datasets database also generates a unique identifier for the dataset (DatasetID) which is used in all databases records for keeping traceability.

This database is also used for logging any action relevant to the dataset (e.g. One FAO code is inconsistent, the data owner has been advised by email 03 AUG 2023, the data owner provided a correction and advised to change FAO code ORH to ORY) on 05 AUG 2023.

Once a dataset is recorded, the original is being kept, and all subsequent works are made on a copy.

3.2. Step2: Completeness and Checking of the data

The general objective of this step is to check for missing information, duplicated data, formatting issues and data inconsistencies. When inconsistencies are readily correctable, then it is corrected at the Secretariat level. When the issues cannot be straightforwardly resolved, then the data provider is informed of the issue(s) detected and asked for clarifications and/or corrections.

Excel cells formatting and units

Verify that all number and dates are on the same format.

For **date**, the format should be YYYY-MM-DD hh:nn:ss (eg. 2021-06-19 15:21:00).

For **latitude and longitude** positions, the format should be decimal degree. Note that positions can be provided by degree-minute-second, degree-minute-decimal-minute or decimal degree. Conversion is required when the units that have been provided are not decimal degree. The databases store latitudes and longitudes in decimal degrees only.

For **catch**, the unit to be used is Kilogram.

Data Consistency

The aim of this control is to detect any inconsistencies in relation to the fishing operations.

Fishing **start and end time**:
The fishing operation duration must be checked. If an operation exceeds a certain duration, then there is a chance that the data is wrong. When the data correction is not straightforward then the CCP is notified. The duration can be calculated only if date/time are provided when the operation started and ended. The sequence of operations must also be checked. E.g. a trawl tow may not start before the previous tow has ended.

For **trawl duration**, minutes must be used. Note that if start and end time are not provided, then the duration cannot be computed. Typical tow durations are available in the below table and have been computed using the data provided at tow level:

Trawl operation	Target	Tow duration threshold (min)
Semi-pelagic trawl (haul)	Alfonsino	30
Bottom-trawl (haul)	Orange Roughy	100
Bottom-trawl (haul)	Saya de Malha species	480

If one tow duration exceeds the above values, then it triggers an investigation.

For **longline setting duration**, a normal setting speed in about 3000 hooks per hour.

For **longline soak time** (time between the end setting date/time and the haul start date/time), it should not exceed a couple of days. Any duration above 5 days must be investigated.

Fishing **start and end position**:
Fishing positions: positions must be within the SIOFA area, therefore mapping the positions is required to detect any activity that fall outside the SIOFA area. If the positions can be corrected (case of a typo error and by verification with the other data available), then it is corrected internally. If it is not straightforward, then the CCP is notified and requested for confirmation or revision.

Fishing **set/haul length**
The length of a tow or a longline can be checked thanks to the coordinates when both start and end points are provided. The easier is to a use haversine function to compute the length of each operation (using the start and end positions). A GIS software can also be used to map the positions and build a segment for each end and start point of an operation.
Outstanding segments, above the below thresholds, will show up and must be investigated.

Longline	Target	Length threshold (km)
Demersal (or set longline)	Deep water species	12
Pelagic longline	Oilfish	120

Catch levels
Depending on the fishing activities, the catch made by one operation is checked against a threshold, the below values are used.

Gear/Fisheries operation	Test threshold (Kg)	Target
Semi-pelagic trawl (haul)	10,000	Alfonsino
Bottom-trawl (haul)	10,000	Orange Roughy
Demersal Longline (haul)	2,000	Toothfish, Deep water sharks
Handline (daily operation)	500	Misc demersal species
Pelagic Longline	2,000	Oilfish

Species codes validity and other taxa occurrence likelihood

A single species FAO codes need to be recorded for each taxon or taxa group reported. The taxon code provided by the data owner need to be checked for:
- Its presence in the ASFIS list (FAO species codes list),
- Its likelihood to occurs within the SIOFA area (e.g. freshwater fish cannot occur in the SIOFA area)

It is also useful that when a new species is detected in a dataset, and if this species has never been recorded before in the SIOFA databases, that this taxon is investigated to check its relevance.
When a species is doubtful, the data owner must be informed, and his confirmation or correction be requested.

Biological sampling

Typical metrics such as fish weight and fish need to be checked for any outstanding values to be highlighted. For example, Alfonsino will usually not exceed 60 cm in length and 6Kg in weight.

3.3. Step3: Harmonizing and organizing the data

The dataset is then rearranged to match the database format.

The Database table format drives the Excel sheet formatting. The Excel sheets and columns are re-arranged in order to match the relevant table and fields in the database.

3.4. Step 4: importing the data into the databases

The Excel sheets are usually temporarily imported in the database (link) and an update query is used for inserting the new records into the relevant tables.

The first records to import are the fishing operations, as each fishing operation will be given a unique identifier generated by the database. These identifiers need to be used in the other Excel sheets and the database tables to maintain the linkage between the operations information and the other information (e.g. catches linked to fishing operations)

The databases tables have field-level validation process, if inserted data is outside a defined range, then the database triggers alerts preventing the data to be inserted.

4. ANNEX 1: List of table fields in SIOFA database

The field names are usually self-explanatory, when they are not a description has been added in the right columns.

Note that all table have a datasetID and a _insertDate field which, for each record, contains the originating dataset identifier and the date and time the record has been added into the database.

4.1. Annex 1: Aggregated Catch and Effort Database (AGG)

TABLE	FIELD	TYPE	DESCRIPTION
tbl_activities	activityID	Long Integer	Activity unique identifier (PK)
	countryID	Long Integer	Fishing flag country
	vesselID	Long Integer	
	gearID	Long Integer	
	activityTargetSpecies	Short Text	
	activityType	Short Text	Type of fishing activity: Commercial, Research, etc
	activityYear	Long Integer	
	activityMonth	Long Integer	
	activityDay	Integer	
	activityLatitude	Double	
	activityLongitude	Double	
	activityDepth	Integer	
	activityArea	Short Text	
	activitySubArea	Short Text	
	activityOtherArea	Short Text	
	activityRemarks	Long Text	
	datasetID	Long Integer	
	activityInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_activities _catches	activitycatchID	Long Integer	
	activityID	Long Integer	
	activitycatchSpeciesID	Long Integer	
	activitycatchFate	Integer	Fate of the catch such as retained (1) or discarded (0)
	activitycatchWeight	Double	
	activitycatchNotes	Long Text	
	datasetID	Long Integer	
	activitycatchInsertDate	Date With Time	

4.2. Annex 1: Catch and Effort Database (HBH)

TABLE	FIELD	TYPE	DESCRIPTION
tbl_fishop	fishopID	Long Integer	Operation unique identifier (PK)
	vesselID	Long Integer	
	GearID	Long Integer	
	fishopTripIdentifier	Short Text	
	fishopHaulNumber	Short Text	Set/Tow number as provided by fishing flag
	fishopTargetSpecies	Short Text	
	fishopType	Short Text	Type of fishing operation: Commercial, Research, etc
	fishopSetStartDate	Date With Time	
	fishopSetStartLatitude	Double	
	fishopSetStartLongitude	Double	
	fishopFishingStartDepth	Long Integer	
	fishopSetEndDate	Date With Time	
	fishopSetEndLatitude	Double	
	fishopSetEndLongitude	Double	
	fishopFishingEndDepth	Long Integer	
	fishopStartBottomDepth	Long Integer	
	fishopTowStartDate	Date With Time	
	fishopTowStartLatitude	Double	
	fishopTowStartLongitude	Double	
	fishopTowEndDate	Date With Time	
	fishopTowEndLatitude	Double	
	fishopTowEndLongitude	Double	
	fishopEndBottomDepth	Long Integer	
	fishopAvgBottomDepth	Long Integer	
	fishopHaulStartDate	Date With Time	
	fishopHaulStartLatitude	Double	
	fishopHaulStartLongitude	Double	
	fishopHaulEndDate	Date With Time	
	fishopHaulEndLatitude	Double	
	fishopHaulEndLongitude	Double	
	fishopSST	Long Integer	
	fishopRemarks	Long Text	
	datasetID	Long Integer	
	fishopInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_fishop _catches	catchID	Long Integer	
	fishopID	Long Integer	Operation identifier (FK)
	speciesID	Long Integer	
	catchFate	Integer	
	catchWeight	Double	Total weight (Kg) caught of the species

	catchNumber	Long Integer	Number of species specimen caught
	catchRemark	Short Text	
	datasetID	Long Integer	
	catchInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_fishop _bycatches	bycatchID	Long Integer	
	fishopID	Long Integer	
	bycatchPresence	Integer	
	speciesID	Long Integer	
	bycatchWeight	Double	
	bycatchAliveNumber	Long Integer	
	bycatchDeadInjuredNumber	Long Integer	
	bycatchComment	Short Text	
	datasetID	Long Integer	
	bycatchInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_fishop _geardetails	geardetailID	Long Integer	
	fishopID	Long Integer	
	geardetailSoakTime	Double	
	geardetailTrawlStrata	Short Text	
	geardetailTrawlType	Short Text	
	geardetailTrawlMeshSize	Long Integer	
	geardetailTrawlDesignation	Short Text	
	geardetailTrawlAvgSpeed	Long Integer	
	geardetailTrawlHours	Double	
	geardetailTrawlTowDistance	Integer	
	geardetailTrawlNumber	Integer	
	geardetailTrawlVerticalOpening	Long Integer	
	geardetailTrawlHorizontalOpening	Long Integer	
	geardetailLonglineType	Short Text	
	geardetailLonglineLength	Long Integer	
	geardetailLonglineHooksNumber	Long Integer	
	geardetailLonglineHookSize	Double	
	geardetailLonglineHookSpacing	Double	
	geardetailLonglineHooksPerCluster	Long Integer	
	geardetailLonglineHookModel	Short Text	
	geardetailLonglineHooksLost	Long Integer	
	geardetailLonglineHooksNbBetweenFloats	Long Integer	
	geardetailLonglineLightStickNb	Long Integer	
	geardetailLonglineFloatingLineLength	Long Integer	
	geardetailLonglineBranchLineLength	Long Integer	

TABLE	FIELD	TYPE	DESCRIPTION
	geardetailLonglineBranchLineDistance	Long Integer	
	geardetailPotType	Long Integer	
	geardetailPotLineType	Short Text	
	geardetailPotLineLength	Long Integer	
	geardetailPotSpacing	Long Integer	
	geardetailPotsNumber	Long Integer	
	geardetailPotsLost	Long Integer	
	geardetailHandDroplineFishFinderUsed	Short Text	
	geardetailHandDroplineFishersmenNumber	Integer	
	geardetailHandDroplineLinesNumber	Long Integer	
	geardetailHandDroplineHooksNumber	Long Integer	
	geardetailHandDroplineHooksNbPerLine	Long Integer	
	geardetailHandDroplineHoursWork	Double	
	geardetailHandDroplineLineliftsNumber	Long Integer	
	geardetailHandDroplineHooksLost	Long Integer	
	geardetailHandDroplineHookModel	Short Text	
	geardetailHandDroplineLeaderType	Short Text	
	geardetailHandDroplineLampPower	Double	
	geardetailBaits	Short Text	
	geardetailGillnetLength	Long Integer	
	datasetID	Long Integer	
	geardetailInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_weight_conversion factors	wcfID	Long Integer	
	fishopID	Long Integer	
	vesselID	Long Integer	
	fishopTripIdentifier	Short Text	
	speciesID	Long Integer	
	wcfProcessName	Short Text	Code of fish process (e.g. HG for Headed and Gutted)
	wcfConversionFactor	Double	
	datasetID	Long Integer	
	wcfInsertDate	Date With Time	

4.3. Annex 1: Observer database (OBS)

Observer database: general trips and operations information

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _observers _trips	otID	Long Integer	Observer trip unique identifier (PK)
	vesselID	Long Integer	
	observer1ID	Long Integer	1st observer identifier (linked to contact register)
	observer2ID	Long Integer	2nd observer identifier when 2 onboard observers are present (linked to contact register)
	otIdentifier	Short Text	Trip identifier from fishing flag
	otBoardingDatetime	Date With Time	
	otBoardingLocationID	Long Integer	
	otBoardingLatitude	Double	
	otBoardingLongitude	Double	
	otDisembarkationDateTime	Date With Time	
	otDisembarkationLocationID	Long Integer	
	otDisembarkationLatitude	Double	
	otDisembarkationLongitude	Double	
	otFishingStartDate	Date With Time	
	otFishingEndDate	Date With Time	
	datasetID	Long Integer	
	otInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations	foID	Long Integer	Observed Operation unique identifier (PK)
	foNumber	Short Text	Fishing operation identifier from catch and effort database provide link to HBH database
	otID	Long Integer	Observer trip identifier (FK)
	foType	Short Text	
	foDateTime	Date With Time	
	foMainGearID	Long Integer	
	foObserved	Short Text	
	foTargetSpeciesCodes	Short Text	
	foBycatchObservation	Short Text	
	foBenthosMonitoring	Integer	
	foTotalCatch	Double	
	foSubSampleTotalWeight	Double	
	foBycatchHaulPercentageObserved	Double	
	foComments	Short Text	
	datasetID	Long Integer	
	fishopID	Long Integer	4
	foInsertDate	Date With Time	8

Observer database: longline operations and gear details

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operation _longline	follID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	gdlIID	Long Integer	Longline gear detail identifier (FK)
	follCetExclDeviceUsed	Short Text	
	follObservationDate	Date With Time	
	follSettingSpeed	Double	
	follSettingPosition	Short Text	
	follBaitSpecies	Short Text	
	follSettingStartDatetime	Date With Time	
	follSettingStartLatitude	Double	
	follSettingStartLongitude	Double	
	follSettingStartDepth	Integer	
	follSettingEndDatetime	Date With Time	
	follSettingEndLatitude	Double	
	follSettingEndLongitude	Double	
	follSettingEndDepth	Integer	
	follTotalLength	Long Integer	
	follTotalHooks	Long Integer	
	follBasketsMagazinesSetNumber	Long Integer	
	follHooksPerBasketMagazineNumber	Long Integer	
	follPercentageHooksBaited	Double	
	follDistanceBetweenBranches	Long Integer	
	follDistanceHookOfBottom	Long Integer	
	follDecklightUsed	Short Text	
	follBycatchMitigationMeasures	Short Text	
	follStreamerLineUsed	Short Text	
	follStreamerLinesNumber	Integer	
	follBaitEntryPosition	Short Text	
	follOffalDuringSetting	Short Text	
	follOffalSettingDumpingPosition	Short Text	
	follHaulingStartDateTime	Date With Time	
	follHaulingStartLatitude	Double	
	follHaulingStartLongitude	Double	
	follHaulingStartDepth	Long Integer	
	follHaulingEndDateTime	Date With Time	
	follHaulingEndLatitude	Double	
	follHaulingEndLongitude	Double	
	follHaulingEndDepth	Long Integer	
	follHooksNumberObservedforBycatch	Long Integer	
	follLostSectionNumber	Long Integer	
	follLostSectionHooksNumber	Long Integer	
	follOtherHooksLost	Long Integer	
	follOffalDumpingDuringHauling	Short Text	
	follOffalHaulingDumpingPosition	Short Text	
	follOffalPropellerRotationDirection	Short Text	
	follMinimumDepth	Long Integer	
	follMaximumDepth	Long Integer	
	DatasetID	Long Integer	
	follnsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _geardetails _longline	gdllID	Long Integer	Unique identifier for longline gear details (PK)
	foID	Long Integer	
	gdllType	Short Text	
	gdllUsageStartDate	Date With Time	
	gdllUsageEndDate	Date With Time	
	gdllMainlineMaterial	Short Text	
	gdllMainlineDiameter	Double	
	gdllMainlineIntegratedWeight	Double	
	gdllBranchlineMaterial	Short Text	
	gdllBranchlineDiameter	Double	
	gdllBranchlineLength	Double	
	gdllBranchlineIntegratedWeight	Double	
	gdllBranchlineSpacing	Long Integer	
	gdllHooksNumberBetweenFloats	Long Integer	
	gdllHookType	Short Text	
	gdllHookMake	Short Text	
	gdllHookSize	Short Text	
	gdllHookTotalLength	Double	
	gdllHookShank	Short Text	
	gdllHookGape	Integer	
	gdllHookThroat	Long Integer	
	gdllHookFrontLength	Long Integer	
	gdllHookUsualSettingPosition	Short Text	
	gdllHooksLineOffBottom	Double	
	gdllHooksOffBottom	Double	
	gdllHooksBaitingMethod	Short Text	
	gdllHooksinkerSize	Long Integer	
	gdllHooksinkerPositionFromHook	Long Integer	
	gdllOffalDumpingPosition	Short Text	
	gdllOffalDumpingDuringHauling	Short Text	
	gdllPropellerRotationDirection	Short Text	
	gdllLineWeight	Double	
	gdllTrotlineWeight	Double	
	datasetID	Long Integer	
	gdllInsertDate	Date With Time	

Observer database: trawl operations and gear details

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _trawl	fotrawlID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	gdtrawlID	Long Integer	Trawl gear detail identifier (FK)
	fotrawlType	Short Text	
	foTrawlFeature	Short Text	
	fotrawlOperationStartDatetime	Date With Time	
	fotrawlOperationEndDatetime	Date With Time	
	fotrawlStartBottomDepth	Integer	
	fotrawlFishingStartDateTime	Date With Time	
	fotrawlFishingStartLatitude	Double	
	fotrawlFishingStartLongitude	Double	
	fotrawlFishingStartDepth	Integer	
	fotrawlEndBottomDepth	Integer	

TABLE	FIELD	TYPE	DESCRIPTION
	fotrawlFishingEndDateTime	Date With Time	
	fotrawlFishingEndLatitude	Double	
	fotrawlFishingEndLongitude	Double	
	fotrawlFishingEndDepth	Integer	
	fotrawlMinDepth	Long Integer	
	fotrawlMaxDepth	Long Integer	
	fotrawlDuration	Long Integer	
	fotrawlOffalDischargedDuringShooting	Short Text	
	fotrawlOffalDischargedDuringHauling	Short Text	
	fotrawlTrawlSpeed	Double	
	fotrawlHeadLineTemperature	Double	
	fotrawlByCatchMitigationMeasures	Short Text	
	fotrawlToriLineUsed	Short Text	
	fotrawlBirdBafflersUsed	Short Text	
	fotrawlWarpStrikesMonitored	Short Text	
	fotrawlStrikesObservationStarttime	Date With Time	
	fotrawlStrikesObservationEndtime	Date With Time	
	fotrawlAirStrikesNumber	Integer	
	fotrawlWaterStrikesNumber	Integer	
	fotrawlSinkerStrikesNumber	Integer	
	DatasetID	Long Integer	
	fotrawlInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _geardetails _trawl	gdtrawlID	Long Integer	Unique identifier for trawl gear details (PK)
	otID	Long Integer	
	foID	Long Integer	
	gdtrawlGearID	Long Integer	
	gdtrawlType	Short Text	
	gdtrawlNetIdentifier	Short Text	
	gdtrawlHeadropeLength	Double	
	gdtrawlGroundropeLength	Integer	
	gdtrawlBobbinDiameter	Integer	
	gdtrawlOtterboardToWingLength	Integer	
	gdtrawlHorizontalOpening	Double	
	gdtrawlVerticalOpening	Double	
	gdtrawlWingMeshSize	Double	
	gdtrawlCodendMeshSize	Long Integer	
	gdtrawlCodendCircumference	Double	
	gdtrawlMeshType	Short Text	
	gdtrawlNetDesign	Long Text	
	gdtrawlNetMaterial	Short Text	
	gdtrawlOtterboardType	Short Text	
	gdtrawlOtterboardWeight	Integer	
	gdtrawlGroundRope	Short Text	
	gdtrawlGroundRopeMaterial	Short Text	
	gdtrawlInsertDate	Date With Time	
	datasetID	Long Integer	

Observer database: other line gear operations and line gear details

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _handline	fohlID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	gdhlID	Long Integer	
	fohlOperationStartDatetime	Date With Time	
	fohlOperationStartLatitude	Double	
	fohlOperationStartLongitude	Double	
	fohlOperationStartBottomDepth	Integer	
	fohlOperationEndDatetime	Date With Time	
	fohlOperationEndLatitude	Double	
	fohlOperationEndLongitude	Double	
	fohlOperationEndBottomDepth	Integer	
	fohlFishermenNumber	Long Integer	
	fohlLineLiftsPerFisherman	Double	
	fohlLinesNumber	Long Integer	
	fohlHooksPerLineNumber	Long Integer	
	fohlHooksBaitedPercentage	Double	
	fohlBaitSpecies	Short Text	
	fohlBaitProportion	Short Text	
	fohlbaitSize	Short Text	
	fohlBaitEntryPosition	Short Text	
	fohlDecklightUsed	Short Text	
	fohlOffalDumpingPosition	Short Text	
	fohlOffalDumpingDuringSetting	Short Text	
	fohlOffallPropellerRotationDirection	Short Text	
	fohlHooksLostNumber	Long Integer	
	DatasetID	Long Integer	
	fohlnsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _dahndropline	foddlID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	gdddlID	Long Integer	Gear detail record identifier (FK)
	foddlSettingSpeed	Double	
	foddlSettingStartDatetime	Date With Time	
	foddlSettingStartLatitude	Double	
	foddlSettingStartLongitude	Double	
	foddlSettingStartBottomDepth	Integer	
	foddlSettingEndDatetime	Date With Time	
	foddlSettingEndLatitude	Double	
	foddlSettingEndLongitude	Double	
	foddlSettingEndBottomDepth	Integer	
	foddlMainLineLength	Long Integer	
	foddlHooksSetNumber	Long Integer	
	foddlPercentageHooksBaited	Double	
	foddlDistanceBetweenBranchesSnood	Long Integer	
	foddlDistanceHooksOfBottom	Long Integer	
	foddlBaitSpecies	Short Text	

TABLE	FIELD	TYPE	DESCRIPTION
	foddlBaitProportion	Short Text	
	foddlbaitSize	Short Text	
	foddlBaitEntryPosition	Short Text	
	foddlDecklightUsed	Short Text	
	foddlStreamerLineUsed	Short Text	
	foddlStreamerLineNumber	Long Integer	
	foddlOffalDumpingDuringSetting	Short Text	
	foddlOffalDumpingPosition	Short Text	
	foddlHaulingDatetime	Date With Time	
	foddlHaulingLatitude	Double	
	foddlHaulingLongitude	Double	
	foddlOffalDumpingDuringHauling	Short Text	
	foddlOffalPropellerRotationDirection	Short Text	
	foddlLineSectionsLost	Long Integer	
	foddlSectionHooksLost	Long Integer	
	foddlOtherHooksLost	Long Integer	
	foddDatasetID	Long Integer	
	foddlnsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_ geardetails _dahndrop _line	gdddlID	Long Integer	Unique identifier for other line gear details (PK)
	foID	Long Integer	Fishing operation identifier (FK)
	gdddlTypeID	Short Text	
	gdddlUsageStartDate	Date With Time	
	gdddlUsageEndDate	Date With Time	
	gdddlMainlineMaterial	Short Text	
	gdddlMainlineDiameter	Double	
	gdddlMainlineIntegratedWeight	Double	
	gdddlHookType	Short Text	
	gdddlHookMake	Short Text	
	gdddlHookSize	Short Text	
	gdddlHookTotalLength	Double	Hook measurement details
	gdddlHookShank	Integer	
	gdddlHookGape	Integer	
	gdddlHookThroat	Integer	
	gdddlHookFrontLength	Integer	
	gdddlHookUsualSettingPosition	Short Text	
	gdddlHooksLineOffBottom	Double	
	gdddlHooksOffBottom	Double	
	gdddlHooksBaitingMethod	Short Text	
	gdddlLampPower	Double	For lamp fishing (e.g. squid jigging)
	gdddlPropellerRotationDirection	Short Text	
	datasetID	Long Integer	
	gdddlInsertDate	Date With Time	

Observer database: catch, incidental bycatch and other ecosystem observations

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _catches	catchID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	speciesID	Long Integer	
	catchStatus	Short Text	
	catchFate	Integer	Code for Retained, Discarded, Cut, etc.
	catchWeight	Double	
	catchConvFactor	Double	
	catchNumber	Long Integer	
	catchRemark	Short Text	
	datasetID	Long Integer	
	catchInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _catches	foibcID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	foibsPresence	Integer	
	speciesID	Long Integer	
	foibcNbCaught	Integer	
	foibcNbReleased	Integer	
	foibcNbReleasedVigorous	Integer	
	foibcNbReleasedAlive	Integer	
	foibcNbReleasedLethargic	Integer	
	foibcNbReleasedInjured	Integer	
	foibcNbReleasedDead	Integer	
	foibcNbSampled	Integer	
	foibcNbFemale	Integer	
	foibcNbMale	Integer	
	foibcNbUndetermined	Integer	
	foibcNbRetained	Integer	
	foibcWeightCaught	Double	
	foibcMinLength	Integer	
	foibsMaxLength	Integer	
	foibcLengthType	Short Text	
	foibcSharkPups	Short Text	
	foibcCircumstance	Long Text	
	datasetID	Long Integer	
	catchInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _birds_abundance	birdID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	speciesID	Long Integer	

TABLE	FIELD	TYPE	DESCRIPTION
	speciesObsNames	Short Text	Common name if speciesID not available in FAO ASFIS list
	birdAbundance	Long Integer	
	birdMinAbundance	Long Integer	
	birdMaxAbundance	Long Integer	
	birdRemark	Short Text	
	datasetID	Long Integer	
	birdInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _benthos	fobenthosID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	fobenthosPresence	Integer	
	speciesID	Long Integer	
	fobenthosCommonName	Short Text	Common & scientific name if speciesID not available in FAO ASFIS list
	fobenthosScientificName	Short Text	
	fobenthosQuantity	Double	
	fobenthosQuantityUnit	Short Text	
	fobenthosPieces	Integer	Number of benthos species caught
	fobenthosStatus	Short Text	Live or Dead status (for coral)
	fobenthosVMEUnitsNumber	Integer	
	fobenthosSegmentNo	Integer	
	fobenthosSegmentMidLatitude	Double	
	fobenthosSegmentMidLongitude	Double	
	fobenthosPhotoRef	Short Text	
	fobenthosSampled	Short Text	
	fobenthosComments	Long Text	
	datasetID	Long Integer	
	fobenthosInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _whales_int	wiID	Long Integer	Whale interaction record identifier
	foID	Long Integer	Fishing operation identifier (FK)
	wiPresence	Short Text	(P)resence, (A)bsence, (U)nobserved ...
	wiPresenceComment	Short Text	
	speciesID	Long Integer	
	wiPhotos	Short Text	
	wiPhotosComment	Short Text	
	wiMinNumber	Long Integer	
	wiMaxNumber	Long Integer	
	wiNumberComment	Short Text	
	wiInteractionWithGear	Short Text	
	wiInteractionComment	Short Text	
	wiETA	Long Integer	
	wiETAComment	Short Text	
	datasetID	Long Integer	
	wiInsertDate	Date With Time	

Observer database: collection of biological data

TABLE	FIELD	TYPE	DESCRIPTION
tbl_bio _sampling	bsID	Long Integer	Biological sampling unique identifier (= one fish)
	foID	Long Integer	Fishing operation identifier (FK)
	speciesID	Long Integer	
	bsFishNumber	Integer	Serial number of a fish (when used)
	bsObserverID	Long Integer	
	bsLength	Double	
	bsLengthType	Short Text	What has been measured (e.g. fork length)
	bsLengthMethod	Short Text	How length has been measured (e.g. tape)
	bsWingspan	Double	
	bsPelvicLength	Double	
	bsSnoutAnusLength	Double	
	bsHeight	Double	
	bsWeight	Double	
	bsWeightingMethod	Short Text	
	bsSex	Short Text	
	bsMaturity	Short Text	
	bsGonadWeight	Double	
	bsTissueSampled	Short Text	
	bsOtolithCollected	Short Text	
	bsStomachSampled	Short Text	
	bsTagCollected	Short Text	
	bsComment	Short Text	
	datasetID	Long Integer	
	bsInsertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
tbl_bio _sampling _otolith _ageing	foID	Long Integer	Fishing operation identifier (FK)
	SeqNo	Long Integer	
	Tow_no	Integer	
	New_dates	Date With Time	
	Length	Double	
	Weight	Double	
	Sex	Short Text	
	fish_no	Double	
	Maturity	Integer	
	otolith_weight(mg)	Short Text	
	0-TZ	Integer	otolith ageing reading parameters
	R (0-TZ)	Integer	
	TZR	Integer	
	TZ-E	Short Text	
	R (TZ-E)	Short Text	
	Total	Integer	
	Linkage Confidence	Short Text	
	dsID	Long Integer	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _tags _recaptures	tagrecID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	tagFate	Short Text	
	speciesID	Long Integer	
	tagrecSpecimenLength	Double	
	tagrecSpecimenLenghtType	Short Text	
	tagrecSpecimenSex	Short Text	
	tagrecSpecimenMaturity	Short Text	
	tagrecSpecimenWeight	Double	
	tagrec1Type	Short Text	Recaptured Tag1 details
	tagrec1Colour	Short Text	
	tagrec1Number	Short Text	
	tagrec1Wording	Short Text	
	tagrec2Type	Short Text	Recaptured Tag2 details
	tagrec2Colour	Short Text	
	tagrec2Number	Short Text	
	tagrec2Wording	Short Text	
	tagrecSpecimenRecovered_ WhileObserving	Short Text	
	datasetID	Long Integer	
	insertDate	Date With Time	

TABLE	FIELD	TYPE	DESCRIPTION
Tbl _fishing _operations _tags _releases	tagrelID	Long Integer	
	foID	Long Integer	Fishing operation identifier (FK)
	tagFate	Short Text	
	speciesID	Long Integer	
	tagrelSpecimenLength	Double	
	tagrelSpecimenLenghtType	Short Text	
	tagrelSpecimenSex	Short Text	
	tagrelSpecimenMaturity	Short Text	
	tagrelSpecimenWeight	Double	
	tagrel1Type	Short Text	Released tag1 details
	tagrel1Colour	Short Text	
	tagrel1Number	Short Text	
	tagrel1Wording	Short Text	
	tagrel2Type	Short Text	Released tag2 details
	tagrel2Colour	Short Text	
	tagrel2Number	Short Text	
	tagrel2Wording	Short Text	
	tagrelSpecimenStatus	Short Text	
	tagrelDate	Date With Time	Release date and position if different from fishing operation date and position.
	tagrelLatitude	Double	
	tagrelLongitude	Double	
	datasetID	Long Integer	
	insertDate	Date With Time	