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# Development of a database network for use in the assessment of the SBT fishery

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**OBJECTIVE:**

To develop a database system that integrates and allows for the efficient access to the diverse sets of data necessary for the assessment of the southern bluefin tuna fishery.

This has been achieved through the establishment of an extensive Oracle database, holding fishery and research data from Australia, Japan, New Zealand, and Indonesia among others. Key stock indicators can now be easily extracted from these diverse datasets for incorporation into the stock assessment of southern bluefin tuna.

**NON-TECHNICAL SUMMARY:**

One of the primary questions asked by those involved in fishing or research on southern bluefin tuna (SBT) is: Where is the population heading? The answer to this question is very complex and involves extensive research into the biology, ecology and stock assessment of SBT.

All research into the population status and structure must be based on accurate data from the fishery and other sources. This data must be collected over a long period to allow any inference to be made on the SBT population, without the undue influence of year to year fluctuations.

Data for the SBT fishery have been actively collected since the 1950's by Japanese, Australian and New Zealand fishermen and scientists. Over the years, data collection methods and data requirements have changed considerably. Specific databases have been established for holding a particular subset of the whole SBT data. These local databases required specialised knowledge to use and only covered a small fraction of the whole data that are available for SBT research.

Since the advent of the tri-lateral process and recently the formation of the CCSBT, the questions asked about the SBT population are not localised but rather pertain to the SBT population as a whole, thus involving several countries. Whilst the questions and research effort on SBT are global, the data on the SBT fishery are kept in separate databases at BRS and AFMA in Canberra, CSIRO Hobart, NIWA New Zealand, and NRIFS, Japan. This made the annual assessment of SBT a very time consuming exercise in trying to 'piece together' all the relevant information. Also, much of the

data that were collected were not fully analysed, thus not fully utilising the data that had been collected at great expense.

The aim of this project was to store all the data pertaining to SBT in a central database. This database was to be used primarily for research and was not to be the primary store for fishery data. The database allows fishery and other data to be easily accessible in a variety of formats to scientists and all data should be compatible with industry standard tools such as statistics, graphics and mapping software. Oracle was chosen as the database platform to be used since it is the leader in database technology with a proven record in robust database servers. They also provide no cost software licenses for CSIRO clients.

Programs whose data are incorporated into the database include: CSIRO tagging (1965), CSIRO aerial survey (1991), AFZ domestic logbook (1975), AFZ foreign fleet logbook (1979), AFZ observer program on foreign vessels (1980), New Zealand domestic and foreign logbook (1980), Australian length weight sampling (1951), CSIRO domestic observer (1994), Indonesian sampling (1993), Japanese aggregated global fleet (1952), Japanese RTMP High Seas monitoring (1991) and Japanese RTMP High Seas observer (1992).

The database stores information on over 1 500 000 fishing operations, setting over 4 billion hooks and catching over 50 million SBT.

The multitude of data sources, especially in recent years, lead to a situation where all the fishery data could not be managed and analysed except through the effective use of a central database system. This project has resulted in such a database system. This system greatly facilitates the ability of the researchers to perform analyses and assessments of the SBT stock and fisheries.

**KEYWORDS:**

database, southern bluefin tuna, stock assessment, Oracle.

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## 1 BACKGROUND

All recent assessments of southern bluefin tuna (SBT) indicate that the spawning stock is at a historically low level: between 25 and 39% of the 1980 level and 5 to 8% of the 1965 level (Anon, 1996). These assessments also indicate that recruitment has been declining since the 1980s.

In response to the declines in both spawning and recruitment, management has imposed increasingly restrictive global catch quotas. However, it is far from certain that the quotas are sufficient to enable the stock to recover, while the quotas have generated economic problems for the Australian SBT fishing industry. Consequently, managers and researchers are focusing on improving the assessment methods to ensure that all data are taken adequately into account.

## 2 NEED

The critical state of both the SBT resource and Australian SBT fishing industry has focussed attention on improving the precision of assessments to fully account for the uncertainties in the assessments. Improved, and more complex, analytical methods are being incorporated in the assessment process.

The basis of any stock assessment is the input data, which is integrated into the assessments and advice provided to managers. The current methods also attempt to account for the uncertainties in the data and models so that they can be accurately reflected in the advice presented to managers. The data must therefore, be readily available at the fine-scale resolution at which they have been collected. Furthermore, the critical state of the resource, together with the uncertainty associated with the current quota means that the most recent data are crucial. The turnaround between the provision of data and completion of the analyses must be as fast as possible. An efficient, reliable and integrated data network was needed to ensure that all data can be, and are, incorporated in the assessments.

The sources of data for assessing southern bluefin tuna stocks have increased rapidly in the past few years. Research, commercial and observer data from Australia and other countries are collected by a variety of institutions in a variety of formats. The data and databases that now require integration are: the AFZ observer data; AFMA radio reports for the most recent seasons; size-frequency data from the Australian commercial SBT fisheries (held by various institutions); vessel licences for Japanese vessels that fish within the AFZ; CSIRO tagging data; the data from aerial surveys; the high seas catch, effort and size data supplied by vessels in the real-time monitoring program (RTMP); RTMP observer data; Japanese commercial longline catch-and-effort logbook data; size-frequency data from Japanese longline vessels; catch and size data from New Zealand domestic troll and handline fisheries; catch, effort, effort and size data for joint venture and bi-lateral longline vessels operating in New Zealand's EEZ; the New Zealand observer data; and catch and size data from longliners landing in Indonesia – 14 databases in all. The data are held by several institutions, either in computerised databases with different data structures or in (some cases) without any formal data storage structures.

Recognising the critical need for a specific database that could handle and integrate these data sets for the SBT assessments and research, CSIRO developed an information management system that established compatible data formats and enable the data sources to be integrated efficiently, rapidly and easily into the assessment process.

### 3 OBJECTIVE

To develop a database that integrates and links the diverse sets of SBT data, enabling fast and efficient data access necessary for the assessment of the SBT population

### 4 METHODS

The Oracle database management system, which is CSIRO's standard database, was used as the engine for designing and building the entity-relationship data models within this robust and secure system. The SBT data in the general categories of catch-and-effort, size-frequency sampling, tagging, aerial survey, biological results and environmental data are integrated by universal database tables that form a union of the separate data sets.

Specialised software tools for loading, extracting and reporting were developed to facilitate storing, linking, transferring, analysing and entering of data. Sophisticated computerised verification and validation suites were written for entering RTMP and SBT tagging data directly and for loading data from other computerised databases (e.g. AFZIS, AFZ observer, aerial survey data). Easy to use software was developed for flexible and efficient, though complex, transformations of the data (e.g. assignment of age from length) and aggregation and extraction of the data in forms suitable for direct input to the analyses required for stock assessment (e.g. the catch-at-age matrix). In addition, graphical and statistical tools (such as S-plus) were interfaced directly with the database to provide standard summaries, reports and graphical representations of the data.

### 5 DETAILED RESULTS

This project has been successful in developing a fully relational and integrated database that can contain all the basic data and related information needed for SBT stock assessments. The database currently contains catch, effort and size data from all the main components of the global SBT fishery, as well as by-catch information. It also contains the data produced by the extensive AFMA and RTMP observer programs, the large body of tag-and-recapture data, the SBT aerial survey data and biological sampling information.

The database contains data collected by Australia, Japan, New Zealand, and other countries, over 46 years during which there were 1.5 million fishing operations, 4.5 billion hooks were set and over 50 million SBT caught. These data are stored in over 100 tables, together holding 2 million data records and occupying 500 megabytes.

The data are provided by organisations in Australia, New Zealand, Japan and Indonesia. A large task of this project was establishing contacts within these organisations and establishing standard procedures and formats for the exchange of data.

The context diagram for the SBT database (Fig. 1) shows the external data providers and recipients and the data they provide or receive.

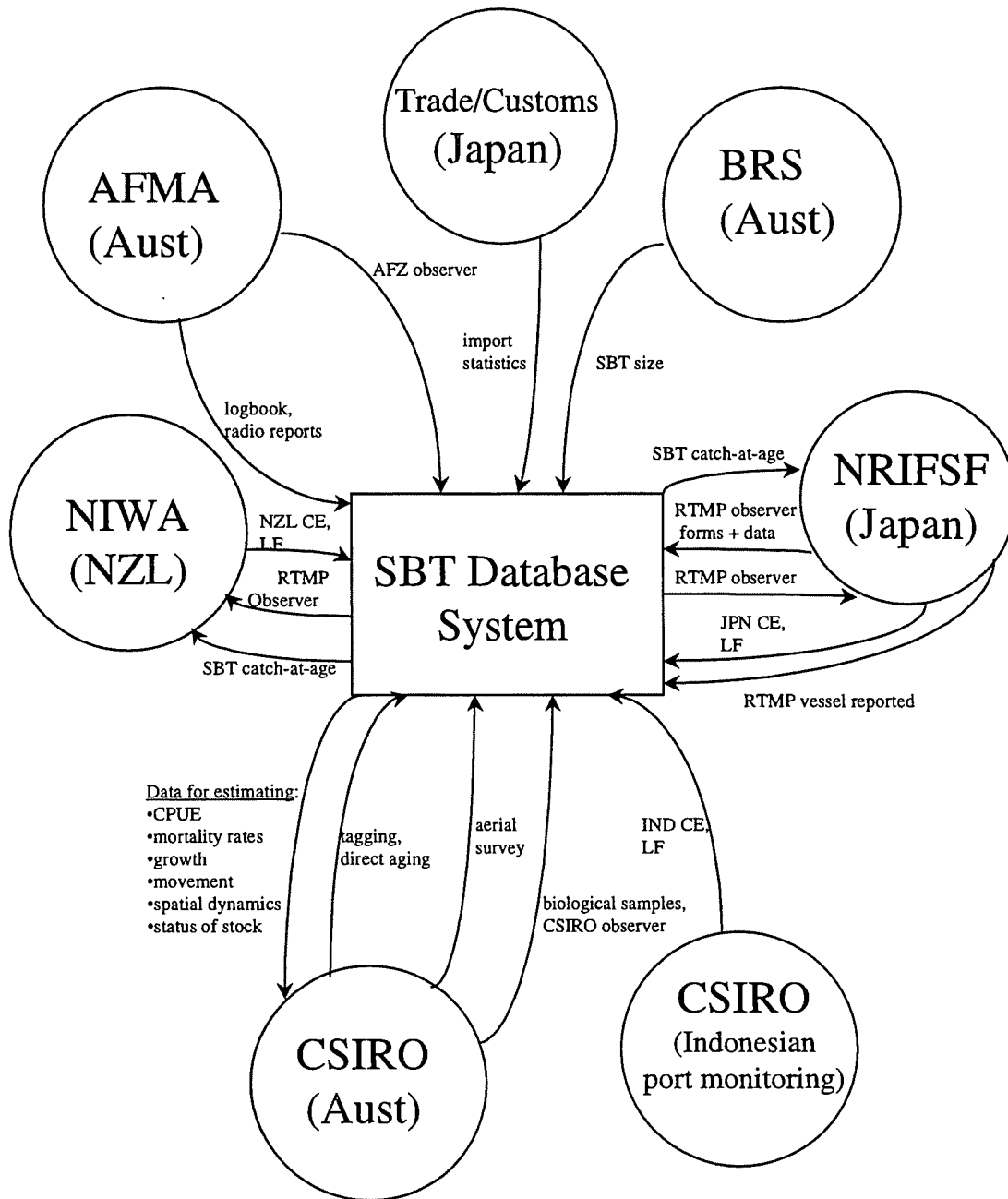


Figure 1. Context diagram showing the major external data providers and receivers and their relationship to the SBT database system.

CE = catch-and-effort, LF = length-frequency  
 IND = Indonesia, NZL = New Zealand, JPN = Japan  
 RTMP = Real Time Monitoring Program

## 5.1 Research Requirements

Access to the most up-to-date research and commercial SBT fishery data is essential for both stock assessment and research. Data at the finest scales, from a variety of sources, have been incorporated into the SBT database. Several different ways of accessing the data were required: automated reports, common data querying facilities, mapping procedures, data extraction programs for datasets, and ad hoc queries to investigate new ideas or conduct new analyses and provide information on specific aspects of the fishery.

### 5.1.1 Data Access

Four methods of accessing the data, have been developed. Only SBT researchers are allowed to use them.

#### 5.1.1.1 Direct access

Individual researchers can access the data they need by SQL queries. SQL is an industry standard, Structured Query Language. The researcher can construct views of the data and new tables to generate transformations of individual data fields, calculate new fields from combinations of existing fields, and link data from disparate sources.

An alternative method for direct access is through Oracle Browser or Microsoft Access, which are user-friendly products that helps users to explore the data and to write simple queries and reports. These tools do not require knowledge of SQL.

#### 5.1.1.2 Oracle Forms

A user front-end for the tagging data uses Oracle forms to enable a researcher to make simple queries on individual fields in the database. The field value to find is entered and, upon search completion, the full set of information on that tag (or vessel, or fishing operation etc.) is presented. Where more than one record matches the query, the user can tab through the list of responses. For example, a user can access all the data entered for tag number 99998, the vessel named *Rosa Linda*, the tags returned when an observer was on board, or for all fishing operations between certain dates. These same forms are used for data editing and entering of individual records. Again access for this purpose is restricted to specifically approved users.

#### 5.1.1.3 Standard reports

Standard reports can be generated and printed as required. They include lists of tags, release and recapture sites, and the vessels concerned; returns from individual fish farms; lists of fish tagged by observers on longliners and so on. From the aerial survey data, information can be retrieved for single/particular sightings, or can be aggregated by date, position, environmental conditions, etc.

#### 5.1.1.4 Tagging Certificates

As part of the tagging database, certificates for tag returners are generated by the system to express our appreciation for them returning tags to CSIRO. These certificates contain release and recapture information about the tagged fish (see Appendix E for a sample certificate). There are English and

Japanese versions of the certificate, and Taiwanese and Indonesian versions are currently being prepared. They can easily be added to the system.

A standard report on the tagging data is produced each month. It presents information on yearly trends (e.g. return rates by various categories of data) and the trend for the data entered in the most recent month (an example report is provided Appendix A). Information from these reports is incorporated in the working papers for the SBT recruitment monitoring workshop held each year.

The aerial survey data are analysed in a yearly report: *Data Analysis of the Aerial Surveys for Juvenile Southern Bluefin Tuna in the Great Australian Bight*. The report covers the survey design, surface-abundance estimates, data issues, environmental conditions, and other topics. Programs were written to extract the data and report the details of the sightings, transect details and environmental conditions. The data are presented in the report as tables compiled in Tex, and as graphs, mostly produced with Splus. This annual aerial survey report is an important working paper for both the CCSBT Scientific Committee Meeting and the SBT Recruitment Monitoring Workshop.

### 5.1.1.5 Mapping and graphics programs

Mapping of geographical data is a powerful technique for analysis of fisheries data, so it is used extensively in the stock assessment of SBT.

The tag-return mapping program extracts data via a set of simple queries, and plots the release and recapture sites for each tagged fish. Maps based on a wide variety of criteria (e.g. release site, release data, release fishery, time-at-liberty recapture fishery, tag finder, etc.) can be prepared easily. In these maps the release and recapture sites are joined by an arrow; see Appendix B for an example. These maps provide an overview of SBT movements and fishery interactions. They are used routinely in movement papers presented at the SBT Recruitment Monitoring Workshop held each year, as well as being used in other reports and scientific papers (e.g. Preece and Polacheck, 1997; Whitelaw et al 1996)

MapInfo, a commercial mapping program, is also used to analyse geographical trends in the data and for displaying complex geographical data. ArcInfo GIS software is used to analyse interactions of trends in the CPUE and aerial survey data with environmental conditions.

Producing a series of maps over a time period (e.g. catch rates and effort from 1980-1988 off Tasmania) is difficult with most GIS and mapping packages. A Windows 95-based mapping package, PELDB, has been built into the SBT database system. This package can readily produce comprehensive maps (including a time series) from many of the data tables and fields in the database. Appendix C provides an example of how this package is used and of its output.

For the annual assessment of SBT stock, catch rates are examined to determine whether there are any age or year trends. These analyses are best presented graphically. A large number of such graphs are needed to cover various permutations of areas, fisheries and age groupings. Software was developed for the easy and efficient production of these graphs with a standard UNIX package. Appendix D gives an example of the output.

## 5.1.2 Data Analysis

The SBT database has greatly facilitated the analysis of fishery and research data by making some tasks easier and quicker, and new tasks possible. This is largely because data from a variety of sources are now in a central storage system in a common format and the software enables users to extract and combine these data.

An example of one task is the comparison of catch rates from observer and vessel logbook data. Matching the two sets manually is laborious with large amounts of data. Different spellings of vessel names, slightly different dates and times, different data formats and the time lapses between data collection and distribution add to the difficulty.

Another example is in the analysis of tag recaptures and the recovery rate of tags in relation to the catches of a particular vessel. Only by matching effort (from vessel logbooks), observer coverage (where tag recovery is high) and tag recoveries can one estimate tag recovery rates. This requires data from the tagging programs, observer programs and fishery catch-and-effort to be readily compared. The SBT database enables efficient and easy comparisons such as these to be made without creating special software to handle the different data formats and collection issues.

The database also stores all the data that are used to produce the catch-at-age matrix used in the virtual population analysis (VPA) stock assessment (Polacheck et al 1997a). Procedures have been written to integrate these data and to store the catch data from each source. It is now possible to calculate different catch-at-age matrices that use alternative growth models, and include or exclude data from the different data sources (Polacheck et al 1997d).

## 5.2 The Southern Bluefin Tuna Fishery

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is an international organisation with responsibility for managing the global SBT fishery. It does this primarily through setting annual catch quotas. Established in 1994, the convention replaces the previous informal 'trilateral' arrangement, which operated from 1980 to 1993.

Australia, New Zealand and Japan are member countries. The commission's scientific committee meets annually to present reports from each country, new biological information, stock assessment and projections. Most of the analyses of data held in the database are presented at these meetings and subsequently in papers in the scientific literature.

SBT are caught by fisheries of at least six countries. A brief description is provided below and a detailed description can be found in Caton, 1994.

### 5.2.1 The Japanese Fishery

The Japanese tuna longline fleet consists of several hundred 40m vessels. These vessels can operate for extended periods in the roughest of conditions, as found in the Southern Ocean. The fleet target SBT on the high seas in the Atlantic, Indian and Southern Oceans and also within the Australian Fishing Zone (AFZ) and New Zealand's Exclusive Economic Zones (EEZ).

The regulations and reporting requirements of the vessels depends on where they are fishing.

**High seas fishery** - Japanese vessels on the high seas are regulated by Japanese laws.

**Australian AFZ and NZ EEZ** - vessels are required to obtain licenses from the respective country. There are two types:

- **Joint Venture** - vessels use Australian or NZ quota. These are called *charter* operations in NZ. Between 1989 and 1995, this practice was followed in Australia, and might be reinstated in the future.

- **Bilateral** – vessels use Japanese quota but must obtain a license to fish in Australian or NZ waters. These are called *foreign* vessels in New Zealand. In October 1995, bilateral fishing ceased in Australian and New Zealand waters due to disagreement over quotas, but restarted in June 1996 within the AFZ. Bilateral fishing ceased again in the AFZ in 1997 and 1998.

## 5.2.2 Australian Domestic Fishery

A recreational and charter troll fishery also exists off Tasmania, operating from February to June. The Australian domestic commercial fishery catches SBT with longline, trolling pole-and-line, and purse seine vessels (Caton, 1994). The longline industry mainly fishes off the continental shelf in southern New South Wales in the winter, with some activity off Tasmania since the late 1990s. There is also some longlining in Western Australian and the Great Australian Bight. The vessels are smaller than those in the Japanese fleet and they operate closer to port and fishing trips are generally less than one week. The Australian fleet caters mainly for the fresh rather than the frozen market. The processed weights of SBT from Australian and Japanese vessels are often different for the same weight and length of fish because of differences in processing after they are caught.

The pole-and-line and purse seine fisheries are currently concentrated in the Great Australian Bight. In recent years, purse seining is only used to capture SBT for farming. There has been some occasional and very limited pole and live bait activity off NSW in recent years. Before the mid-1980's, both pole-and-line and purse seine catches were used primarily for canning, but now most of the catch has been exported to Japan for the sashimi market.

## 5.2.3 New Zealand Domestic Fishery

The New Zealand domestic (non-charter) fishery was very small until the early 1990s but since then it has expanded to fish from 29 ports, although the catch remains relatively small.

## 5.2.4 Third Party Fisheries

These fisheries are operated by vessels from Taiwan, Indonesia, Korea, Singapore, and from vessels under “Flag of Convenience”. None of these countries are members of the CCSBT. Currently, with the exception of Indonesia, the main source of data on catches by non-CCSBT fisheries are import statistics compiled by Japan. These data are publicly available in published reports.

The Indonesian longline fishery operates in the SBT spawning ground off Bali. In 1991, CSIRO established a catch-monitoring program in Balinese ports to collect catch and size-distribution data on the SBT caught in the Indonesian fishery.

## 5.3 Sources of Data

The data contained in the database comes from a wide variety of sources. Each country has its own method of collecting and distributing these data, and this changes frequently. This section outlines the sources of the data.

### 5.3.1 Japanese Longline Data

Under Japanese regulations, every vessel is required to complete daily logbooks when at sea. And submit them to the Japan Fishery Agency (JFA). In addition, Japanese vessels fishing the Australian Fishing Zone (AFZ) must satisfy Australian Fisheries Management Authority's (AFMA) log-book requirements. Vessels participating in the Real Time Monitoring Program (RTMP) also keep a separate RTMP log-book (see below).

All Japanese vessels report regularly to JFA. If they are in the Australian or New Zealand zones they also report to AFMA (Australia) or NIWA (New Zealand). RTMP vessels also report to the National Research Institute for Far Seas Fisheries (NRIFSF) in Japan. Thus, potentially one vessel could report the same fishing data three times: to AFMA (or NIWA), JFA and RTMP. However, the RTMP vessels are mainly in non-EEZ areas (i.e. the high seas), so we have, at most, duplication of data. This is seen as a bonus, as it provides invaluable verification of fishery data, particularly with respect to completeness of coverage.

#### 5.3.1.1 Japan Fishery Agency Data

Japan Fishery Agency (JFA) does not allow the fine-scale data (i.e. the daily log sheets) to be accessed outside of Japan. Since 1980, it has distributed aggregated data on SBT fishing areas only to CSIRO and NIWA and only on a confidential basis. The aggregated data are known as *yellow book data* because prior to 1980, it was published annually in volumes with yellow covers. The data are provided only for research and analyses of SBT stock and fisheries. The entire collection of set-by-set data is stored in Japan at NRIFSF.

The aggregated catch-and-effort data is of two kinds: monthly latitude by longitude ( $5^\circ$  square) summaries of catch-and-effort data on tuna and billfish species, and quarterly size-frequency summaries ( $5^\circ \times 10^\circ$ ) of SBT size distribution. Size has been measured by length or weight, and with varying accuracy over the years. The size-frequency summaries have never been published. The size data are used to calculate the age distribution of the catch for the catch-at-age matrix used in the VPA, CPUE and tagging analyses.

NRIFSF updates the aggregated data once a year, with a 1-2 year time lag (e.g. in May 1996, CSIRO received 70% of the data from 1995 plus 100% of the 1994 data). It includes data from Japanese bilateral vessels but not joint venture vessels (1989-1995). RTMP length samples are also included in these data sets.

Not only SBT catches are recorded in the yellow books; they include catch of the principle tuna and billfishes by the entire Japanese fishery, within SBT fishing areas. While we are interested in only the SBT fishery and stock, information on the catches of other species can be useful in interpreting CPUE and the distributions of fishing effort in time and space. The SBT database stores all sets from the SBT statistical areas, plus all  $5^\circ \times 5^\circ$  squares in which SBT have been caught.

#### 5.3.1.2 Real Time Monitoring Program (RTMP) Data

The Real Time Monitoring Program (RTMP) was begun in 1991 to improve the timeliness and information on the catch-and-effort in SBT fisheries. Components of the programs are integrated in Australia, Japan and New Zealand.

The Japanese component consists of vessels' logbook data (since 1991) and observer data (since 1992). The vessels' data include the length and weight of all SBT caught, and the location, time and other



details of each longline set. These reports are faxed daily to Japan for compilation in their RTMP vessel database.

Since 1995, all Japanese vessels longlining for SBT on the high seas, have been reporting RTMP data. In addition, from 1991 through 1995, between 13 and 20 Japanese longline vessels were allowed to use up to 800 tonnes of Australian quota outside the normal operating period of their fishery. When vessels were using this quota, Australian observers were allowed on the vessel to collect RTMP data. Since 1996, only Japanese nationals have been used as observers.

Initially, the Japanese RTMP included a small amount of effort by bilateral vessels fishing in the EEZs of Australia or New Zealand. However, this was seen as redundant because the reporting requirements for such vessels already provided this information. Since 1993, only data on high seas operations have been collected.

Initially, all the data reported by RTMP observers and vessels were exchanged in electronic form, among the SBT research scientists in CSIRO, NIWA and NRIFS. NRIFS in Japan is the primary repository for these data. With the expansion of the program to the entire fleet, only vessels selected for catching the component of the Australian quota and vessels with observers on board have supplied data. Although the information content is similar to that on joint ventures and bi-lateral vessels supplied by AFMA, the format is entirely different. Software was developed to translate these data into a format compatible with the basic data structure.

### 5.3.2 Australian Fishing Zone Data

Basic catch, effort and size data have been collected under a variety of arrangements over the years (see Majkowski, 1982, Caton, 1991). Currently, AFMA is responsible for the collection of basic catch-and-effort data. AFMA distributes and collects vessel logbooks from domestic and foreign vessels and keeps an electronic copy of the information in a computerised database. WW Consultants is contracted to collect most of the data on the size distributions of the domestic catch, but BRS maintains the database. Both the vessels and observers collect size-frequency information on foreign vessel catches. These data are stored in the AFMA database.

The primary data are contained in logbooks completed, by law, by all vessels in the AFZ. Data are collected for all domestic, bilateral and joint venture vessels that fish in the AFZ. There are separate logbooks for foreign and domestic vessels. The Japanese logbook is referred to as TL04. There is a myriad of logbooks for the different Australian fisheries, varying with gear and the species caught. The logbooks for tuna longliners (ALO1, ALO2 and AL04) and purse seine (SFO5) have information relevant to the SBT fisheries.

The completed logbooks are sent to AFMA, which then enters the data into their computer system, the Australian Fisheries Zone Information System or AFZIS. Because logbooks are often not received for up to 12 months, real-time (or closer to real-time) data collection methods were developed: daily radio reporting and provisional logbooks. Each vessel reports catch-and-effort information daily via radio. These data are currently in AFZIS but not yet stored in the CSIRO SBT database. Radio reporting has been superseded by the satellite transmitted Vessel Monitoring System (VMS) system for the Japanese fleet. Since March 1995, all Japanese vessels fishing in the AFZ are required to have a satellite transmitter to send accurate position information every 6 hours, as well as daily catch-and-effort data. The latter data are entered by fishing personnel, on specially designed PCs. The data are then sent by satellite directly to AFMA. This system, which will replace both the logbook and radio reporting systems, is now completely operational in the Japanese longline fleet.

AFMA also has a vessel licence system, that contains data on vessel names, callsigns, bilateral and joint venture licenses, captains, etc. It also maintains a database for monitoring domestic SBT catches of individual quota holders. The CSIRO database does not contain any quota monitoring data.

Details of the fishing gear and fishing vessels are not entered into an electronic form at AFMA, so are not included in the current SBT database.

### 5.3.3 New Zealand EEZ Data

Foreign and domestic vessel logbooks are kept, as well as length and weight distribution data. The current format of the data is very similar to the AFZ logbook's.

The New Zealanders record SBT weight rather than length as part of their logbook program. More recently, separate length and weight data have also been recorded. Unfortunately, these data are collected separately to the logbooks and the quality and data matching is poor. They are therefore not loaded into the database.

The source of the New Zealand data is the National Institute for Water and Atmosphere (NIWA) fisheries research (previously Ministry of Agriculture and Fisheries - MAF) it is updated once a year in April.

### 5.3.4 Observer Data

Australia, Japan and New Zealand all conduct observer programs on SBT longline fishing vessels. These observers have a variety of functions, but two of the main ones are to collect detailed scientific catch-and-effort data for verification of the vessel logbook data and to collect biological samples for improving understanding of the factors affecting catch rates. The scientific catch-and-effort data are all recorded in similar formats.

The Australian and New Zealand programs are focussed primarily on observing foreign longline vessel fishing within their zones. Although observers have been placed on foreign vessels since the 1980s, data collection procedures were not standardised until the early 1990s. In recent years, between 10 and 20% of foreign operations in the zone have been observed. This program is administered by AFMA, who now maintain the primary database for the data collected in this program. In addition, CSIRO has placed a few observers on domestic longline vessels to understand how they operate and to monitor seabird by-catch and tuna/marlin interactions.

Until 1996, Australia and New Zealand had a limited number of observers on Japanese longline vessels on the high seas as part of the RTMP. The RTMP was a collaborative program between Australia, Japan and New Zealand. It was co-ordinated through a liaison group of representatives from industry, management and assessment scientists. Observer coverage ranged between 10 and 30%. Since 1996, the program has been administered solely by NRIFSF in Japan, placing Japanese observers only on Japanese longline vessels fishing on the high seas.

Observers record detailed data on each landed tuna as well as non-tuna by-catch. They also record data on each shot, including location, setting and haul times, number of hooks and environmental conditions. RTMP and AFZ Observer data are similar in nature, but the details differ. Generally the AFZ observers record more information. The observer data consist of data on:

- **Vessel Shot** - details of how the shot was set. Data is from observations and vessel records (one form per set).

- **Observed Shot** - details of the catch actually observed (one form per set).
- **Biological** - species, live/dead, length, weight, tags, samples, etc. (one line per fish, possibly covering several pages).
- **Other Data** - cruise dates and summary, vessel information, crew numbers and names, fishing and electronic gear fitted to the vessel, details on fishing strategies, tuna processing information, assessment of the accuracy of logbook information and the attitude of the crew to the observer and his/her work.

### 5.3.5 Observer Data Storage

Until 1996, CSIRO received the original data sheets from observers on RTMP vessels. CSIRO entered and verified the data, and distributed them to the appropriate scientific agencies in Japan and New Zealand. Japan now manages the data entry and since 1996, no RTMP data has been exchanged.

Data from AFZ observers on foreign vessels come from AFMA after being loaded into their computer system, AFZIS. These data are strictly confidential and accessible only to scientists involved in SBT stock assessment. Software was written to translate portions of the data into a common structure, loading this data into the database. At present, there are no data from observers on domestic vessels recorded within the AFMA system.

Data for a limited number of domestic observer cruises are held at CSIRO. They are recorded on the same forms that are used in the RTMP program and are entered by CSIRO using the RTMP data entry system.

### 5.3.6 Size Data

Every Japanese vessel fishing within the AFZ is required to measure the length of each SBT caught for use in length-frequency analysis, from which the age composition of the catch is calculated. Australian longline vessels are encouraged to do the same, but few do so.

A port monitoring program is run by the Bureau of Resource Science (BRS) and WW Consultants, to measure all SBT landed in Australia. It mainly monitors from ports along the Great Australian Bight, but also collects data from all sectors of the domestic fishery. These data are sent to CSIRO for use in analysing domestic catch-and-effort in the AFZ and constructing of the catch-at-age matrix. Before 1986, length-frequency data were collected by CSIRO (see Majkowski, 1982) and stored on magnetic tape at CSIRO. They have not been incorporated in the current system, but the aggregated estimates of the size frequency of the total SBT catch by area and two-weekly time periods, are incorporated.

### 5.3.7 Tagging Data

The SBT database is the repository for the data collected from tagging experiments on southern bluefin tuna. There have been three periods of tagging experiments: in the 1960s, the 1980s, and since 1990. The data collected provide information on natural mortality, fishing mortality, recruitment, growth, movement and spatial dynamics, and are used to verify direct aging methods. The results of these analyses are being incorporated directly into the VPA assessment of the SBT stock.

The tuna are tagged by inserting one or two numbered plastic spaghetti tags behind their dorsal fin. Their length or weight and their condition is recorded. The date, name of the tagger, the vessel used

and method of capture are also recorded. When a fish is recaptured these data are recorded again and the tag and data are sent to CSIRO. A reward is offered to encourage the fishing industry to return tags.

Some tagged fish are also injected with chemicals (strontium chloride or oxytetracycline) that leave marks on hard bony parts (e.g. otoliths). When one of these fish is recaptured (they have an orange tag), scientists attempt to extract the otoliths and send them to CSIRO. The data collected from the marked hard parts are used to verify direct aging methods.

#### *5.3.7.1 The three tagging experiments:*

Since 1990 (to January 1997), 67 000 SBTs have been tagged of these, 20 000 have also been injected with a chemical to mark the hard parts. The number of recaptured fish reported to CSIRO up to 1997 is over 4 000.

CSIRO staff have tagged off the coasts of South Australia and Western Australia. Some opportunistic tagging has also occurred on board Japanese longline vessels, by observers trained in tagging. Fish from at least seven cohorts have been tagged and recaptured. The current experiment is part of the SBT recruitment monitoring program

The 1980s tagging experiment ran from 1980 to 1984. A total of 10 781 SBT were tagged and 4 287 recovered. There is still the possibility of recovering a fish tagged in these years.

The 1960s tagging experiment ran from 1959 to 1970, with a few releases from 1970 to 1978. A total of 52 195 SBT were tagged and 7 639 recovered. The probability that some of these tagged fish may still be recovered is very low, however direct ageing studies suggest that SBT live for up to 40 years.

### **5.3.8 Aerial Survey Data**

The first aerial survey was in the Great Australian Bight in the summer of 1990/91, to assess the feasibility of developing a fishery independent index of SBT recruitment. Surveys have been made every year since then. These aerial surveys are now part of the Japan-Australia Collaborative Recruitment Monitoring Program. The main objectives of the survey are :

- to estimate the surface abundance of SBT in the Great Australian Bight during the summer season of each year
- to establish a relative abundance index of SBT recruitment over a five to ten year time span.

These surveys are still in the developmental stage and it will be several more years before we will know whether they can provide a measure of relative recruitment with reasonable precision. The survey uses line transects, with a pilot and a spotter with extensive experience in sighting surface SBT schools. A data recorder on the plane records the time and position of sighting, species, number of fish, estimated weight of the school, searching effort, etc. The planes fly on a given day only if the environmental conditions (e.g. wind speed and cloud cover) are within defined limits, otherwise tuna are difficult to spot. One or two planes survey different areas in the same day.

The aerial surveys provide two types of data that are collected and stored in the SBT database: searching effort and the details of all SBT schools detected. The plane's position (from GPS readings) and estimates of sea surface temperature (from infra-red sensors) are automatically and continuously recorded during the surveys. The database allows for information to be retrieved for individual sightings, or to be grouped into aggregates based on date, position, environmental conditions, etc.

Several programs have been written to extract the data into files, for statistical analyses and for producing reports on the sightings, transect and environmental conditions.

The format of the survey has not been constant. After the first two years of surveying (1991 and 1992), an Aerial Design Workshop recommended changes, which were incorporated in subsequent surveys. See *Data Analysis of the Aerial Surveys (1991-1997) for Juvenile Southern Bluefin Tuna in the Great Australian Bight* (Cowling et al., 1997) for details of the two formats.

## 5.4 SBT Database Design

The database has been designed to integrate and store the data described in the previous section. Appendix F contains the definitions of each of the tables and their fields.

Vessel logbook data are stored in three main tables: FOP (Fishing Operation), CATCH AGGREGATE and CATCH INDIVIDUAL. Figure 2 shows the layout of the vessel logbook data in the SBT database.

Observer-recorded catch-and-effort data are stored in two main tables: FOP (Fishing Operation) and CATCH INDIVIDUAL. Biological sampling data are stored in the SAMPLE table. Detailed effort data are also stored in the COURSE, OBS\_PERIOD and OBS\_SNOOD tables. Observer data on the entire cruise are also placed in the OCRUISE, VESSEL, VESSEL\_HISTORY, VCREW, EGear, FGear, SNOOD, CAMPAIGN, TUNA\_PROCESSING, LOGBOOK\_ASSESSMENT and ATTITUDE tables. An entity-relationship diagram for these tables is shown in Figure 3.

The main tables for the aggregated summary data on catch, size and effort are stored in CE\_JPN, LF\_JPN and SBT\_LF.

The tagging program data are stored in five main tables: RELEASES, RECAPTURES, TAGGERS, VESSEL and FINDERS. The relationship between these tables is shown in the entity-relationship diagram in Figure 4.

Data from the aerial survey are also stored in four main tables: SIGHTING, TRANSECT, ENVIRONMENT and SEA\_TEMPERATURE. From these tables and additional information such as the stratum boundaries are derived new data which is stored in STRATA\_TRANSECT, SEA\_TEMPERATURE\_INTERVALS and ENV\_INTERVALS. An entity-relationship diagram for these tables is shown in Figure 5.

### 5.4.1 Fishery tables

The FOP, CATCH\_INDIVIDUAL and CATCH\_AGGREGATE data from different sources are stored in different tables with the same format but a different prefix or suffix, (e.g.. AOBS\_FOP contains AFZ Observer data, AFZ\_FOP\_AUS contains AFZ Domestic vessel data and AFZ\_FOP\_JPN contains AFZ Japanese vessel data (see Table 1)).

Table 1: details of the table, their coverage and the number of operations that the dataset contains.

Data source description	Organisation	Tables	Years	Number of operations
Global Japanese fleet aggregated catch/effort data	NRIFSF	CE_JPN, LF_JPN	1952-present	1 400 000
AFZ vessel logbook data for Australian domestic vessels	AFMA	AFZ_FOP_AUS, AFZ_CATCH_AGGREGATE_AUS, AFZ_CATCH_INDIVIDUAL_AUS	1975-present	160 000
AFZ SBT landing sampling	BRS	SBT_LF	1951-present	NA
AFZ vessel logbook data for Japanese vessels	AFMA	AFZ_FOP_JPN, AFZ_CATCH_AGGREGATE_JPN, AFZ_CATCH_INDIVIDUAL_JPN	1979-1994	130 000
AFZ vessel monitoring system (VMS, satellite) data for Japanese vessels	AFMA	AFZ_FOP_JPN, AFZ_CATCH_AGGREGATE_JPN, AFZ_CATCH_INDIVIDUAL_JPN	1995-present	7 500
AFZ Observer data	AFMA	AOBS_FOP, AOBS_CATCH_INDIVIDUAL	limited: 1980-1990, extensive: 1990-present	4 500
RTMP vessel data	NRIFSF	RVES_FOP, RVES_CATCH_INDIVIDUAL, RVES_CATCH_AGGREGATE	1991-1995	12 000
RTMP observer data	NRIFSF, CSIRO	ROBS_FOP, ROBS_CATCH_INDIVIDUAL	1992-1995	3 000
CSIRO domestic observer program	CSIRO	COBS_FOP, COBS_CATCH_INDIVIDUAL	1994-present	150

#### 5.4.1.1 Fishing Operation - FOP

Fishery data such as those recorded by vessels and observers are usually stored on a set-by-set basis. The data pertaining to a set (position, date, number of hooks, etc.) are stored in FOP (Fishing Operation) tables. There is one FOP record per set. A fishing operation is defined as one unit of fishing (i.e. from setting => soak =>hauling => rest; commonly called a *shot* or *set*). In the longline fishery, due to the time it takes to set and retrieve a line, there is usually one fishing operation per day. The domestic fishery, with fewer hooks and shorter mainlines, can set up to three times per day.

This table's data can come from either vessel logbooks or observer reports, so data for the same set could be stored twice but in separate tables (i.e. vessel originated and observer originated).

AOBS\_FOP, FOP, ROBS\_FOP, AFZ\_FOP\_AUS, AFZ\_FOP\_JPN, etc. all contain data on the fishing operations and use a similar format, but their data are from different sources.

The identifying field for a fishing operation is the FOP\_KEY field. This is a very important field throughout the database, since all tables linked to the FOP record (e.g.. CATCH\_INDIVIDUAL and CATCH\_AGGREGATE) use the FOP\_KEY to identify which fishing operation the catch is from.

A valuable feature of the database is the linking of vessel logbook and observer data. The observer FOP records have a field, VES\_FOP\_KEY, which is the FOP\_KEY of the corresponding vessel record. Also, the vessel FOP records have a field, OBS\_FOP\_KEY, which is the FOP\_KEY of the corresponding observer record. Thus it is very simple to compare logbook and observer data.

### *5.4.1.2 Catch Individual*

Catch from a set is stored in the catch individual and catch aggregate tables. The former holds information (such as species, length and weight) on each fish caught in a fishing operation, the later holding total catch of each of the commercial species.

Generally, observers record each fish as it is landed, and cover all landed species. The vessel logbook mainly records data on the commercial species (SBT, yellowfin tuna, bigeye tuna, sharks, etc).

### *5.4.1.3 Catch Aggregate*

Data on catches from a set are also stored in the catch aggregate tables, which contains the catch data on each fishing operation aggregated by species. It contains the total number of fish of each species caught, the grade, and the whole and dressed weight of the total catch.

Generally, vessel logbooks record catch in aggregate form, while observers record each individual fish as it is landed. Only vessel logbook data are contained in these tables, not AFZ or RTMP observer data.

These tables do not contain the Japanese aggregated summary data (yellow book) or the like. The Japanese data are stored in the catch, size and effort tables described below.

### *5.4.1.4 Observer Cruises*

The OCRUISE table is designed to hold summary information on an entire observer cruise. Start and end dates, length of the cruise and observer coverage are recorded in this table. Vessel details, fishing and electronic gear used for the cruise are also recorded for both AFZ and RTMP cruises in VESSEL\_HISTORY, VCREW, FGEAR and EGEAR. Additionally, AFZ observers record a good deal of other information, such as on fishing strategy, the processing of tuna, the attitude of the fishermen to observers and how the logbooks are filled out in CAMPAIGN, TUNA\_PROCESSING, ATTITUDE and LOGBOOK\_ASSESSMENT.

## **5.4.2 Catch, Size and Effort tables**

Aggregated and summary data, such as the Japanese global fleet data, are stored in a separate format to the set-by-set data.

The CE\_JPN and LF\_JPN tables hold data aggregated by time and space intervals (5 degree squares by month). These data comprise size sampling (weight and length frequency) data and catch-and-effort data. The tables contain the Japanese longline fleet data collected and supplied by NRIFSF.

SBT\_LF contains data derived from size sampling (length or weight frequency), which are “rounded up” to give the length or weight frequency for the entire catch. This table contains the Australian size data collected and supplied by the Bureau of Rural Resources. It also contains the Japanese size data received in the years before the aggregated data (stored in LF\_JPN) were available i.e. prior to 1965.

### 5.4.3 Tagging program tables

The data from the SBT tagging program are stored in five main tables. Release and recapture data are linked by a unique *release\_number*. Taggers, finders and vessels are each given a unique numerical code, which is used to link them with release and recapture records. Recapture data can be linked back to individual fishing operations by the recapture vessel code.

#### 5.4.3.1 Releases

The release data are stored in the releases table. There is one record for each fish tagged. It is made at the time of tagging and includes information on the release site, date, time of day, and length, weight and condition of the fish. The unique *release\_number* and tag numbers are used to link this table to other tag tables.

#### 5.4.3.2 Recaptures

The recapture data contains detail on recapture site, recapture method, date, time of day, and length, weight and condition. Some fish are recaptured, measured and then re-released into either the wild or fish farms. Every time a tagged fish is recaptured its details are recorded.

#### 5.4.3.3 Taggers

The skills and abilities of the taggers vary, and this can affect calculations of tag-shedding rates. Therefore records of each tagger - name, left or right handedness, and experience - are kept. For each fish tagged, the tagger's unique code is stored with the release information.

#### 5.4.3.4 Finders

Every person who returns a tag is sent a reward and a printed certificate. We record the name and address and give each one a unique number (*finder\_code*). Some finders, (e.g. farm owners and fishing masters), have returned large numbers of tags.

### 5.4.4 Aerial survey tables

#### 5.4.4.1 Sighting

Each sighting made during the survey is recorded by the data recorder on a 'Sighting Data Sheet'. The time, location, distance from the transect, size and quality of fish and how the fish were behaving are recorded. The data recorders subsequently transfer the information into an Excel document, with one worksheet for each day.

#### 5.4.4.2 Environment

The data recorder also completes a 'Search Effort and Environment Data Sheet' to record the environmental conditions at the start and end of a transect, and at intervals in between. These data are also entered into an Excel document by the recorder, with one worksheet for each day. The environmental variables stored in the table are: wind speed, air temperature, sea shade, glare, low cloud cover, haze, and swell.



### **5.4.4.3 Environmental Intervals**

Data from the Environment table are averaged over sections of a transect line, to give a picture of the conditions at intervals along each line.

### **5.4.4.4 Sea Temperature**

The survey planes have two infrared thermometers fitted to estimate the temperature of the sea surface at regular intervals (every 15-20 seconds). Other instruments record the plane's position, the time and date, latitude, longitude, altitude, and the pitch and roll of the plane. Position information is taken from a GPS instrument. The other sensors and data logging equipment were assembled by CSIRO's Electronics personnel. All of the data are stored in the sea temperature table.

### **5.4.4.5 Sea Temperature Intervals**

Data from the Sea Temperature table are averaged over sections of transect line, as with the environmental conditions.

### **5.4.4.6 Transect Table**

This table contains information on the individual transect sections flown during the survey: the start and end position of the transect, start and end times, distance flown, and data to identify the transect, such as the replicate, block, and plane.

### **5.4.4.7 Strata Transect Table**

This table holds similar data to the transect table, but is derived by splitting transect lines into sections determined by the spatial strata boundaries. The survey analysis used spatial strata until 1997 when comparison of stratified and unstratified estimates suggested that the unstratified estimates were preferable (See Cowling et al 1997).

## **5.4.5 Vessel and Vessel History tables**

These tables were designed to record information on fishing vessels over time and document changes in their details and configurations. VESSEL holds data identifying a particular vessel and VESSEL\_HISTORY contains data on their specifications. Data from observers, the AFMA licence system and the New Zealand logbooks are also recorded in these tables. The AFZ observer data are the most reliable and comprehensive, while RTMP observers provide only a subset of the information AFZ observers record. For example, RTMP vessels do not provide the vessel's call sign or name.

The information on vessel specifications is incomplete. The first time a vessel is registered in Australia, the master must provide vessel details, but is not required to update these on subsequent license renewals. Thus, there is no source to ensure the specifications are unchanged.

Information on vessels used for tagging operations and on vessels that recapture tagged fish are also recorded in the vessel table. This is an important link between fishing operations (logbook data) and tag recaptures. An entity-relationship diagram illustrating this link is presented in Figure 6.

Australia, Japan and New Zealand each maintain their own vessel registers, and there are differences between them. It is sometimes difficult to track a vessel working in different fishing zones, as the

vessel call sign is not always unique. Furthermore, both call signs and names change. This makes it difficult to keep track of vessels over time.

Before the Japanese/Australian joint venture ended, vessels could catch fish under one licence one day and use a different licence the next. A field in the FOP table, 'Licence', is used to differentiate which licence type was used on a fishing operation. It is critical to be able to do this, because Japan supplied only aggregates of the catches by their vessels fishing with bilateral licences within the AFZ. They also supply these data aggregated by 5° squares of latitude and longitude. Since the AFZ covers only portions of any 5° square, the only way of obtaining catch-and-effort figures for the entire Japanese longline fleet is to add data on joint venture licence vessels within the AFZ to the data supplied by Japan.

#### 5.4.6 Reference Data tables

Several other tables are used to store reference information: AGENCY, CODES, PROJECT, SPECIES\_CODES and STAFF. The data held in these tables are referred to by many of the other database tables and they contain information that is generally static over time. Species and other codes used throughout the database are examples of reference tables.

Other tables, such as SBT\_WEIGHT\_LENGTH\_PARMS and AGE\_AT\_LENGTH, contain SBT reference information pertaining to the aging of SBT.

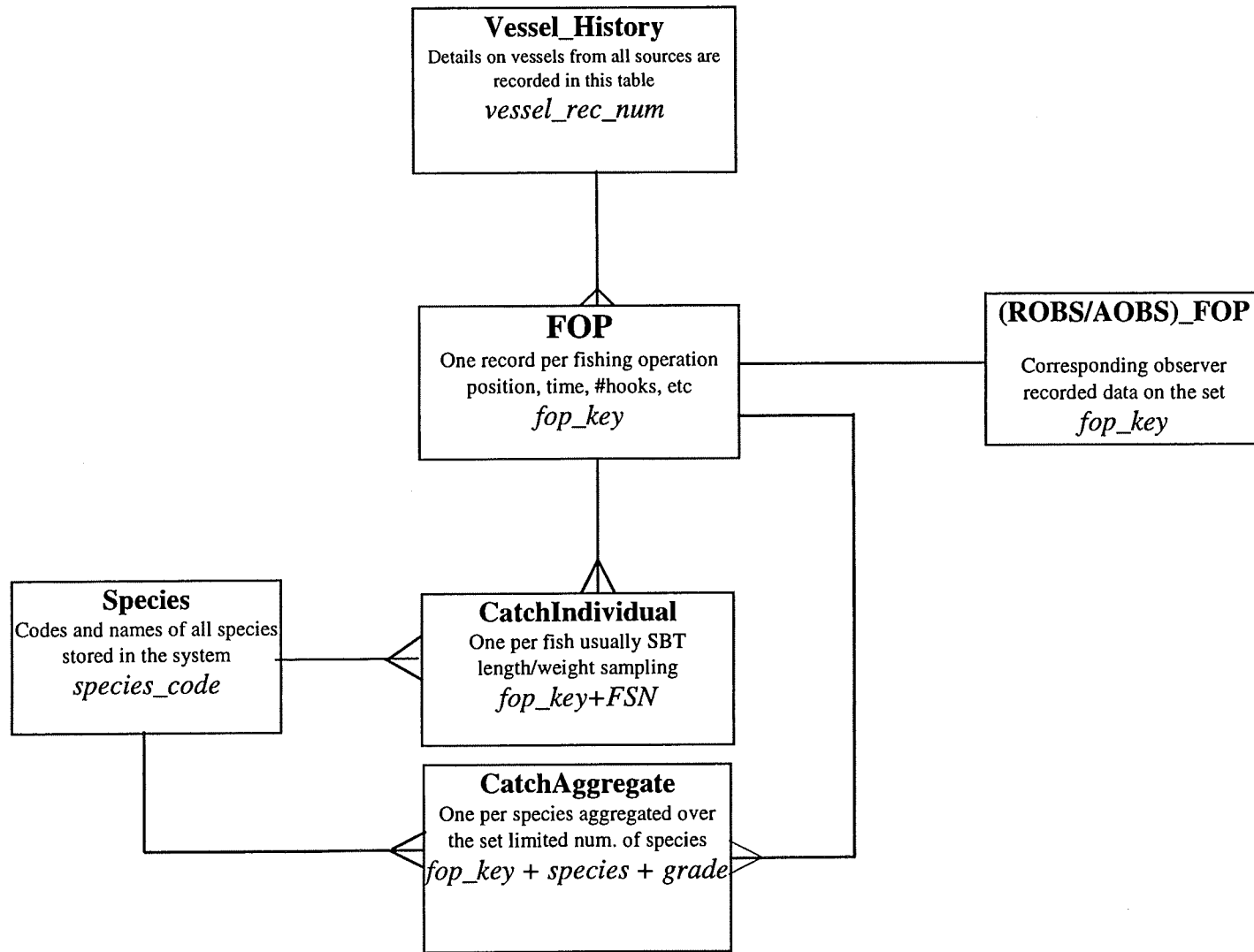
Codes and species codes used throughout the database are listed in Appendix G.

The tagging codes were changed in the early 1990s. Codes described in the earlier tag database documents (Majkowski, 1982; Majkowski and Morris, 1986; Miyashita et al, 1997) for the 1960s and 1980s tagging programs have been currently updated to the new codes. The data entry program used by the contractor for tag releases uses the old codes, and a translation program converts them to new codes before entering them into the RELEASES table.

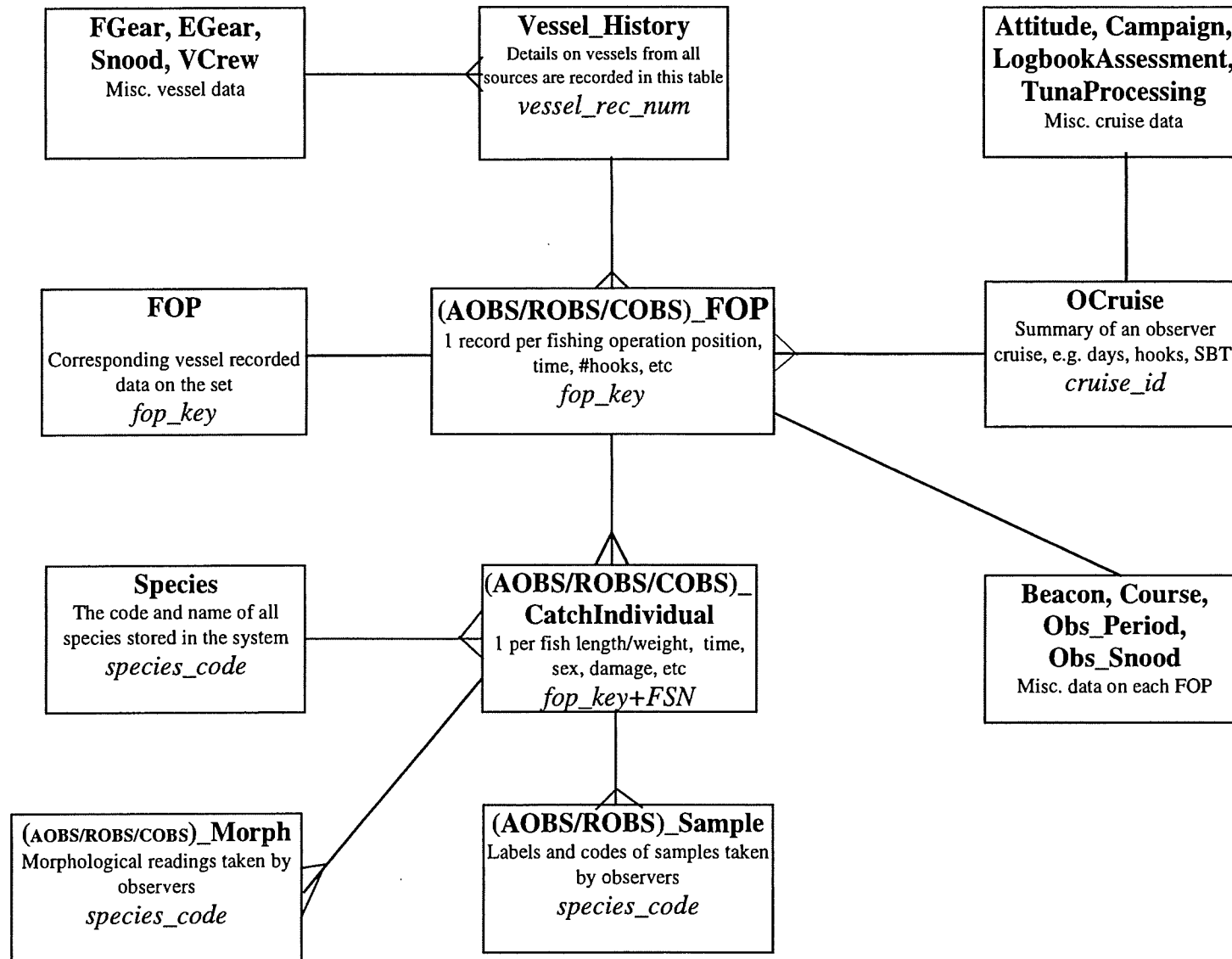
#### 5.4.7 Generated tables

The SBT\_AGE\_SUMMARY tables hold summary information on the SBT catch of different age classes. These summary tables age all SBT caught in a fishing operation and combine these data with set information to provide a convenient method of viewing SBT aging information. These tables are automatically generated from the corresponding FOP and CATCH\_INDIVIDUAL tables for each data source.

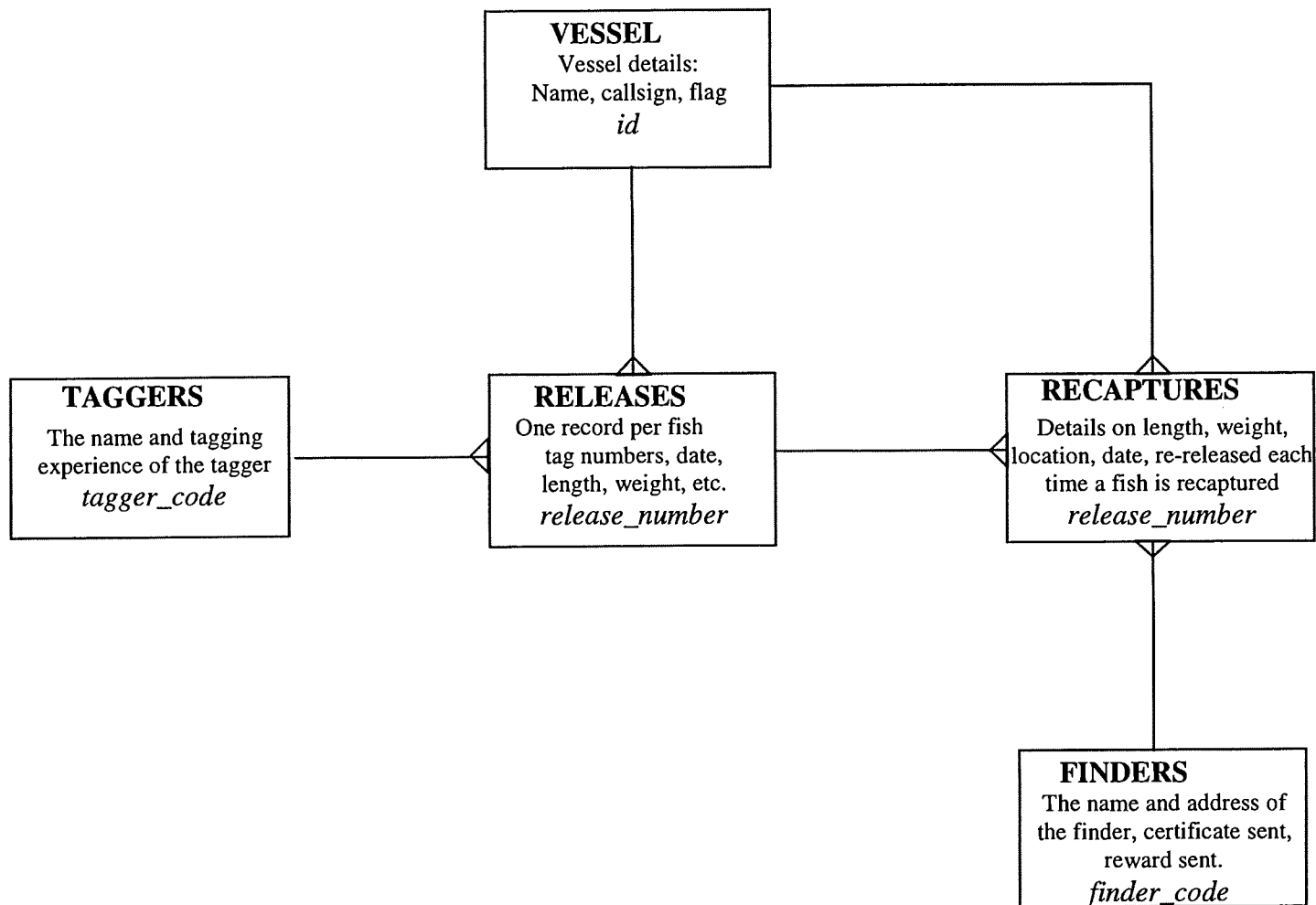
A UNIX program, *update\_age*, will calculate and age from the length or weight of the SBT CATCH\_INDIVIDUAL records, whilst *cr\_age\_summary\_table*, will create the SBT\_AGE\_SUMMARY tables.



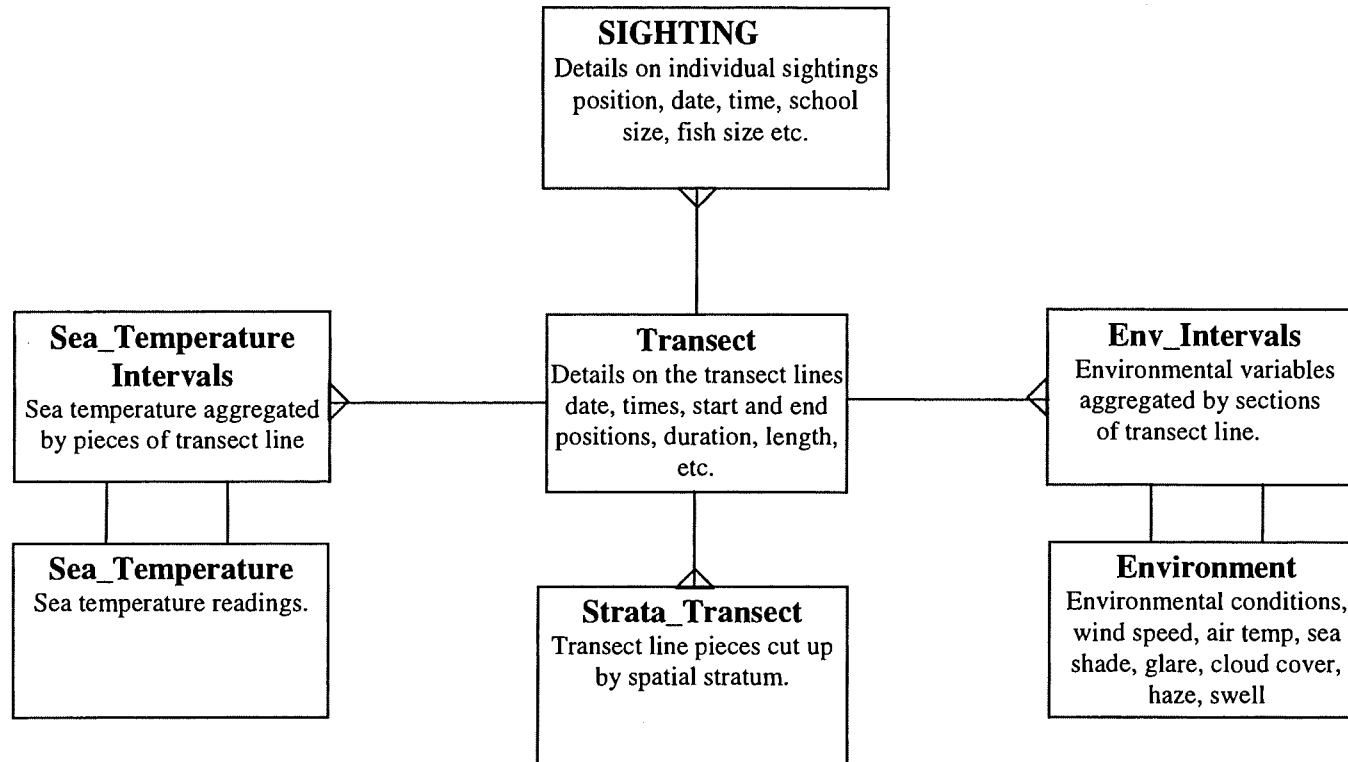
**Figure 2** The entity-relationship diagram for vessel logbook data.



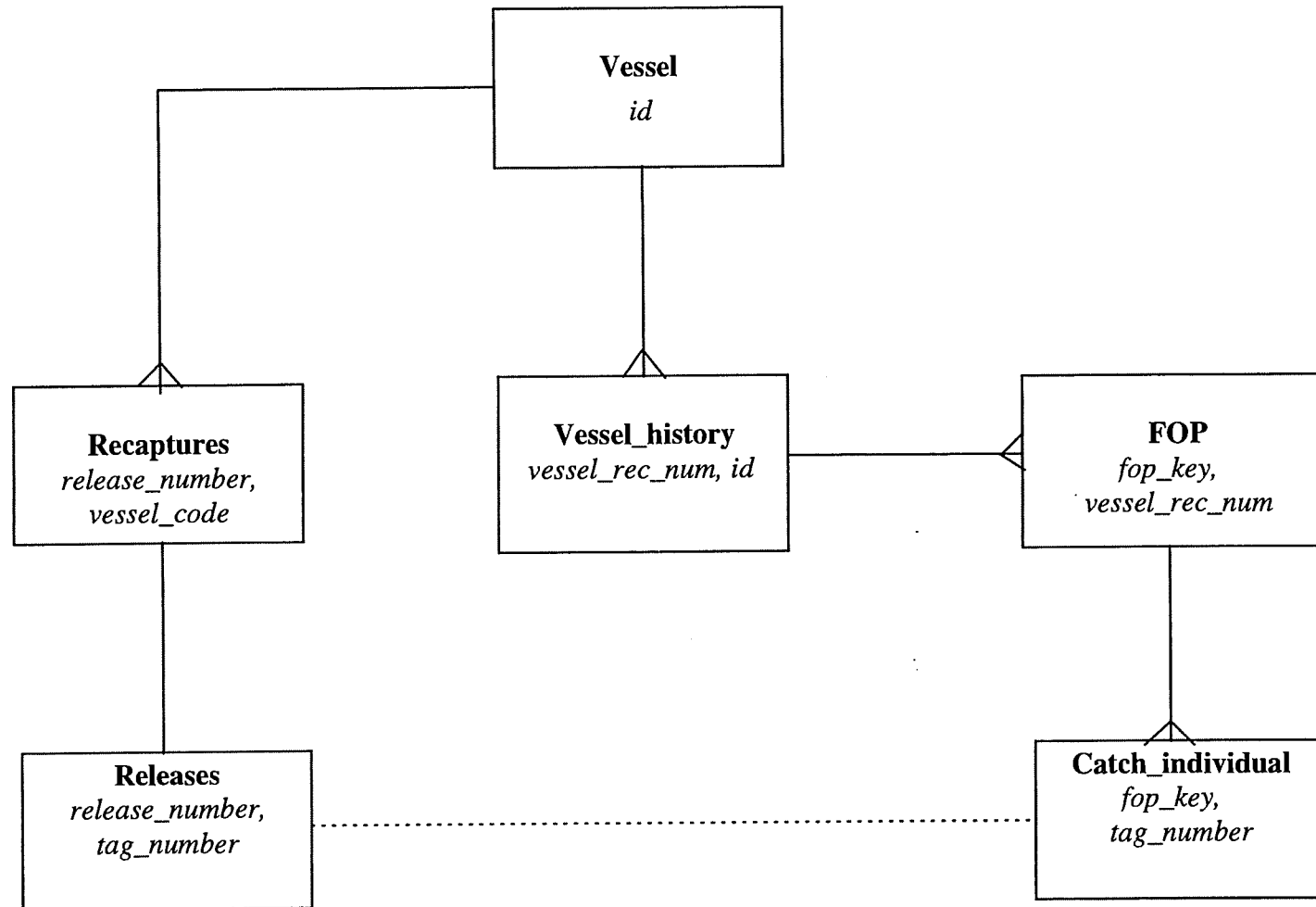
**Figure 3** The entity-relationship diagram for observer recorded data.



**Figure 4** The entity relationship diagram for the tagging program data.



**Figure 5** The entity relationship diagram for the aerial survey data.



**Figure 6** The entity relationship diagram showing the interactions between the tagging data and the vessel logbook data.

## 5.5 Data Format and Loading

### 5.5.1 Fisheries data

The data provided by the various fisheries agencies come in different formats, including: AFZ logbook, AFZ VMS data, AFZ observer, RTMP logbook, RTMP observer, Japanese length/weight sampling, Australian length sampling, Japanese catch-and-effort and New Zealand logbook. Also each data provider invariably changes the data and format as their systems, projects and requirements change. Therefore a flexible system for loading data into the database has been built to rapidly incorporate any changes in data format into the system.

Within the database each set of data is reformatted into a consistent format, and stored within tables in the database. This allows for easy retrieval and analysis across all different sources of data from the relational database.

The various data providers have their own systems of nomenclature for species and other codes, e.g. AFMA uses the CSIRO species code, CSIRO uses FAO species codes, southern bluefin tuna is recorded as STN in New Zealand and SBT elsewhere. The data loading programs must therefore be able to convert species and other codes to the standard codes used within the database. Two tables - SPECIES\_CODES and CODES - are used to make these translations. The tables contain the standard codes and descriptions used in the database and a translation of the codes of each data provider (project and country) to the standard codes. All data are therefore stored consistently, even though the original data was different.

For some of the provider's species codes, we have been unable to ascertain which species the code actually refers to, so both the original and standard codes are stored in the data tables. This also serves as a backup system in case of translation errors. If the original species code is later deciphered, we change it to the standard code.

### 5.5.2 RTMP and CSIRO Observer data

The RTMP observer data entry system is used to enter the RTMP and CSIRO observer's data. It stores the observer data in an intermediate data format, which is then loaded by a separate process into the SBT database. This allows for comprehensive data validation checks to ensure the integrity of the data.

### 5.5.3 Tagging data

Release data are recorded on data entry sheets at the time of tagging. The data are then entered by an external contractor into fixed format data files. Codes are used for fish condition, type and size of injury, quality and position of tag insertion, and quality of the length measurement. The old codes used in the 1960s and 1980s have been translated to the new codes (as part of the data loading procedure).

Programs are used to load these data into the releases table, together with codes for the taggers and the vessel default values in empty fields, and a unique identifier for each release (the *release\_number*). The loading programs calculate values for some fields and update the taggers tables with new counts for the numbers of fish tagged by each tagger.

Batches of release data can be thousands of records long. The raw release data are stored on disk and on the CSIRO backup system. As part of the Australian and Japanese Recruitment Monitoring Program, a hard copy and PC disk of the raw data files are sent to AMSAT each year, for forwarding to Japan. These data are usually published in the annual report on the Recruitment Monitoring Program (e.g. Miyashita et al. 1997).



When tags are returned to CSIRO, the data are entered into the database in an Oracle form called 'tag'. This form also allows data for related tables to be entered. If the finder of the tag is identified, a reward certificate is printed automatically. The quality of the data are checked against all available criteria. Incomplete data are tracked down by the data entry scientist where possible. If information about a tag becomes available later, this data can be added to the recapture record.

#### **5.5.4 Aerial Survey data**

Data for the aerial survey comes from two sources. A recorder on each flight records sighting details for all SBT detected, information on searching effort and environmental conditions. These data are stored on two separate data sheets and later entered into Excel spreadsheets. The other source of data is GPS location information and environmental data from the instruments located in the plane. These data are automatically stored during the flights in ASCII files on portable computers using specially developed CSIRO software. A separate file is generated for each survey flight containing a continuous record of the plane's activity for that day.

All the raw data files from the aerial survey are converted into a format for loading into the Oracle aerial survey tables via SQL\*Loader. Separate tables hold the raw data for each year. These data are used to create the final tables, which only hold data relevant to the analysis. For example, the recorders record all sighting events including other species of fish, birds, wind etc. that were initially thought to have been SBT.

### **5.6 Data Validation**

#### **5.6.1 RTMP and CSIRO observer data validation**

The RTMP (prior to 1996) and CSIRO observer data are entered at CSIRO, the source of this data. As such, extensive checks are performed on this data to ensure data validity.

The data entry system performs a series of 35 checks that are run against all of the CSIRO and RTMP observer data, to check the validity of the data. This is very effective in finding errors and allows it to then be corrected.

Type of data validity checks performed

- Range checks - makes sure field values are within certain ranges
- Observed hook counts are consistent with the vessel recorded hooks set
- Times are in the correct sequence
- Vessel positions are valid i.e. not on land, positions do not vary too much within a day
- Length/weight ratio for SBT is valid
- Not more than 19 lines on a biological form
- Form sequence numbers are valid
- Time zones are valid
- Total weight/count recorded match the sum of individual weights/counts

If errors are found, the original data form is checked to identify and correct the problem in the database. Most of the errors found are actually on the form itself e.g. wrong date; 108 instead of 118.

#### **5.6.2 Tagging data validation**

The tag data entry forms for all data have built in database triggers for data validation. Data quality codes are also entered for specific fields in each of the tables.

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The validation and quality codes include:

- Unique *release\_number*
- Range checks - makes sure field values are within certain ranges
- Date accuracy
- Vessel positions are valid
- Accuracy of the reported location
- Length/weight for a recaptured tagged fish is within expected range
- Quality of the measurement data
- Recapture dates are greater than release dates
- Spelling of vessel names
- Vessel name and callsign matching

### **5.6.3 Aerial Survey data validation**

During pre-processing and loading into the database the quality of the data is checked and any errors traced back to the data sheets. Some errors can not be picked up this way and so graphical plots are also used to check that the plane positional data are correct.

## **5.7 Security and Backups**

The database resides on a Sun UNIX machine under the management of the CSIRO Division of Marine Research. Access to the database is limited to staff and authorised visitors of CSIRO Division of Marine Research under the guidelines of the CSIRO security policy. Further, only those users who request and require access to the database are granted access. Each user is assigned their own Oracle user name and password in addition to the UNIX user name and password.

Incremental database backups are performed daily with a full backup once a week.

## 6 BENEFITS

Most significant is the preparation of data reports for the annual assessment meetings under the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and thus improve assessment and management advice. Distribution of data to other national agencies and co-operating international agencies will be greatly facilitated. Modern database techniques greatly improve the accuracy of data through a variety of computerised validations and verification techniques. The database will allow efficient generation of reports back to industry and management concerning the state of the fishery, the stock and current research results.

Other significant benefits of this project are:

- The database structure is designed to be flexible so that as new data sources are identified, they are easily able to be stored as part of the database.
- The archiving of SBT data and metadata (data about data) is now available for long term usage.
- All data have consistent formats. For example, latitude and longitude information is no longer stored in a variety of formats, but rather one format for all data.
- The storage of vessel information is centralised leading to reduced vessel duplication and thus better ability to match data from different sources.
- The database and the data within are fully documented allowing for greater and more confident use of the data in research and management advice.
- The database is primarily used to store data pertaining to the SBT fishery, but the database holds data on many other species. Yellowfin tuna and other tropical tunas are also being researched using the database.
- Improved efficiency in the analysis of cross linked data. This means more questions can be answered about the fishery and better advice given to managers.

## 7 INTELLECTUAL PROPERTY AND VALUABLE INFORMATION

Although this report does not contain any intellectual property or commercially important information, the data stored within the database are of great commercial value. Much of the data within the SBT database is not the property of CSIRO. For example, JFA has agreed to continue supplying aggregated catch-and-effort data for storage within the database only if access is restricted to research into southern bluefin tuna and related species. The access and release of AFMA and New Zealand data are similarly restricted.

## 8 FURTHER DEVELOPMENT

The work that has been performed on the database although extensive, still does not cover the scope of the entire SBT data domain. Further development in the following areas is still needed:

- The data loading programs need maintenance as the external data providers change the way they sample, record and report fishery data.
- Automatic production of the catch-at-age matrix is currently being trialed.

- A completely integrated Indonesian catch monitoring system is being developed.
- Entry of SBT direct aging and archival tag data will need consideration in the future.

## **9 STAFF**

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## **10 FINAL COST**

Total final funds for the project consisted of \$76,650 from FRDC with \$95,000 from CSIRO and a further \$90,000 from AFMA. The project cost a total of \$261,650. The final 'statement of receipts and expenditures' was completed and sent to FRDC on 29th May 1997.

## **11 DISTRIBUTION**

Fisheries Research and Development Council

Australian Fisheries Management Authority

Department of Primary Industries and Environment

Bureau of Resource Sciences

CSIRO Marine Research

## 12 GLOSSARY OF TERMS

aerial survey	a scientific survey of juvenile SBT using planes in the Great Australian Bight
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AFZIS	Australian Fisheries Zone Information System
basket	a section of longline and it's hooks suspended between 2 buoys
BRS	Bureau of Resource Sciences
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
cohort	a term to describe a group of fish born in the same year
CPUE	Catch per Unit Effort = number of fish caught per 1000 hooks set
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EEZ	Exclusive Economic Zone
FAO	Fisheries and Agricultural Organisation
FOP	Fishing Operation - 1 complete shot
GPS	Global Positioning System
haul	to retrieve the longline from the sea
high seas	waters outside of the Australian and New Zealand EEZ's
JFA	Japan Fishery Agency
longline	A line 80-150km long containing 2500-6000 hooks
MAF	Ministry of Agriculture and Fisheries (New Zealand)
NIWA	National Institute of Water and Atmospheric Research
NRIFS	National Research Institute for Far Seas Fisheries
observer	person employed to watch fishing operations and record details of the catch-and-effort
quota	maximum catch allowable for the year
RTMP	Real Time Monitoring Program
SBT	Southern Bluefin Tuna
set	the operation of casting the longlines into the sea
shot	A complete sequence of setting, soaking and hauling
snood	the short line that attaches hooks to the main longline
soak	to leave the longlines at sea for a few hours to catch fish
VPA	Virtual Population Analysis

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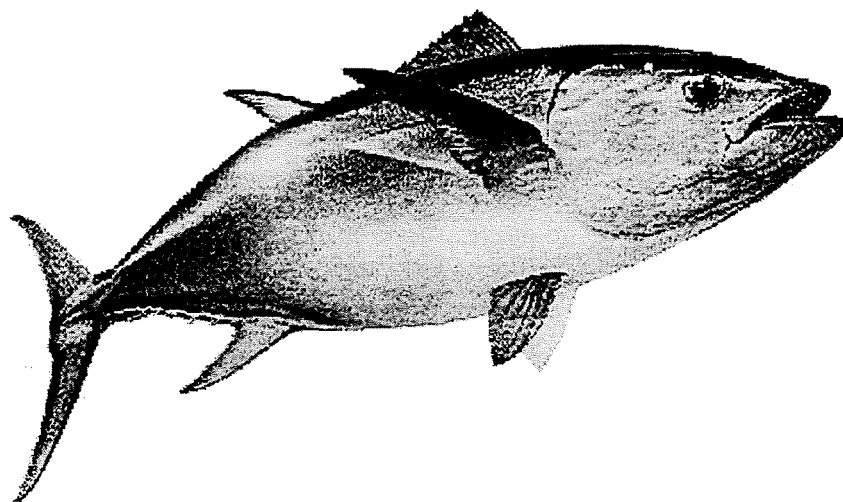
14 APPENDIX A - EXAMPLE TAGGING MONTHLY REPORT



07/98

*REPORT ON THE TAG  
DATABASE*

Summary for JUNE 1998



## *Monthly Report on the Tagging DataBase*

Produced on Thursday, July 2 1998

This report is for the month starting 01-06-98

### 1. General Information

Total Number of release records (1960 - present) = 131397  
 Total Number of recaptures (including multiple recaptures) = 22093  
 Total number of taggers = 71  
 Total number of vessels = 2379  
 Total Number of tag finders = 611

Total number of fish tagged since 1990 = 68421  
 Total number of fish tagged with Orange tags since 1990 = 20204  
 Total number of fish tagged with Yellow tags since 1990 = 48217  
 Number of new releases entered this month = 0

Total number of recaptures since 1990 (multiple recaptures excluded) = 6993  
 Total number of Orange tag recaptures since 1990 (no multiple recaptures) = 1786  
 Total number of Yellow tag recaptures since 1990 (no multiple recaptures) = 5207  
 Number of tagged fish recaptured this month = 37  
 Number of recaptures entered this month = 227  
 Number of recapture records updated this month = 37

Note : Years in each of these tables refers to calendar year.  
 This report covers the 1990's conventional tagging program only.

### 2. Total Numbers of Fish Tagged

Releases	Year Tagged									Total
	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Orange	320	1083	3083	5248	8251	2219	0	0	0	20204
Yellow	2936	4739	3846	5839	8253	18682	1473	2227	222	48217
Sum	3256	5822	6929	11087	16504	20901	1473	2227	222	68421

### 3. Total Number of Recoveries of Tagged Fish

Recaptures	Year Tagged and Percentage of Releases Recaptured																Total		
	1990	%	1991	%	1992	%	1993	%	1994	%	1995	%	1996	%	1997	%		1998	%
Orange	10	3.1	112	10.3	240	7.8	390	7.4	785	9.5	250	11.3	0	0.0	0	0.0	0	0.0	1787
Yellow	155	5.3	518	10.9	346	9.0	547	9.4	824	10.0	2280	12.2	265	18.0	247	11.1	25	11.3	5207
Sum	165		630		586		937		1609		2530		265		247		25		6994



## 4. Recoveries of tagged fish by year

## ORANGE Tagged Fish

Year Recap.	Tagging Year and % of Releases Recaptured																	
	1990	%	1991	%	1992	%	1993	%	1994	%	1995	%	1996	%	1997	%	1998	%
1990																		
1991	2	.6	27	2.5	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1992	4	1.3	19	1.8	59	1.9	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1993	2	.6	22	2.0	79	2.6	83	1.6	0	.0	0	.0	0	.0	0	.0	0	.0
1994	1	.3	22	2.0	60	1.9	100	1.9	102	1.2	0	.0	0	.0	0	.0	0	.0
1995	1	.3	15	1.4	25	.8	115	2.2	261	3.2	48	2.2	0	.0	0	.0	0	.0
1996	0	.0	3	.3	11	.4	51	1.0	213	2.6	112	5.0	0	.0	0	.0	0	.0
1997	0	.0	4	.4	6	.2	37	.7	206	2.5	86	3.9	0	.0	0	.0	0	.0
1998	0	.0	0	.0	0	.0	4	.1	3	.0	3	.1	0	.0	0	.0	0	.0
# Rel.	320		1083		3083		5248		8251		2219		0		0		0	

## YELLOW Tagged Fish

Year Rec.	Tagging Year and % of Releases Recaptured																	
	1990	%	1991	%	1992	%	1993	%	1994	%	1995	%	1996	%	1997	%	1998	%
1990	2	.1	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1991	29	1.0	178	3.8	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1992	41	1.4	145	3.1	100	2.6	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1993	41	1.4	92	1.9	105	2.7	95	1.6	0	.0	0	.0	0	.0	0	.0	0	.0
1994	23	.8	52	1.1	79	2.1	167	2.9	96	1.2	0	.0	0	.0	0	.0	0	.0
1995	12	.4	28	.6	34	.9	149	2.6	265	3.2	234	1.3	0	.0	0	.0	0	.0
1996	5	.2	13	.3	15	.4	81	1.4	222	2.7	808	4.3	81	5.5	0	.0	0	.0
1997	2	.1	10	.2	12	.3	54	.9	237	2.9	1129	6.0	167	11.3	202	9.1	0	.0
1998	0	.0	0	.0	1	.0	1	.0	4	.0	109	.6	17	1.2	45	2.0	25	11.3
# Rel.	2936		4739		3846		5839		8253		18682		1473		2227		222	

## All Tagged Fish

Year Rec.	Tagging Year and % of Releases Recaptured																	
	1990	%	1991	%	1992	%	1993	%	1994	%	1995	%	1996	%	1997	%	1998	%
1990	2	.1	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1991	31	1.0	205	3.5	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1992	45	1.4	164	2.8	159	2.3	0	.0	0	.0	0	.0	0	.0	0	.0	0	.0
1993	43	1.3	114	2.0	184	2.7	178	1.6	0	.0	0	.0	0	.0	0	.0	0	.0
1994	24	.7	74	1.3	139	2.0	267	2.4	198	1.2	0	.0	0	.0	0	.0	0	.0
1995	13	.4	43	.7	59	.9	264	2.4	526	3.2	282	1.3	0	.0	0	.0	0	.0
1996	5	.2	16	.3	26	.4	132	1.2	435	2.6	920	4.4	81	5.5	0	.0	0	.0
1997	2	.1	14	.2	18	.3	91	.8	443	2.7	1215	5.8	167	11.3	202	9.1	0	.0
1998	0	.0	0	.0	1	.0	5	.0	7	.0	112	.5	17	1.2	45	2.0	25	11.3
# Rel.	3256		5822		6929		11087		16504		20901		1473		2227		222	

## Returns for This Month : JUNE 1998

Tag Colour	Tagging Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Orange	0	0	0	2	1	0	0	0	0	0
Yellow	0	0	0	1	1	2	0	1	2	

## 5. Recoveries by the Japanese

Recapt Year	Statistical Area									No Pos	Total
	1	2	3	4	5	6	7	8	9		
1991	0	0	7	2	0	1	40	11	3	0	64
1992	0	0	4	12	0	4	87	22	3	0	132
1993	0	1	0	41	3	0	147	19	26	0	237
1994	0	1	0	21	0	2	97	51	39	0	211
1995	0	11	0	58	0	6	78	84	26	0	263
1996	0	2	0	53	0	0	35	115	53	0	258
1997	0	0	0	59	1	5	94	93	32	0	285
1998	0	0	0	0	0	7	0	1	0	0	8
<b>Total</b>	0	15	11	246	4	25	578	396	182	0	1458

## Recoveries by the Japanese for JUNE 1998

This Month	Statistical Area									No Pos	Total
	1	2	3	4	5	6	7	8	9		
06/98	0	0	0	0	0	4	0	0	0	0	4

## 6. Recoveries from Australian vessels (Wild recaptures only).

Recapt Year	Statistical Area									No Pos	Total
	1	2	3	4	5	6	7	8	9		
1990	0	1	0	0	0	0	0	1	0	0	2
1991	0	7	143	0	0	0	7	2	0	0	159
1992	0	0	105	16	0	0	100	3	0	1	225
1993	0	0	199	27	0	0	45	1	0	0	272
1994	0	2	417	29	0	0	16	0	0	0	464
1995	0	0	864	18	0	0	31	0	0	0	913
1996	0	0	1253	15	0	0	71	0	0	0	1339
1997	0	0	1660	52	0	0	38	0	0	0	1750
1998	0	0	159	0	0	0	7	0	0	0	166
<b>Total</b>	0	10	4800	157	0	0	315	7	0	1	5290

## Australian Recoveries for JUNE 1998

This Month	Statistical Area									No Pos	Total
	1	2	3	4	5	6	7	8	9		
06/98	0	0	0	0	0	0	2	0	0	0	2

## 7. Recoveries from tuna farms

Recapture Year	Number Recaptured
1991	1
1992	8
1993	108
1994	205
1995	570
1996	776
1997	1402
1998	118
<b>Total</b>	3188

## 8. Number of tags collected by each Agency

Recapture Year	Agency											Field Empty
	A	C	W	O	S	J	R	F	M	P	X	
1990	0	2	0	0	0	0	0	0	0	0	0	0
1991	47	18	120	11	1	1	16	0	11	3	7	1
1992	45	43	166	53	12	6	12	0	3	6	10	5
1993	68	103	124	60	39	1	25	1	4	10	5	5
1994	77	78	125	56	29	2	52	0	1	8	21	4
1995	29	67	373	67	98	0	50	1	4	2	3	23
1996	32	31	514	32	113	0	54	2	7	6	10	17
1997	26	49	750	22	165	0	22	4	8	0	6	3
1998	12	7	74	0	0	0	0	0	4	0	0	0

This Month	Agency											Field Empty
	A	C	W	O	S	J	R	F	P	M	X	
06/98	2	2	0	0	0	0	0	0	0	0	0	0

## Agency Codes:

A Australian Fishermen	C CSIRO staff	W W.W. Fishery	O Observer
S Japanese speakers	J Japanese Industry	R Japanese researchers	
F Japanese fishermen	P Maritime Police	M Amateur	X Other

## 9. Otoliths collected from orange tagged fish.

Year of Recapture	Otoliths Collected	%	Ot'ths not Collected	Field Empty
1991	4	14.81%	23	0
1992	51	65.38%	27	0
1993	90	49.45%	92	0
1994	102	45.13%	124	0
1995	331	72.75%	123	1
1996	178	45.52%	213	0
1997	53	15.01%	300	0
1998	4	40.00%	6	0

This Month	Otoliths Collected	%	Ot'ths not Collected	Field Empty
06/98	2	50.00%	2	0

## 10. Numbers of beached tags returned

Release Year	Age at Release	Tag colour and time found after release			
		Yellow tag within 1yr	Orange tag within 1yr	Yellow tag after 1 yr	Orange tag after 1yr
1990	0	9	2	2	2
1991	0	0	2	0	0
1991	1	0	0	1	1
1992	1	1	0	0	0
1993	1	2	3	0	0
1993	3	0	0	0	1
1994	1	1	17	0	11
1994	2	0	0	0	3
1994	3	1	3	0	0
1995	1	3	0	4	1
1995	2	0	0	0	1

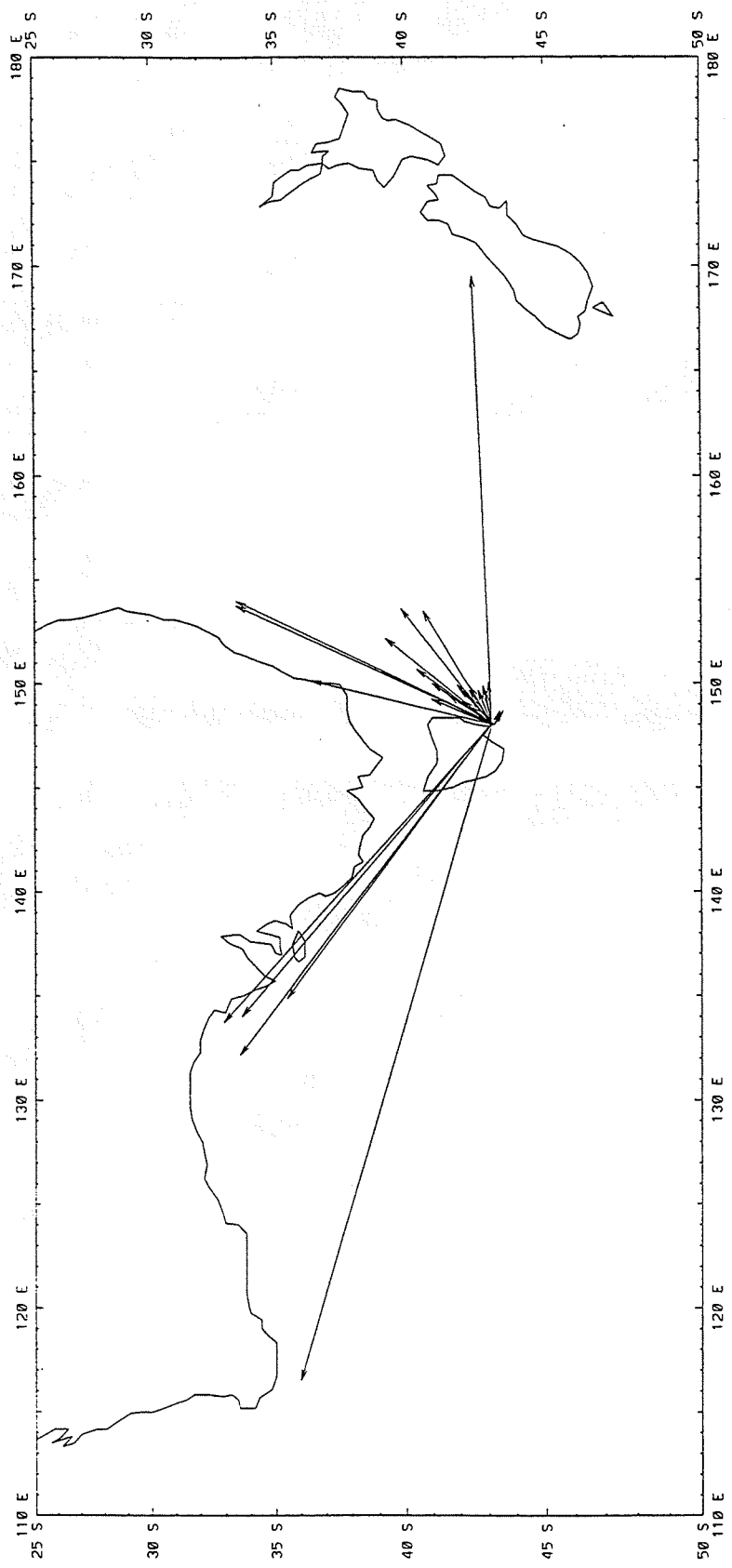
## Beached Tag Returns Entered in JUNE 1998

Recapture Date	Age at release	Tag colour and time found after release				Date released
		Yellow tag within 1 yr	Orange tag within 1 yr	Yellow tag after 1 yr	Orange tag after 1 yr	

## 11. List of returned tags entered in the last month.

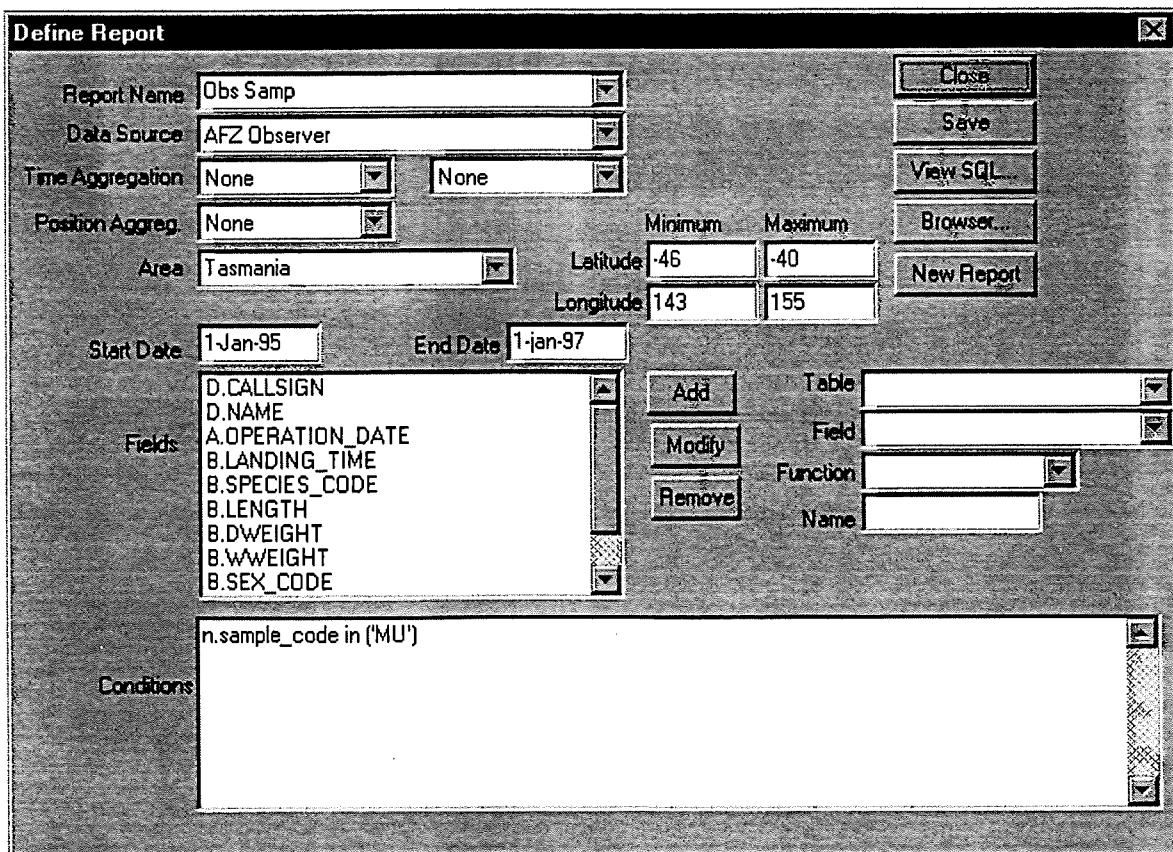
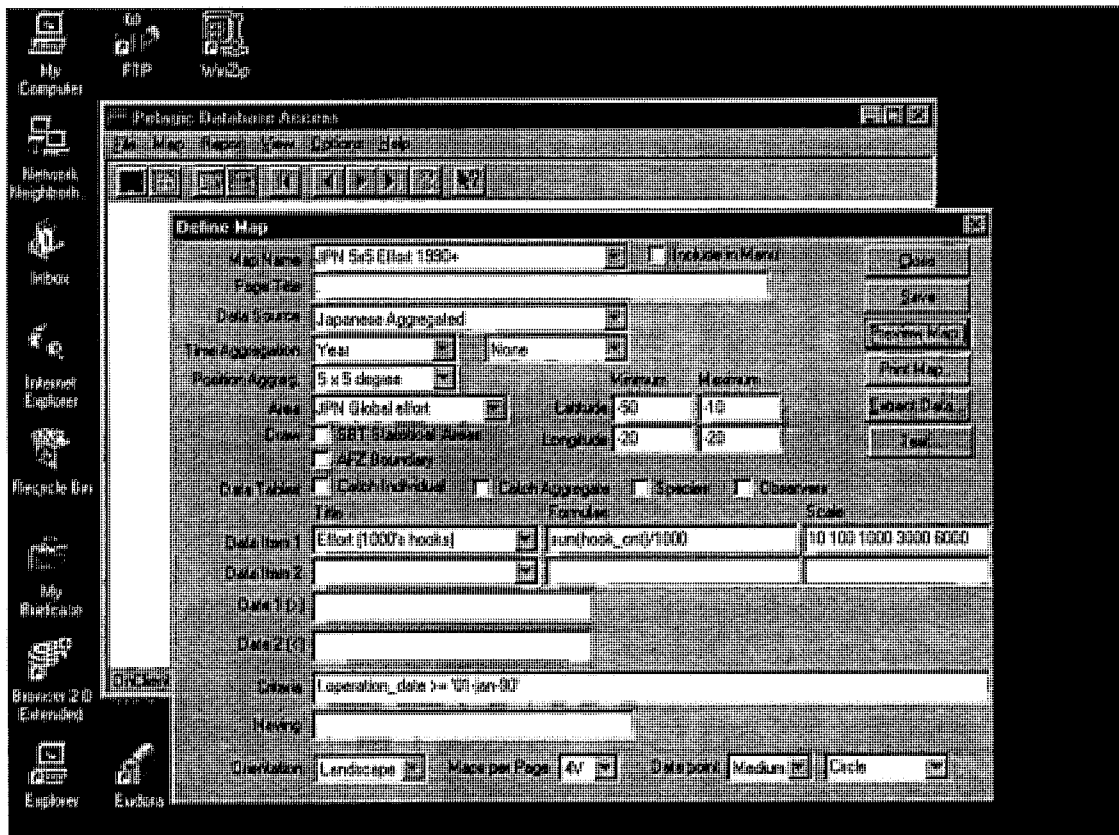
Primary Tag Num C	Companion Tag Num C	W/F	Recapture Date	Recapt Lat.	Recapt Lon.	Release Date	Release Lat.	Release Lon.	Rel. Len.	Rec. Len.	Days Free
78531 O	78532 O	W	17-Jun-98	42.02	167.44	13-Jan-93	32.09	132.33	77	164	1981
81825 O	81826 O	W	29-Jun-98	44.09	147.35	27-Jan-93	33.41	133.57	83	143	1979
95551 Y	95552 Y	W	05-Jun-98	38.18	153.32	09-Jun-93	43.20	148.28	89	147	1822
102809 Y	102810 Y	W	06-May-98	42.34	150.21	22-Jan-94	35.03	118.55	52	129	1565
103689 Y	103690 Y	W	15-Jan-98	33.12	133.33	10-Jan-95	34.31	121.06	48		1101
103689 Y	103690 Y	F	29-May-98			10-Jan-95	34.31	121.06	48	115	1235
109261 Y	109262 Y	W	30-Apr-98	41.06	151.26	11-Jan-95	34.29	120.35	45	110	1205
109683 Y	109684 Y	W	25-Jan-98	33.25	131.45	11-Jan-95	34.29	120.35	49		1110
109683 Y	109684 Y	F	02-Jun-98			11-Jan-95	34.29	120.35	49	115	1238
109703 Y	109704 Y	W	15-Mar-98	33.40	132.40	11-Jan-95	34.29	120.35	51		1159
116599 Y	116600 Y	W	20-May-98	39.15	178.40	12-Jan-94	32.44	133.17	76	136	1589
117265 Y	117266 Y	W	13-Jun-98	38.19	179.01	15-Jan-94	32.10	132.28	79	154	1610
123435 Y	123436 Y	W	14-Mar-98	33.34	132.28	14-Jan-95	34.38	119.49	49	111	1155
123439 Y	123440 Y	W	16-Jan-98	32.58	131.35	14-Jan-95	34.38	119.49	50	108	1098
123719 Y	123720 Y	W	25-Jan-98	31.20	131.30	15-Jan-95	34.39	119.44	50	111	1106
124005 Y	124006 Y	W	27-Mar-98	34.42	133.02	15-Jan-95	34.38	119.47	47	101	1167
124831 Y	124832 Y	W	15-Feb-98	33.20	131.30	16-Jan-95	34.38	119.51	50		1126
124831 Y	124832 Y	F	15-May-98			16-Jan-95	34.38	119.51	50	113	1215
125355 Y	125356 Y	W	15-Feb-98	33.00	131.00	16-Jan-95	34.38	119.51	50		1126
125761 Y	125762 Y	W	18-Mar-98	33.47	132.23	16-Jan-95	34.34	120.07	53	110	1157
126247 Y	126248 Y	W	13-Mar-98	33.32	132.22	16-Jan-95	34.34	120.07	51	109	1152
126313 Y	126314 Y	W	21-Jan-98	33.09	131.38	17-Jan-95	34.34	120.10	48	112	1100
126401 Y	126402 Y	W	30-Jan-98	33.25	131.45	17-Jan-95	34.33	120.12	51		1109
126401 Y	126402 Y	F	20-Apr-98			17-Jan-95	34.33	120.12	51	119	1189
126631 Y	126632 Y	W	01-Feb-98	33.27	132.14	22-Jan-95	34.34	121.44	55	114	1106
126779 Y	126780 Y	W	25-Jan-98	33.25	131.45	22-Jan-95	34.34	121.44	49		1099
126779 Y	126780 Y	F	02-Jun-98			22-Jan-95	34.34	121.44	49	114	1227
126955 Y	126956 Y	W	30-Jan-98	33.25	131.45	22-Jan-95	34.34	121.44	51		1104
126955 Y	126956 Y	F	25-Apr-98			22-Jan-95	34.34	121.44	51	112	1189
126995 Y	126996 Y	W	15-Feb-98	32.50	131.30	01-Feb-95	34.39	119.43	50		1110
126995 Y	126996 Y	F	15-May-98			01-Feb-95	34.39	119.43	50	111	1199
127307 Y	127308 Y	W	03-Feb-98	33.27	132.17	01-Feb-95	34.39	119.44	53		1098
127307 Y	127308 Y	F	28-Apr-98			01-Feb-95	34.39	119.44	53	117	1182
127389 Y	127390 Y	W	14-Mar-98	33.34	132.28	01-Feb-95	34.39	119.44	50	109	1137
127721 Y	127722 Y	W	15-Feb-98	33.00	131.00	01-Feb-95	34.39	119.44	49		1110
127983 Y	127984 Y	W	06-Feb-98	33.35	132.15	02-Feb-95	34.37	119.50	51		1100
127983 Y	127984 Y	F	05-Jun-98			02-Feb-95	34.37	119.50	51	117	1219
128071 Y	128072 Y	W	14-May-98	39.24	151.39	06-Jun-94	42.07	148.50	112	135	1438
128647 Y	128648 Y	W	21-Jan-98	32.50	131.30	02-Feb-95	34.33	120.03	52	106	1084
128949 Y	128950 Y	W	30-Jan-98	33.25	131.45	02-Feb-95	34.33	120.03	54		1093
128949 Y	128950 Y	F	04-May-98			02-Feb-95	34.33	120.03	54	117	1187
129113 Y	129114 Y	W	12-Jan-98	33.21	131.47	02-Feb-95	34.35	120.04	49	110	1075
129263 Y	129264 Y	W	22-Feb-98	33.18	130.55	02-Feb-95	34.35	120.04	49		1116
129263 Y	129264 Y	F	14-Jun-98			02-Feb-95	34.35	120.04	49	114	1228
129309 Y	129310 Y	W	25-Jan-98	33.25	131.45	02-Feb-95	34.35	120.04	50		1088
129309 Y	129310 Y	F	26-May-98			02-Feb-95	34.35	120.04	50	108	1209
129945 Y	129946 Y	W	15-Jan-98	33.12	131.33	08-Feb-95	34.17	122.21	62		1072
129945 Y	129946 Y	F	08-Jun-98			08-Feb-95	34.17	122.21	62	115	1216
131037 Y	131038 Y	W	15-Feb-98	33.20	131.30	11-Feb-95	34.28	123.38	50		1100
131037 Y	131038 Y	F	15-May-98			11-Feb-95	34.28	123.38	50	114	1189
131407 Y	131408 Y	W	15-Feb-98	33.00	131.00	11-Feb-95	34.28	123.37	53		1100
131625 Y	131626 Y	W	25-Jan-98	33.25	131.45	11-Feb-95	34.28	123.37	59		1079
131625 Y	131626 Y	F	05-Jun-98			11-Feb-95	34.28	123.37	59	119	1210
132019 Y	132020 Y	W	14-Mar-98	33.34	132.28	12-Feb-95	34.24	123.37	53	113	1126
132687 Y	132688 Y	W	15-Feb-98	33.20	131.30	12-Feb-95	34.27	123.35	64		1099
132687 Y	132688 Y	F	30-Mar-98			12-Feb-95	34.27	123.35	64	116	1142
133293 Y	133294 Y	W	22-Feb-98	33.18	130.55	13-Feb-95	34.33	123.34	54		1105
133293 Y	133294 Y	F	16-Jun-98			13-Feb-95	34.33	123.34	54	114	1219
133591 Y	133592 Y	W	10-Feb-98	33.49	132.10	13-Feb-95	34.33	123.34	54		1093
133591 Y	133592 Y	F	08-Jun-98			13-Feb-95	34.33	123.34	54	118	1211

# 15 APPENDIX B - TAGGING RELEASE AND RECAPTURE MAP

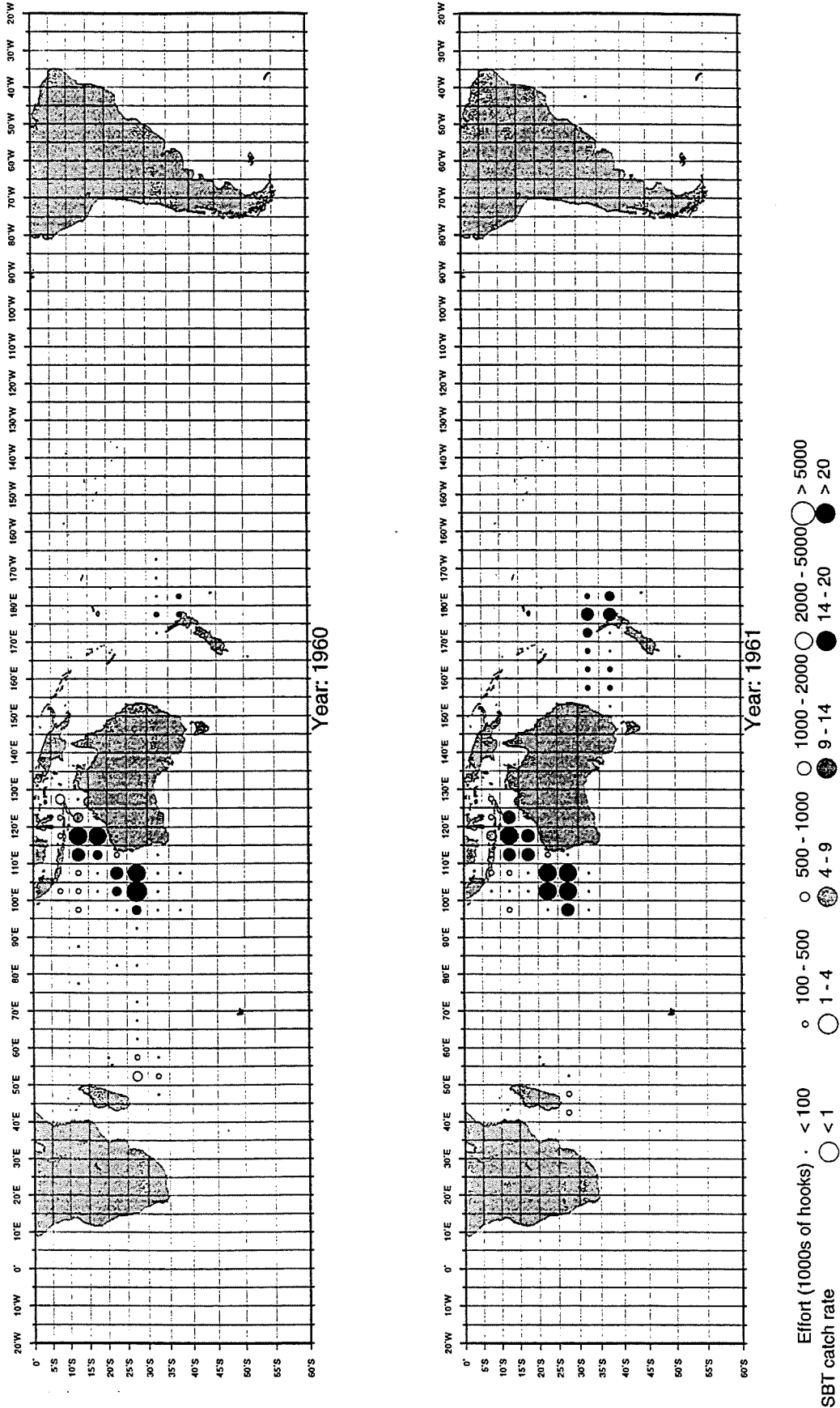


Fish tagged and released from inshore Tasmanian Fishery 1990-1998

## 16 APPENDIX C - WINDOWS 95/NT PELDB USAGE



16.1.1.1 Catch rate and fishing effort of Japanese longline vessels. Taken from Betlehem et al, 1996.



# 17 APPENDIX D - SAMPLE UNIX CATCH RATE PROGRAM OUTPUT

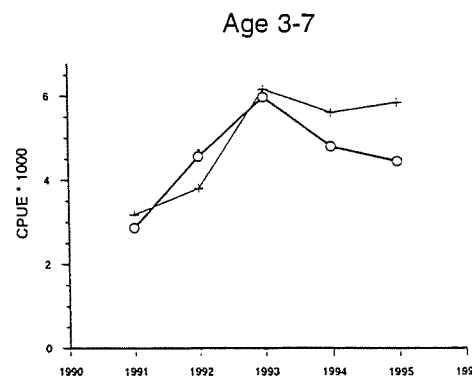
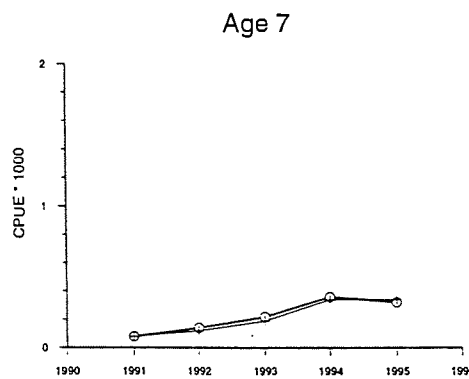
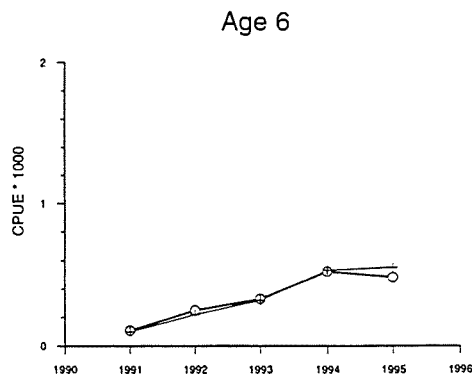
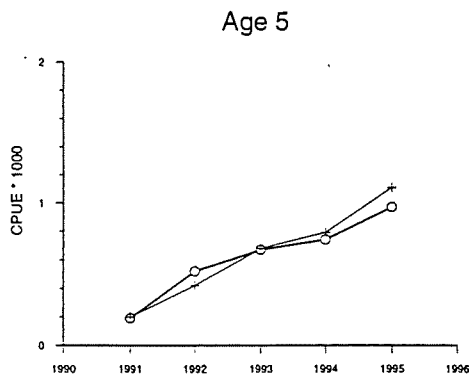
Catch rates for the Tasmanian winter Japanese longline fleet during May to August. Taken from Betlehem et al, 1996.

Fishery: TAS Winter (May-Aug)

Growth model: Base case

○—○ JPN longline

—+— JPN Observer





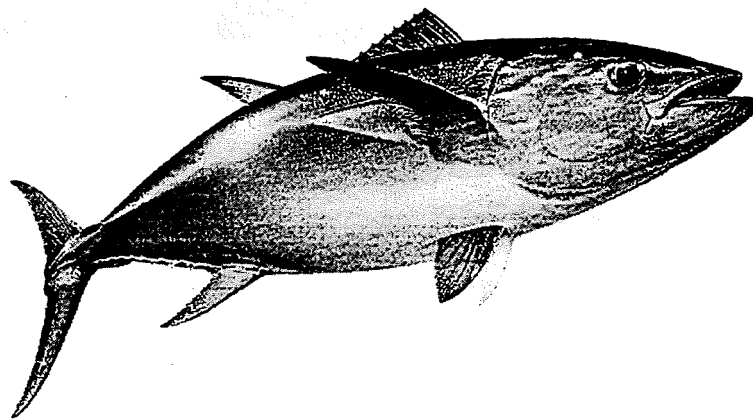
## 18 APPENDIX E - TAG RECAPTURE CERTIFICATES

## 18.1 English tag recapture certificate



CSIRO Division of Marine Research

## Southern Bluefin Tuna Tag Return Certificate



*This Certificate has been awarded to*

.....  
*Of the Vessel*

*For returning the following tags and thereby making a contribution to the world research on Southern Bluefin Tuna.*

<i>Tag Number</i>	<i>82074</i>
<i>Tag Colour</i>	<i>yellow</i>

### *Fish Details*

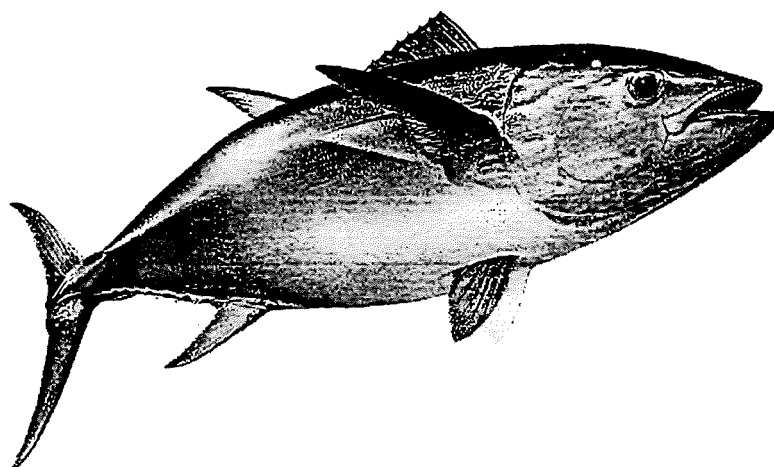
*Released at 32° 12' S 131° 55' E on 26-Jan-91*  
*Recaptured at 38° 40' S 151° 20' E on 25-Jul-97*  
*Days at Large 2372 Distance Moved 1022.9 miles*  
*The fish grew 69 cm to a length of 138 cm*  
*Average Growth per Month .9 cm*

GPO Box 1538, Hobart, Tas 7001 Phone: (03) 6232 5222 Fax: (03) 6232 5000

## 18.2 Japanese tag recapture certificate



CSIRO Division of Marine Research  
ミナミマグロ  
標識返還証明書



## 返還者氏名

## 船名

主標識 117207 色 yellow

副標識 117208 色 yellow

## 放流データ 再捕獲データ

日時 15-Jan-94 2-Oct-97

体長 57 cm 127 cm

緯度 32° 10' S 40° 57' S

経度 132° 07' E 115° 26' E

放流日数 1356 最小回遊距離 958.8 マイル

成長 70 cm 月間平均成長 1.6 cm

cm = センチメートル

GPO Box 1538, Hobart, Tas 7001 Phone: (03) 6232 5222 Fax: (03) 6232 5000

## 19 APPENDIX F - SBT DATA TABLES

### 19.1 Vessel recorded data tables

#### 19.1.1 AFZ\_CATCH\_AGGREGATE\_AUS

Aggregate catch by individual species for a given fishing operation.  
Mainly Tuna, billfish and shark species.

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	Y	Not used
OPERATION_DATE	DATE	7	Y	Date of operation from AFZ_FOP_AUS table
OPERATION_NO	NUMBER	2.0	Y	Operation number from AFZ_FOP_AUS table
VESSEL_REC_NUM	VARCHAR2	6	Y	Vessel code from AFZ_FOP_AUS table
FOP_KEY	NUMBER	8.0	Y	Key of associated FOP record
SPECIES_CODE	VARCHAR2	3	Y	3-letter spp. code (see SPECIES_CODES table)
ESTIMATED_FLAG	VARCHAR2	1	Y	"Y" if estimated, else "N" or null if not known
SUBSAMPLE_FLAG	VARCHAR2	1	Y	Values this record from a subsample of catch if flag is "Y"
SPECIES_GRADE	VARCHAR2	10	Y	Grade of fish (EXPORT, DOMESTIC, ETC)
CATCH_CNT	NUMBER	5.0	Y	Number of fish of this species and grade caught this set
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Actual or Derived? (see CODES)
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHOLE, TRUNKED, etc)
WEIGHT_FACTOR	NUMBER	3.2	Y	Whole/Dressed Ratio used to convert DW to WW
ORIG_SPECIES_CODE	VARCHAR2	6	Y	species code from the original data
DATA_SOURCE	VARCHAR2	7	Y	The source of the original data

#### 19.1.2 AFZ\_CATCH\_AGGREGATE\_JPN

Aggregate catch by individual species for a given fishing operation.  
Limited to Tuna, billfish and shark species.

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	Y	Not used
OPERATION_DATE	DATE	7	Y	Date of operation from AFZ_FOP_JPN table
OPERATION_NO	NUMBER	2.0	Y	Operation number from AFZ_FOP_JPN table
VESSEL_REC_NUM	VARCHAR2	6	Y	Vessel code from AFZ_FOP_JPN table
FOP_KEY	NUMBER	8.0	Y	Key of associated FOP record
SPECIES_CODE	VARCHAR2	3	Y	3-letter spp. code (see SPECIES_CODES table)
ESTIMATED_FLAG	VARCHAR2	1	Y	"Y" if estimated, else "N" or null if not known
SUBSAMPLE_FLAG	VARCHAR2	1	Y	Values this record from a subsample of catch if flag is "Y"
SPECIES_GRADE	VARCHAR2	10	Y	Grade of fish (EXPORT, DOMESTIC, ETC)
CATCH_CNT	NUMBER	5.0	Y	Number of fish of this species and grade caught this set
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Actual or Derived? (see CODES)
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHOLE, TRUNKED, etc)
WEIGHT_FACTOR	NUMBER	3.2	Y	Whole/Dressed Ratio used to convert DW to WW
ORIG_SPECIES_CODE	VARCHAR2	6	Y	species code from the original data
DATA_SOURCE	VARCHAR2	7	Y	The source of the original data
DISCARD_CNT	NUMBER	5.0	Y	Number of fish of this species and grade caught and discarded this set

#### 19.1.3 AFZ\_CATCH\_INDIVIDUAL\_AUS

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Not used

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	Y	Date of operation from AFZ_FOP_AUS table
OPERATION_NO	NUMBER	2.0	N	Operation number from AFZ_FOP_AUS table
VESSEL_REC_NUM	VARCHAR2	6	N	Vessel code from AFZ_FOP_AUS table
FOP_KEY	NUMBER	8.0	Y	Key of associated FOP record
FISH_SEQ_NO	NUMBER	6.0	N	Fish sequence number within this FOP (1..n)
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data
ERROR_FLAG	VARCHAR2	1	Y	Not null if inconsistency reported
SEX_CODE	VARCHAR2	1	Y	Unused
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.
LENGTH_OTH	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH_CODE	VARCHAR2	3	Y	code for alternate length
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	1	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHole, TRunked, etc)
COHORT	NUMBER	2.0	Y	Unused
COHORT_1	NUMBER	2.0	Y	Unused
SAMPLE_KEY	NUMBER	38.10	Y	Unused
COHORT_5	NUMBER	2.0	Y	Unused
COHORT_7	NUMBER	2.0	Y	Unused
COHORT_8	NUMBER	2.0	Y	Cohort Age (0-20): Ageing Method 8 (created and updated by
COHORT_10	NUMBER	2.0	Y	Unused
COHORT_11	NUMBER	2.0	Y	Unused
AGE_CODE_11	VARCHAR2	1	Y	The code of how age method 8 was used
AGE_CODE_8	VARCHAR2	1	Y	The code of how age method 8 was used
AGE_CODE_10	VARCHAR2	1	Y	The code of how age method 8 was used
DATA_SOURCE	VARCHAR2	7	Y	The data source of the data

#### 19.1.4 AFZ\_CATCH\_INDIVIDUAL\_JPN

Catch sampling of individual fish length/weight (mainly by Japanese longline operations)

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Not used
OPERATION_DATE	DATE	7	Y	Date of operation from AFZ_FOP_JPN table
OPERATION_NO	NUMBER	2.0	N	Operation number from AFZ_FOP_JPN table
VESSEL_REC_NUM	VARCHAR2	6	N	Vessel code from AFZ_FOP_JPN table
FOP_KEY	NUMBER	8.0	Y	Key of associated FOP record
FISH_SEQ_NO	NUMBER	6.0	N	Fish sequence number within this FOP (1..n)
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data
ERROR_FLAG	VARCHAR2	1	Y	Not null if inconsistency reported
SEX_CODE	VARCHAR2	1	Y	Unused
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.
LENGTH_OTH	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH_CODE	VARCHAR2	3	Y	code for alternate length
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	1	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHole, TRunked, etc)
COHORT	NUMBER	2.0	Y	Unused
COHORT_1	NUMBER	2.0	Y	Unused
SAMPLE_KEY	NUMBER	38.10	Y	Unused
COHORT_5	NUMBER	2.0	Y	Unused
COHORT_7	NUMBER	2.0	Y	Unused
COHORT_8	NUMBER	2.0	Y	Cohort Age (0-20): Ageing Method 8 (created and updated by
COHORT_10	NUMBER	2.0	Y	Unused
COHORT_11	NUMBER	2.0	Y	Unused
AGE_CODE_8	VARCHAR2	1	Y	The code of how age method 8 was used
AGE_CODE_10	VARCHAR2	1	Y	The code of how age method 8 was used
AGE_CODE_11	VARCHAR2	1	Y	The code of how age method 8 was used
COHORT_AFZ_JPN_AGE_RE	NUMBER	2.0	Y	Unused
DATA_SOURCE	VARCHAR2	7	Y	The data source of the data

### 19.1.5 AFZ\_FOP\_AUS

Fishing Operation table. Each record uniquely describes a single fishing operation. AFZ\_FOP\_AUS contains AFZ Domestic data since 1975.

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table
OPERATION_DATE	DATE	7	N	Initial date of operation
OPERATION_NO	NUMBER	2.0	N	Sequence of operation during Operation_date (1,2,3..)
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identity number (in VESSEL_HISTORY)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence- seq_fop_key)
FOP_ID	NUMBER	9.0	Y	Unused.
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather..
CRUISE_ID	NUMBER	38.10	Y	Unused
CRUISE_NUM	VARCHAR2	14	Y	Unused
CRUISE_LEG	NUMBER	3.0	Y	Unused
FISHING_METHOD_CODE	VARCHAR2	3	Y	Gear and Deployment Methodology used for this FOP LL, PS, PL, etc
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table)
TARGET_SPECIES	VARCHAR2	3	Y	Unused
DATA_TYPE	VARCHAR2	8	Y	Source of data eg LOGBOOK or VMSDATA
DATA_SOURCE	VARCHAR2	7	Y	Source of the data i.e. AVE9501
FORM_TYPE	VARCHAR2	8	Y	Character code for type of data entry form eg TL04, TL02
FORM_BOOK_NO	VARCHAR2	8	Y	Number of book of forms (e.g. a logbook #)
FORM_SEQ_NO	NUMBER	38.10	Y	Page Number or sequence number of entry form
REPORTING_CODE	VARCHAR2	2	Y	Unused
ENTRY_DATE	DATE	7	Y	Entry Date of data at AFMA
ENTRY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
VERIFY_DATE	DATE	7	Y	Unused
VERIFY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
MODIFY_DATE	DATE	7	Y	Modify Date of data at AFMA
MODIFY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
BAIT_DETAILS	VARCHAR2	1	Y	Unused
ENV_DETAILS	VARCHAR2	1	Y	Unused
SET_DETAILS	VARCHAR2	1	Y	Unused
SAMPLE_DETAILS	VARCHAR2	1	Y	Unused
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0
OPERATION_LON	NUMBER	13.5	Y	reported normative operation pos longitude in seconds, S<0, N>0
STATISTICAL_AREA	NUMBER	8.0	Y	SBT statistical area derived from operation pos
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos
NOON_LAT	NUMBER	13.5	Y	reported noon pos latitude in seconds, W<0, E>0
NOON_LON	NUMBER	13.5	Y	reported noon pos longitude in seconds, S<0, N>0
S_SET_LAT	NUMBER	13.5	Y	reported start set pos latitude in seconds, W<0, E>0
S_SET_LON	NUMBER	13.5	Y	reported start set pos longitude in seconds, S<0, N>0
E_SET_LAT	NUMBER	13.5	Y	Unused
E_SET_LON	NUMBER	13.5	Y	Unused
S_HAUL_LAT	NUMBER	13.5	Y	Unused
S_HAUL_LON	NUMBER	13.5	Y	Unused
E_HAUL_LAT	NUMBER	13.5	Y	Unused
E_HAUL_LON	NUMBER	13.5	Y	Unused
POS_PRECISION	NUMBER	4.0	Y	+/- precision in seconds for position data
S_SET_TIME	DATE	7	Y	start of fishing time
E_SET_TIME	DATE	7	Y	Unused
S_HAUL_TIME	DATE	7	Y	Unused
E_HAUL_TIME	DATE	7	Y	Unused
OPERATION_TIME	DATE	7	Y	Unused
LOCAL_TIME_CODE	VARCHAR2	3	Y	time used on board (e.g. LOC/JAP/UTC);
TIME_ZONE	NUMBER	3.1	Y	time zone at reporting in hours difference +- UTC
HOOK_CNT	NUMBER	6.0	Y	number of hooks
BASKET_CNT	NUMBER	6.0	Y	number of baskets
CATCH_CNT	NUMBER	6.0	Y	Total fish of all species caught in this haul
WWEIGHT_TOT	NUMBER	8.2	Y	Unused
WWEIGHT_CODE	VARCHAR2	2	Y	Unused
SAMPLE_CNT	NUMBER	6.0	Y	Total number of fish for which L/W details are available
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight SBT caught in this haul
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Unused

Column Name	Type	Size	Null	Comment
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method for deriving WWeight
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Code of the Observer on board ship when FOP was taken
OBS_HOOK_CNT	NUMBER	6.0	Y	Unused
OBS_BASKET_CNT	NUMBER	6.0	Y	Unused
OBS_SBT_CNT	NUMBER	6.0	Y	Unused
OBS_SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Unused
OBS_SBT_WWEIGHT_CNT	NUMBER	8.2	Y	Unused
OBS_SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Unused
BAIT	VARCHAR2	3	Y	Main bait used in this FOP
BEACONECNT	NUMBER	2.0	Y	Unused
OBS_BEACON_CNT	NUMBER	2.0	Y	Unused
BEACON_CNT	NUMBER	2.0	Y	number of beacons
SET_DISTANCE	NUMBER	6.1	Y	Unused
SEA_TEMP	NUMBER	4.1	Y	Sea surface temperature of operation
YFT_CNT	NUMBER	4.0	Y	Total YFT caught in this haul
BET_CNT	NUMBER	4.0	Y	Total BET caught in this haul

### 19.1.6 AFZ\_FOP\_JPN

Fishing Operation table. Each record uniquely describes a single fishing operation. AFZ\_FOP\_JPN contains AFZ Japanese data since 1979.

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table
OPERATION_DATE	DATE	7	N	Initial date of operation
OPERATION_NO	NUMBER	2.0	N	Sequence of operation during Operation_date (1,2,3..)
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identity number (in VESSEL_HISTORY)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence- seq_fop_key)
FOP_ID	NUMBER	9.0	Y	Unused.
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather..
CRUISE_ID	NUMBER	38.10	Y	Unused
CRUISE_NUM	VARCHAR2	14	Y	Unused
CRUISE_LEG	NUMBER	3.0	Y	Unused
FISHING_METHOD_CODE	VARCHAR2	3	Y	Gear and Deployment Methodology used for this FOP LL, PS, PL, etc
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table)
TARGET_SPECIES	VARCHAR2	3	Y	Unused
DATA_TYPE	VARCHAR2	8	Y	Source of data eg LOGBOOK or VMSDATA
DATA_SOURCE	VARCHAR2	7	Y	Source of the data i.e. AVE9501
FORM_TYPE	VARCHAR2	8	Y	Character code for type of data entry form eg TL04, TL02 (NOT VMS)
FORM_BOOK_NO	VARCHAR2	8	Y	Number of book of forms (e.g. a logbook #) (NOT VMS)
FORM_SEQ_NO	NUMBER	38.10	Y	Page Number or sequence number of entry form (NOT VMS)
REPORTING_CODE	VARCHAR2	2	Y	Unused
ENTRY_DATE	DATE	7	Y	Entry Date of data at AFMA (NOT VMS)
ENTRY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
VERIFY_DATE	DATE	7	Y	Unused
VERIFY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
MODIFY_DATE	DATE	7	Y	Modify Date of data at AFMA (NOT VMS)
MODIFY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
BAIT_DETAILS	VARCHAR2	1	Y	Unused
ENV_DETAILS	VARCHAR2	1	Y	Unused
SET_DETAILS	VARCHAR2	1	Y	Unused
SAMPLE_DETAILS	VARCHAR2	1	Y	Unused
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0
OPERATION_LON	NUMBER	13.5	Y	reported normative operation pos longitude in seconds, S<0, N>0
STATISTICAL_AREA	NUMBER	8.0	Y	SBT statistical area derived from operation pos
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos
NOON_LAT	NUMBER	13.5	Y	reported noon pos latitude in seconds, W<0, E>0
NOON_LON	NUMBER	13.5	Y	reported noon pos longitude in seconds, S<0, N>0
S_SET_LAT	NUMBER	13.5	Y	reported start set pos latitude in seconds, W<0, E>0 (NOT VMS)
S_SET_LON	NUMBER	13.5	Y	reported start set pos longitude in seconds, S<0, N>0 (NOT VMS)
E_SET_LAT	NUMBER	13.5	Y	Unused
E_SET_LON	NUMBER	13.5	Y	Unused
S_HAUL_LAT	NUMBER	13.5	Y	Unused
S_HAUL_LON	NUMBER	13.5	Y	Unused
E_HAUL_LAT	NUMBER	13.5	Y	Unused

E_HAUL_LON	NUMBER	13.5	Y	Unused
POS_PRECISION	NUMBER	4.0	Y	+ - precision in seconds for position data (NOT VMS)
S_SET_TIME	DATE	7	Y	start of fishing time (NOT VMS)
E_SET_TIME	DATE	7	Y	Unused
S_HAUL_TIME	DATE	7	Y	Unused
E_HAUL_TIME	DATE	7	Y	Unused
OPERATION_TIME	DATE	7	Y	Message time from VMS (1996+)
LOCAL_TIME_CODE	VARCHAR2	3	Y	time used on board (e.g. LOC/JAP/UTC);
TIME_ZONE	NUMBER	3.1	Y	time zone at reporting in hours difference +- UTC
HOOK_CNT	NUMBER	6.0	Y	number of hooks
BASKET_CNT	NUMBER	6.0	Y	number of baskets (NOT VMS)
CATCH_CNT	NUMBER	6.0	Y	Total fish of all species caught in this haul
WWEIGHT_TOT	NUMBER	8.2	Y	Total weight of all species caught this haul (VMS, 1996+)
WWEIGHT_CODE	VARCHAR2	2	Y	Unused
SAMPLE_CNT	NUMBER	6.0	Y	Total number of fish for which L/W details are available
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight SBT caught in this haul
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Unused
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method for deriving WWeight
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Code of the Observer on board ship when FOP was taken
OBS_HOOK_CNT	NUMBER	6.0	Y	Unused
OBS_BASKET_CNT	NUMBER	6.0	Y	Unused
OBS_SBT_CNT	NUMBER	6.0	Y	Unused
OBS_SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Unused
OBS_SBT_WWEIGHT_CNT	NUMBER	8.2	Y	Unused
OBS_SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Unused
BAIT	VARCHAR2	3	Y	Main bait used in this FOP (NOT VMS)
BEACONECNT	NUMBER	2.0	Y	Unused
OBS_BEACON_CNT	NUMBER	2.0	Y	Unused
BEACON_CNT	NUMBER	2.0	Y	number of beacons (NOT VMS)
SET_DISTANCE	NUMBER	6.1	Y	Unused
SEA_TEMP	NUMBER	4.1	Y	Sea surface temperature of operation (NOT VMS)
LICENSE	VARCHAR2	2	Y	Is the vessel operating under a Joint Venture (JV) or Bilateral (BI) license
YFT_CNT	NUMBER	4.0	Y	Total YFT caught in this haul
BET_CNT	NUMBER	4.0	Y	Total BET caught in this haul

### 19.1.7 CATCH\_AGGREGATE

Aggregate catch by individual species for a given fishing operation

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	Y	Composite Foreign Key (see FOP table)
OPERATION_DATE	DATE	7	Y	Composite Foreign Key (see FOP table)
OPERATION_NO	NUMBER	2.0	Y	Composite Foreign Key (see FOP table)
VESSEL_REC_NUM	VARCHAR2	6	Y	Composite Foreign Key (see FOP table)
FOP_KEY	NUMBER	8.0	Y	Foreign Key (see FOP table)
SPECIES_CODE	VARCHAR2	3	Y	3-letter spp. code (see SPECIES_CODES table)
ESTIMATED_FLAG	VARCHAR2	1	Y	"Y" if estimated, else "N" or null if not known
SUBSAMPLE_FLAG	VARCHAR2	1	Y	Values this record from a subsample of catch if flag is "Y"
SPECIES_GRADE	VARCHAR2	10	Y	Grade of fish
CATCH_CNT	NUMBER	5.0	Y	Number of fish of this species and grade caught this set
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Actual or Derived? (see CODES)
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHole, TRunked, etc)
WEIGHT_FACTOR	NUMBER	3.2	Y	Whole/Dressed Ratio used to convert DW to WW
ORIG_SPECIES_CODE	VARCHAR2	6	Y	
DATA_SOURCE	VARCHAR2	7	Y	

### 19.1.8 CATCH\_INDIVIDUAL

Catch by individual fish

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Composite Foreign Key (see FOP table)
OPERATION_DATE	DATE	7	Y	Composite Foreign Key (see FOP table)

OPERATION_NO	NUMBER	2.0	N	Composite Foreign Key (see FOP table)
VESSEL_REC_NUM	VARCHAR2	6	N	Composite Foreign Key (see FOP table)
FOP_KEY	NUMBER	8.0	Y	Numeric Foreign Key (see FOP table)
FISH_SEQ_NO	NUMBER	6.0	N	Sequence number within this FOP
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data if not standard code
ERROR_FLAG	VARCHAR2	1	Y	Unused
SEX_CODE	VARCHAR2	1	Y	Sex code (see CODES table)
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.
LENGTH_OTH	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH_CODE	VARCHAR2	3	Y	code for alternate length
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	1	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHOLE, TRUNKED, etc)
SAMPLE_KEY	NUMBER	38.10	Y	Key to SAMPLES table Set by sequence SEQ_UDE_SAMPLES
COHORT_8	NUMBER	2.0	Y	The age using method 8 (2STY1)
AGE_CODE_8	VARCHAR2	1	Y	The age code (eg W or L) using method 8 (2STY1)
DATA_SOURCE	VARCHAR2	7	Y	Source of this data

### 19.1.9 FOP

Fishing Operation data that uniquely describes a single fishing operation from vessels in the RTMP program. Data since 1991.

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table
OPERATION_DATE	DATE	7	N	Initial date of operation
OPERATION_NO	NUMBER	2.0	N	Sequence of operation during Operation_date (1,2,3..)
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identity number (in VESSEL_HISTORY)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence: seq_fop_key)
FOP_ID	NUMBER	9.0	Y	The FOP_Key of the ROBS_FOP for the corresponding observer reported
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather..
CRUISE_ID	NUMBER	38.10	Y	Unused
CRUISE_NUM	VARCHAR2	14	Y	Unused
CRUISE_LEG	NUMBER	3.0	Y	Unused
FISHING_METHOD_CODE	VARCHAR2	2	Y	Gear and Deployment Methodology used for this FOP - LL
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table)
TARGET_SPECIES	VARCHAR2	3	Y	Unused
DATA_TYPE	VARCHAR2	8	Y	Unused
DATA_SOURCE	VARCHAR2	7	Y	Source of the data i.e. RVE9501
FORM_TYPE	VARCHAR2	8	Y	Unused
FORM_BOOK_NO	VARCHAR2	8	Y	Unused
FORM_SEQ_NO	NUMBER	38.10	Y	Unused
REPORTING_CODE	VARCHAR2	2	Y	Always "VV"
ENTRY_DATE	DATE	7	Y	Entry Date of data in our database
ENTRY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
VERIFY_DATE	DATE	7	Y	Unused
VERIFY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
MODIFY_DATE	DATE	7	Y	Unused
MODIFY_OPERATOR_CODE	VARCHAR2	3	Y	Unused
BAIT_DETAILS	VARCHAR2	1	Y	Unused
ENV_DETAILS	VARCHAR2	1	Y	Unused
SET_DETAILS	VARCHAR2	1	Y	Unused
SAMPLE_DETAILS	VARCHAR2	1	Y	Unused
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0
OPERATION_LON	NUMBER	13.5	Y	reported normative operation pos longitude in seconds, S<0, N>0
STATISTICAL_AREA	NUMBER	8.0	Y	Australian SBT statistical area derived from operation pos
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos
NOON_LAT	NUMBER	13.5	Y	reported noon pos latitude in seconds, W<0, E>0
NOON_LON	NUMBER	13.5	Y	reported noon pos longitude in seconds, S<0, N>0
S_SET_LAT	NUMBER	13.5	Y	Unused
S_SET_LON	NUMBER	13.5	Y	Unused
E_SET_LAT	NUMBER	13.5	Y	Unused
E_SET_LON	NUMBER	13.5	Y	Unused



S_HAUL_LAT	NUMBER	13.5	Y	Unused
S_HAUL_LON	NUMBER	13.5	Y	Unused
E_HAUL_LAT	NUMBER	13.5	Y	Unused
E_HAUL_LON	NUMBER	13.5	Y	Unused
POS_PRECISION	NUMBER	4.0	Y	Always set to 30 second
SET_DISTANCE	NUMBER	6.1	Y	Unused
S_SET_TIME	DATE	7	Y	Start of set time
E_SET_TIME	DATE	7	Y	End of set time
S_HAUL_TIME	DATE	7	Y	Start of haul time
E_HAUL_TIME	DATE	7	Y	End of haul time
OPERATION_TIME	DATE	7	Y	Unused
LOCAL_TIME_CODE	VARCHAR2	3	Y	Unused
TIME_ZONE	NUMBER	3.1	Y	time zone used in hours difference +- UTC
HOOK_CNT	NUMBER	6.0	Y	number of hooks
BASKET_CNT	NUMBER	6.0	Y	number of baskets
BEACON_CNT	NUMBER	6.0	Y	
CATCH_CNT	NUMBER	6.0	Y	Total fish of all species caught in this haul
WWEIGHT_TOT	NUMBER	8.2	Y	Unused
WWEIGHT_CODE	VARCHAR2	2	Y	Unused
SAMPLE_CNT	NUMBER	6.0	Y	Total number of fish for which L/W details are available
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight SBT caught in this haul
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Number of SBT in weight calculation
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method for deriving WWeight - P
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Code of the Observer on board ship when FOP was taken
OBS_HOOK_CNT	NUMBER	6.0	Y	Unused
OBS_BASKET_CNT	NUMBER	6.0	Y	Unused
OBS_BEACON_CNT	NUMBER	6.0	Y	Unused
OBS_SBT_CNT	NUMBER	6.0	Y	Unused
OBS_SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Unused
OBS_SBT_WWEIGHT_CNT	NUMBER	8.2	Y	Unused
OBS_SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Unused
BAIT	VARCHAR2	2	Y	Unused
OBS_FOP_KEY	NUMBER	9.0	Y	The fop key of the corresponding observer FOP

### 19.1.10 NZL\_CATCH\_AGGREGATE

Aggregate catch by individual species for a given fishing operation. Only major species are recorded here.

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	Y	Composite Foreign Key (see FOP table)
FOP_KEY	NUMBER	9.0	Y	Foreign Key (see FOP table)
DATA_SOURCE	VARCHAR2	7	Y	Source of this data
SPECIES_CODE	VARCHAR2	3	Y	3-letter spp. code (see SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	3	Y	3-letter original spp. code
CATCH_CNT	NUMBER	8.0	Y	Number of fish of this species and grade caught this set
DWEIGHT	NUMBER	8.0	Y	Dressed or Processed Weight

### 19.1.11 NZL\_CATCH\_INDIVIDUAL

Catch by individual fish

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Composite Foreign Key (see FOP table)
OPERATION_DATE	DATE	7	N	Composite Foreign Key (see FOP table)
OPERATION_NO	NUMBER	2.0	N	Composite Foreign Key (see FOP table)
VESSEL_REC_NUM	VARCHAR2	6	N	Composite Foreign Key (see FOP table)
FOP_KEY	NUMBER	6.0	N	Numeric Foreign Key (see FOP table)
DATA_SOURCE	VARCHAR2	7	N	The source of this data
FISH_SEQ_NO	NUMBER	6.0	N	Sequence number within this FOP
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data if not standard code
SEX_CODE	VARCHAR2	1	Y	Sex code (see CODES table)
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.

WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHole, TRunked, etc)
COHORT_8	NUMBER	2.0	Y	The age using method 8 (2STY1)
AGE_CODE_8	VARCHAR2	1	Y	The age code (eg W or L) using method 8 (2STY1)

### 19.1.12 NZL\_FOP

Fishing Operation Table uniquely describes single fishing operation

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table
OPERATION_DATE	DATE	7	N	Initial date of operation
OPERATION_NO	NUMBER	2.0	N	Sequence of operation during Operation_date
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identity number (in VESSEL_HISTORY)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence: seq_fop_key)
OBS_FOP_KEY	NUMBER	9.0	Y	Identifies the observer FOP data (not yet implemented)
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather..
FISHING_METHOD_CODE	VARCHAR2	2	Y	Gear and Deployment Methodology used for this FOP
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table)
TARGET_SPECIES	VARCHAR2	3	Y	Standard TLA for Species
DATA_TYPE	VARCHAR2	8	Y	Source of data: logbook code/radio rpt/etc.
DATA_SOURCE	VARCHAR2	7	Y	Source of the data i.e. AVE9501
FORM_BOOK_NO	VARCHAR2	8	Y	Number of book of forms (e.g. a logbook #)
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0
OPERATION_LON	NUMBER	13.5	Y	reported normative operation pos longitude in seconds, S<0, N>0
STATISTICAL_AREA	NUMBER	8.0	Y	SBT statistical area derived from operation pos
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos
S_SET_TIME	DATE	7	Y	reported start set pos date-time
E_SET_TIME	DATE	7	Y	reported end set pos date-time
S_HAUL_TIME	DATE	7	Y	reported start haul pos date-time
E_HAUL_TIME	DATE	7	Y	reported end haul pos date-time
HOOK_CNT	NUMBER	6.0	Y	number of hooks
BASKET_CNT	NUMBER	6.0	Y	number of baskets
CATCH_CNT	NUMBER	6.0	Y	Total fish of all species caught in this haul
WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight of all species caught in this haul
WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method for deriving WWeight
SAMPLE_CNT	NUMBER	6.0	Y	Total number of fish for which details are available
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight SBT caught in this haul
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Count of SBT measured for whole weight
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method for deriving WWeight
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Observer on board ship when FOP was taken
SEA_TEMP	NUMBER	4.1	Y	Sea surface temperature at start of set
E_SET_TEMP	NUMBER	4.1	Y	Sea surface temperature at end of set
LICENSE	VARCHAR2	2	Y	Is the vessel operating under a Joint Venture (JV) or Bilateral (BI) license
CLOUD_COVER	NUMBER	1.0	Y	The cloud cover (0-8 eights)
CLOUD_TYPE	VARCHAR2	2	Y	The type of cloud cover
WIND_FORCE_S	NUMBER	3.0	Y	the strength of the wind at the start of set (m/s)
WIND_FORCE_E	NUMBER	3.0	Y	the strength of the wind at the end of set (m/s)
LINE_LENGTH	NUMBER	3.0	Y	the length of the mainline (kms)

## 19.2 Observer recorded data tables

### 19.2.1 AOBS\_CATCH\_INDIVIDUAL

Details on individual fish caught in a Fishing Operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	6.0	N	Numeric Foreign Key (see FOP table)
OPERATION_DATE	DATE	7	N	Duplicated from the FOP table
VESSEL_REC_NUM	VARCHAR2	6	Y	Duplicated from the FOP table
DATA_SOURCE	VARCHAR2	7	N	Source of this data
FISH_SEQ_NO	NUMBER	3.0	N	Sequence number within this FOP FOP_Key + FSN = Key
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data if not standard code
BEACON_NUM	VARCHAR2	2	Y	number of last beacon observed landed prior to each record
LANDING_TIME	VARCHAR2	6	Y	Time of landing this fish
LIFE_STATUS	VARCHAR2	1	Y	The life status of this fish upon landing
RETAINED	VARCHAR2	1	Y	Is the fish retained or trashed?
DAMAGE	VARCHAR2	1	Y	tag or scar present, net damage
SEX_CODE	VARCHAR2	1	Y	Sex code (see CODES table)
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.
LENGTH_OTH1	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH1_CODE	VARCHAR2	3	Y	code for alternate length
LENGTH_OTH2	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH2_CODE	VARCHAR2	3	Y	code for alternate length
LENGTH_OTH3	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH3_CODE	VARCHAR2	3	Y	code for alternate length
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHole, TRunked, etc)
SAMPLE_KEY	NUMBER	38.10	Y	Key to SAMPLES table Set by sequence SEQ_UDE_SAMPLES
COMMENTS	VARCHAR2	30	Y	
COHORT_8	NUMBER	2.0	Y	
AGE_CODE_8	VARCHAR2	1	Y	
COHORT_10	NUMBER	2.0	Y	
AGE_CODE_10	VARCHAR2	1	Y	
COHORT_11	NUMBER	2.0	Y	
AGE_CODE_11	VARCHAR2	1	Y	
VESSEL_ID	NUMBER	6.0	Y	

### 19.2.2 AOBS\_FOP

Fishing Operation Table uniquely describes single fishing operation with data recorded by an observer

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	Initial date of operation (AFZ, RTMP)
VESSEL_REC_NUM	NUMBER	6.0	Y	Unique vessel identity number (in VESSEL_REGISTER) (AFZ, RTMP)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence: seq_fop_key) (AFZ, RTMP)
VES_FOP_KEY	NUMBER	9.0	Y	Pointer to the corresponding Vessel logbook sourced FOP record (AFZ, RTMP)
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather.. (AFZ, RTMP)
CRUISE_ID	NUMBER	6.0	Y	Cruise id number in CRUISE table (Unique UDE sequence) (AFZ, RTMP)
CRUISE_NUM	VARCHAR2	10	Y	Alphanumeric cruise identifier eg DDMMYY<callsign> or RTMP9413 (AFZ, RTMP)
FISHING_METHOD_CODE	VARCHAR2	2	Y	Gear and Deployment Methodology used for this FOP (AFZ, RTMP)
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table) (AFZ, RTMP)
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table (AFZ, RTMP)
DATA_SOURCE	VARCHAR2	7	N	Source, year and part no of data (AFZ, RTMP)
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0 (AFZ, RTMP)

Field Name	Field Type	Field Length	Field Nullable	Description
OPERATION_LON	NUMBER	13.5	Y	RTMP) reported normative operation pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
STATISTICAL_AREA	NUMBER	8.0	Y	Australian SBT statistical area derived from operation pos (AFZ, RTMP)
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos (AFZ, RTMP)
NOON_LAT	NUMBER	13.5	Y	vessel reported noon pos latitude in seconds, W<0, E>0 (RTMP)
NOON_LON	NUMBER	13.5	Y	vessel reported noon pos longitude in seconds, S<0, N>0 (RTMP)
S_SET_LAT	NUMBER	13.5	Y	reported start set pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
S_SET_LON	NUMBER	13.5	Y	reported start set pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
E_SET_LAT	NUMBER	13.5	Y	reported end set pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
E_SET_LON	NUMBER	13.5	Y	reported end set pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
S_HAUL_LAT	NUMBER	13.5	Y	reported start haul pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
S_HAUL_LON	NUMBER	13.5	Y	reported start haul pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
E_HAUL_LAT	NUMBER	13.5	Y	reported end haul pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
E_HAUL_LON	NUMBER	13.5	Y	reported end haul pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
SET_DISTANCE	NUMBER	6.1	Y	distance traveled start-to-finish for set and haul (AFZ, RTMP)
S_SET_TIME	DATE	7	Y	reported start set pos date-time (AFZ, RTMP)
E_SET_TIME	DATE	7	Y	reported end set pos date-time (AFZ, RTMP)
S_HAUL_TIME	DATE	7	Y	reported start haul pos date-time (AFZ, RTMP)
E_HAUL_TIME	DATE	7	Y	reported end haul pos date-time (AFZ, RTMP)
OPERATION_TIME	DATE	7	Y	normative pos date-time (AFZ, RTMP)
S_SET_SST	NUMBER	3.1	Y	Start set Sea Surface Temperature (AFZ, RTMP)
E_SET_SST	NUMBER	3.1	Y	End set Sea Surface Temperature (AFZ, RTMP)
S_HAUL_SST	NUMBER	3.1	Y	Start Haul Sea Surface Temperature (AFZ, RTMP)
E_HAUL_SST	NUMBER	3.1	Y	End Haul Sea Surface Temperature (AFZ, RTMP)
WIND_DIR	NUMBER	3.0	Y	Wind Direction (degrees) (AFZ, RTMP)
WIND_SPEED	NUMBER	2.0	Y	Wind speed (Beaufort wind scale) (AFZ, RTMP)
PRESSURE	NUMBER	4.0	Y	barometer pressure reading (Hectopascals) (AFZ, RTMP)
PRESSURE_TREND	VARCHAR2	1	Y	Barometer trend (rising or falling) (AFZ)
SEA_DIR	NUMBER	3.0	Y	sea Direction (degrees) (AFZ, RTMP)
SEA_HEIGHT	NUMBER	2.0	Y	Sea Height (metres) (AFZ, RTMP)
AIR_TEMP	NUMBER	4.1	Y	ambient air temperature (Celcius) (AFZ, RTMP)
SEA_TEMP	NUMBER	4.1	Y	Sea surface temperature (Celcius) (AFZ)
SWELL_DIR	NUMBER	3.0	Y	swell direction (degrees) (AFZ, RTMP)
SWELL_HEIGHT	NUMBER	2.0	Y	swell height (Metres) (AFZ, RTMP)
CLOUD_COVER	NUMBER	1.0	Y	Cloud cover (eights) (AFZ, RTMP)
WEATHER_TIME	VARCHAR2	4	Y	Time of recording weather details (AFZ)
SET_PATTERN	VARCHAR2	2	Y	Description of set shape (AFZ, RTMP)
SET_SPEED	NUMBER	4.1	Y	Setting speed of vessel (knots) (AFZ, RTMP)
ENGINE_RPM	NUMBER	3.0	Y	Main engine RPM during set (AFZ)
LT_SPEED	NUMBER	4.1	Y	Line Thrower speed (m/s) (AFZ)
TIMER	NUMBER	4.1	Y	Interval between beeps on setting timer (seconds) (AFZ)
MIN_HOOK_D	NUMBER	3.0	Y	Minimum hook depth (metres) (AFZ, RTMP)
MAX_HOOK_D	NUMBER	3.0	Y	Depth of deepest hook (metres) (AFZ, RTMP)
HOOKS_BUOY	NUMBER	2.0	Y	Number of hooks per bouy (AFZ, RTMP)
DISTANCE_BUOYS	NUMBER	3.0	Y	Distance between bouys (metres) (AFZ, RTMP)
DISTANCE_SNOOD	NUMBER	3.0	Y	Distance between snoods (metres) (AFZ, RTMP)
OBSREC_HOOK_CNT	NUMBER	6.0	Y	number of hooks in shot (recorded by observer) (AFZ, RTMP)
VESREC_HOOK_CNT	NUMBER	6.0	Y	number of hooks in shot (recorded by vessel) (AFZ, RTMP)
OBSREC_BASKET_CNT	NUMBER	6.0	Y	number of baskets in shot (recorded by observer) (AFZ, RTMP)
VESREC_BASKET_CNT	NUMBER	6.0	Y	number of baskets in shot (recorded by Vessel) (AFZ, RTMP)
OBSREC_BEACON_CNT	NUMBER	6.0	Y	number of beacons in shot (recorded by observer) (AFZ, RTMP)
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Code of Observer on board ship when FOP was taken (AFZ, RTMP)
HOOK_CNT	NUMBER	6.0	Y	Total hooks observed (AFZ, RTMP)
CATCH_CNT	NUMBER	6.0	Y	Total observed fish of all species caught in this haul (AFZ, RTMP)
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul (AFZ, RTMP)
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight of SBT caught in this haul (AFZ, RTMP)
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Total count of SBT measured for wh. weight (AFZ, RTMP)
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method observer used to derive WWeight (AFZ, RTMP)
VESREC_SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul (vessel records) (AFZ, RTMP)
VESREC_SBT_WWEIGHT_TO	NUMBER	8.2	Y	Total whole weight SBT caught in this haul (vessel records) (AFZ,
VESREC_SBT_WWEIGHT_CN	NUMBER	6.0	Y	Count of SBT measured for whole weight (vessel records) (AFZ, RTMP)
VESREC_SBT_WWEIGHT_CO	VARCHAR2	2	Y	Code describing method for deriving WWeight (vessel records) (AFZ,
TORI_POLE	VARCHAR2	1	Y	Tori pole in use today? (AFZ)
BAIT_THROWER	VARCHAR2	1	Y	Bait thrower in use today? (AFZ)
MAGNET_DETER	VARCHAR2	1	Y	Magnetic seabird deterrent device used today? (AFZ)

BAIT_THAWING	VARCHAR2		Y	How was the bait thawing routine today? (AFZ)
ALBATROSS_CNT	VARCHAR2	2	Y	Estimated albatrosses during setting observations (AFZ)
OTHER_CNT	VARCHAR2	3	Y	Estimated number of other birds during line setting observation (AFZ)
BWIND_SPEED	NUMBER	2.0	Y	Wind speed during bird observations (AFZ)
BSEA_HEIGHT	NUMBER	2.0	Y	Sea height during bird observations (AFZ)
BSWELL_HEIGHT	NUMBER	2.0	Y	Swell height during bird observations (AFZ)
BMOON_LITE	VARCHAR2		Y	Moonlight during bird observations (AFZ)
BSTART_TIME	VARCHAR2	4	Y	Start time for recording bird observations (AFZ)
BEND_TIME	VARCHAR2	4	Y	End time for recording bird observations (AFZ)
HOOK_CNT_PAS	NUMBER	6.0	Y	
HOOK_CNT_DISCARD	NUMBER	6.0	Y	Total hooks observed for a dedicated discard monitor from the starboard rail (AFZ)
VESSEL_ID	NUMBER	6.0	Y	Vessel Id in VESSEL and VESSEL_HISTORY
TARGET_SPECIES	VARCHAR2	3	Y	The targeted species for this FOP (AFZ 96+)

### 19.2.3 AOBS MORPH

Details on morphological measurements taken of individual fish caught in a Fishing Operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	6.0	N	Numeric Foreign Key (see FOP table)
FISH_SEQ_NO	NUMBER	3.0	N	Sequence number within this FOP FOP_Key + FSN = Key
DATA_SOURCE	VARCHAR2	7	N	Data distribution source
MORPH_CODE	VARCHAR2	2	Y	Code of morphological count or measurement
MORPH_MEAS	NUMBER	3.0	Y	Morphological count or measurement

### 19.2.4 AOBS\_SAMPLE

Detail table for Observer biological samples

Column Name	Type	Size	Null	Comment
SAMPLE_KEY	NUMBER	6.0	N	Unique key taken from sequence SEQ_UDE_SAMPLES
LABELNO	VARCHAR2	6	Y	Label number of this sample
SAMPLE_CODE	VARCHAR2	2	N	Code for type of sample taken
SAMPLE_CNT	NUMBER	2.0	Y	Number of samples taken with this label number
DATA_SOURCE	VARCHAR2	7	N	Data distribution source
FOP_KEY	NUMBER	9.0	N	Foreign key link to fishing operation
FISH_SEQ_NO	NUMBER	6.0	N	FSN (Foreign key link to individual fish)

### 19.2.5 ATTITUDE

Information on the attitude of the crew to the observer and his/her work

Column Name	Type	Size	Null	Comment
CRUISE_ID	NUMBER	6.0	N	foreign key link to OCRUISE table
DATA_SOURCE	VARCHAR2	7	N	The source of this data
OBS_FISHMAST	VARCHAR2	1	Y	The attitude of the fishing master to the observer
OBS_CAPTAIN	VARCHAR2	1	Y	The attitude of the captain to the observer
OBS_RADIOOP	VARCHAR2	1	Y	The attitude of the radio operator to the observer
OBS_ICEMAST	VARCHAR2	1	Y	The attitude of the ice master to the observer
OBS_DECKCREW	VARCHAR2	1	Y	The attitude of the deck crew to the observer
WORK_FISHMAST	VARCHAR2	1	Y	The attitude of the fishing master to the observers work
WORK_CAPTAIN	VARCHAR2	1	Y	The attitude of the captain to the observers work
WORK_RADIOOP	VARCHAR2	1	Y	The attitude of the radio operator to the observers work
WORK_ICEMAST	VARCHAR2	1	Y	The attitude of the ice master to the observers work
WORK_DECKCREW	VARCHAR2	1	Y	The attitude of the deck crew to the observers work

### 19.2.6 BEACON

Information on the number of buoys between beacons used in an observed fishing operation.

Column Name	Type	Size	Null	Comment
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FOP_KEY	NUMBER	9.0	N	Unique identifier for a Fishing Operation (foreign key)
BEACON_NUM	NUMBER	2.0	N	the beacon number
DATA_SOURCE	VARCHAR2	7	N	datasource for this record
BOUYS_NUM	NUMBER	3.0	Y	The number of buoys between beacons Beacon_Num and Beacon_Num +

## 19.2.7 CAMPAIGN

Information on why a vessel is in a particular fishing ground

Column Name	Type	Size	Null	Comment
CRUISE_ID	NUMBER	6.0	N	foreign key link to OCRUISE table
DATA_SOURCE	VARCHAR2	7	N	The source of this data
START_DATE	VARCHAR2	4	N	The starting date on fishing ground (month and year)
END_DATE	VARCHAR2	4	Y	The ending date on fishing ground (month and year)
AREA_CODE	VARCHAR2	2	Y	code describing the fishing ground
DEG_SQUARE	VARCHAR2	5	Y	degrees of latitude and longitude of area fished within the fishing
TARGET_SPECIES	VARCHAR2	3	Y	target species
REASON_ABUND	VARCHAR2	1	Y	reason for fishing there - abundance of target species
REASON_VALUE	VARCHAR2	1	Y	reason for fishing there - value of target species
REASON_QUALITY	VARCHAR2	1	Y	reason for fishing there - quality of target species
REASON_OTHER	VARCHAR2	1	Y	reason for fishing there - other reasons
COMMENTS	VARCHAR2	100	Y	any comments relating to reasons for fishing there

## 19.2.8 COBS\_CATCH\_INDIVIDUAL

Details on individual fish caught in a Fishing Operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	6.0	N	Numeric Foreign Key (see FOP table)
OPERATION_DATE	DATE	7	N	Duplicated from the FOP table
VESSEL_REC_NUM	VARCHAR2	6	N	Duplicated from the FOP table
DATA_SOURCE	VARCHAR2	7	N	Source of this data
FISH_SEQ_NO	NUMBER	3.0	N	Sequence number within this FOP FOP_Key + FSN = Key
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data if not standard code
BEACON_NUM	VARCHAR2	2	Y	number of last beacon observed landed prior to each record
LANDING_TIME	VARCHAR2	6	Y	Time of landing this fish
LIFE_STATUS	VARCHAR2	1	Y	The life status of this fish upon landing
RETAINED	VARCHAR2	1	Y	Is the fish retained or trashed?
DAMAGE	VARCHAR2	1	Y	tag or scar present, net damage
SEX_CODE	VARCHAR2	1	Y	Sex code (see CODES table)
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.
LENGTH_OTH1	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH1_CODE	VARCHAR2	3	Y	code for alternate length
LENGTH_OTH2	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH2_CODE	VARCHAR2	3	Y	code for alternate length
LENGTH_OTH3	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH3_CODE	VARCHAR2	3	Y	code for alternate length
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. WHole, TRunked, etc)
SAMPLE_KEY	NUMBER	38.10	Y	Key to SAMPLES table Set by sequence SEQ_UDE_SAMPLES
COMMENTS	VARCHAR2	30	Y	
COHORT_8	NUMBER	2.0	Y	
AGE_CODE_8	VARCHAR2	1	Y	
HOOK_NUMBER	NUMBER	4.0	Y	

## 19.2.9 COBS\_FOP

Fishing Operation Table uniquely describes single fishing operation with data recorded by an observer

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	Initial date of operation (AFZ, RTMP)

VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identity number (in VESSEL_REGISTER) (AFZ, RTMP)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence: seq_fop_key) (AFZ, RTMP)
VES_FOP_KEY	NUMBER	9.0	Y	Pointer to the corresponding Vessel logbook sourced FOP record (AFZ, RTMP)
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather.. (AFZ,
CRUISE_ID	NUMBER	6.0	Y	Cruise id number in CRUISE table (Unique UDE sequence) (AFZ, RTMP)
CRUISE_NUM	VARCHAR2	10	Y	Alphanumeric cruise identifier eg DDMMYY<callsign> or RTMP9413 (AFZ, RTMP)
FISHING_METHOD_CODE	VARCHAR2	2	Y	Gear and Deployment Methodology used for this FOP (AFZ, RTMP)
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table) (AFZ, RTMP)
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table (AFZ, RTMP)
DATA_SOURCE	VARCHAR2	7	N	Source, year and part no of data (AFZ, RTMP)
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
OPERATION_LON	NUMBER	13.5	Y	reported normative operation pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
STATISTICAL_AREA	NUMBER	8.0	Y	Australian SBT statistical area derived from operation pos (AFZ, RTMP)
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos (AFZ, RTMP)
NOON_LAT	NUMBER	13.5	Y	vessel reported noon pos latitude in seconds, W<0, E>0 (RTMP)
NOON_LON	NUMBER	13.5	Y	vessel reported noon pos longitude in seconds, S<0, N>0 (RTMP)
S_SET_LAT	NUMBER	13.5	Y	reported start set pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
S_SET_LON	NUMBER	13.5	Y	reported start set pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
E_SET_LAT	NUMBER	13.5	Y	reported end set pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
E_SET_LON	NUMBER	13.5	Y	reported end set pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
S_HAUL_LAT	NUMBER	13.5	Y	reported start haul pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
S_HAUL_LON	NUMBER	13.5	Y	reported start haul pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
E_HAUL_LAT	NUMBER	13.5	Y	reported end haul pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
E_HAUL_LON	NUMBER	13.5	Y	reported end haul pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
SET_DISTANCE	NUMBER	6.1	Y	distance traveled start-to-finish for set and haul (AFZ, RTMP)
S_SET_TIME	DATE	7	Y	reported start set pos date-time (AFZ, RTMP)
E_SET_TIME	DATE	7	Y	reported end set pos date-time (AFZ, RTMP)
S_HAUL_TIME	DATE	7	Y	reported start haul pos date-time (AFZ, RTMP)
E_HAUL_TIME	DATE	7	Y	reported end haul pos date-time (AFZ, RTMP)
OPERATION_TIME	DATE	7	Y	normative pos date-time (AFZ, RTMP)
S_SET_SST	NUMBER	3.1	Y	Start set Sea Surface Temperature (AFZ, RTMP)
E_SET_SST	NUMBER	3.1	Y	End set Sea Surface Temperature (AFZ, RTMP)
S_HAUL_SST	NUMBER	3.1	Y	Start Haul Sea Surface Temperature (AFZ, RTMP)
E_HAUL_SST	NUMBER	3.1	Y	End Haul Sea Surface Temperature (AFZ, RTMP)
WIND_DIR	NUMBER	3.0	Y	Wind Direction (degrees) (AFZ, RTMP)
WIND_SPEED	NUMBER	2.0	Y	Wind speed (Beaufort wind scale) (AFZ, RTMP)
PRESSURE	NUMBER	4.0	Y	barometer pressure reading (Hectopascals) (AFZ, RTMP)
PRESSURE_TREND	VARCHAR2	1	Y	Barometer trend (rising or falling) (AFZ)
SEA_DIR	NUMBER	3.0	Y	sea Direction (degrees) (AFZ, RTMP)
SEA_HEIGHT	NUMBER	2.0	Y	Sea Height (metres) (AFZ, RTMP)
AIR_TEMP	NUMBER	4.1	Y	ambient air temperature (Celcius) (AFZ, RTMP)
SEA_TEMP	NUMBER	4.1	Y	Sea surface temperature (Celcius) (AFZ)
SWELL_DIR	NUMBER	3.0	Y	swell direction (degrees) (AFZ, RTMP)
SWELL_HEIGHT	NUMBER	2.0	Y	swell height (Metres) (AFZ, RTMP)
CLOUD_COVER	NUMBER	1.0	Y	Cloud cover (eights) (AFZ, RTMP)
WEATHER_TIME	VARCHAR2	4	Y	Time of recording weather details (AFZ)
SET_PATTERN	VARCHAR2	2	Y	Description of set shape (AFZ, RTMP)
SET_SPEED	NUMBER	4.1	Y	Setting speed of vessel (knots) (AFZ, RTMP)
ENGINE_RPM	NUMBER	3.0	Y	Main engine RPM during set (AFZ)
LT_SPEED	NUMBER	4.1	Y	Line Thrower speed (m/s) (AFZ)
TIMER	NUMBER	4.1	Y	Interval between beeps on setting timer (seconds) (AFZ)
MIN_HOOK_D	NUMBER	3.0	Y	Minimum hook depth (metres) (AFZ, RTMP)
MAX_HOOK_D	NUMBER	3.0	Y	Depth of deepest hook (metres) (AFZ, RTMP)
HOOKS_BUOY	NUMBER	2.0	Y	Number of hooks per bouy (AFZ, RTMP)
DISTANCE_BUOYS	NUMBER	3.0	Y	Distance between bouys (metres) (AFZ, RTMP)
DISTANCE_SNOOD	NUMBER	3.0	Y	Distance between snoods (metres) (AFZ, RTMP)
OBSREC_HOOK_CNT	NUMBER	6.0	Y	number of hooks in shot (recorded by observer) (AFZ, RTMP)
VESREC_HOOK_CNT	NUMBER	6.0	Y	number of hooks in shot (recorded by vessel) (AFZ, RTMP)
OBSREC_BASKET_CNT	NUMBER	6.0	Y	number of baskets in shot (recorded by observer) (AFZ, RTMP)
VESREC_BASKET_CNT	NUMBER	6.0	Y	number of baskets in shot (recorded by Vessel) (AFZ, RTMP)
OBSREC_BEACON_CNT	NUMBER	6.0	Y	number of beacons in shot (recorded by observer) (AFZ, RTMP)
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Code of Observer on board ship when FOP was taken (AFZ, RTMP)
HOOK_CNT	NUMBER	6.0	Y	Total hooks observed (AFZ, RTMP)
HOOK_CNT_PAS	NUMBER	6.0	Y	Total hooks observed passively (AFZ)

HOOK_CNT_DISCARD	NUMBER	6.0	Y	Total hooks observed for a dedicated discard monitor from the starboard rail (AFZ)
CATCH_CNT	NUMBER	6.0	Y	Total observed fish of all species caught in this haul (AFZ, RTMP)
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul (AFZ, RTMP)
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight of SBT caught in this haul (AFZ, RTMP)
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Total count of SBT measured for wh. weight (AFZ, RTMP)
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method observer used to derive WWeight (AFZ, RTMP)
VESREC_SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul (vessel records) (AFZ, RTMP)
VESREC_SBT_WWEIGHT_TO	NUMBER	8.2	Y	Total whole weight SBT caught in this haul (vessel records) (AFZ,
VESREC_SBT_WWEIGHT_CN	NUMBER	6.0	Y	Count of SBT measured for whole weight (vessel records) (AFZ, RTMP)
VESREC_SBT_WWEIGHT_CO	VARCHAR2	2	Y	Code describing method for deriving WWeight (vessel records) (AFZ,
TORI_POLE	VARCHAR2	1	Y	Tori pole in use today? (AFZ)
BAIT_THROWER	VARCHAR2	1	Y	Bait thrower in use today? (AFZ)
MAGNET_DETER	VARCHAR2	1	Y	Magnetic seabird deterrent device used today? (AFZ)
BAIT_THAWING	VARCHAR2	1	Y	How was the bait thawing routine today? (AFZ)
ALBALTROSS_CNT	VARCHAR2	2	Y	Estimated albatrosses during setting observations (AFZ)
OTHER_CNT	VARCHAR2	3	Y	Estimated number of other birds during line setting observation (AFZ)
BWIND_SPEED	NUMBER	2.0	Y	Wind speed during bird observations (AFZ)
BSEA_HEIGHT	NUMBER	2.0	Y	Sea height during bird observations (AFZ)
BSWELL_HEIGHT	NUMBER	2.0	Y	Swell height during bird observations (AFZ)
BMOON_LITE	VARCHAR2	1	Y	Moonlight during bird observations (AFZ)
BSTART_TIME	VARCHAR2	4	Y	Start time for recording bird observations (AFZ)
BEND_TIME	VARCHAR2	4	Y	End time for recording bird observations (AFZ)
TIME_ZONE	NUMBER	2.0	Y	

### 19.2.10 COBS\_SAMPLE

Detail table for Observer biological samples

Column Name	Type	Size	Null	Comment
SAMPLE_KEY	NUMBER	6.0	N	Unique key taken from sequence SEQ_UDE_SAMPLES
LABELNO	VARCHAR2	6	N	Label number of this sample
SAMPLE_CODE	VARCHAR2	2	N	Code for type of sample taken
SAMPLE_CNT	NUMBER	2.0	N	Number of samples taken with this label number
DATA_SOURCE	VARCHAR2	7	N	Data distribution source
FOP_KEY	NUMBER	9.0	N	Foreign key link to fishing operation
FISH_SEQ_NO	NUMBER	6.0	N	FSN (Foreign key link to individual fish)

### 19.2.11 COURSE

Information on the course changes used in an observed fishing operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	9.0	N	Unique identifier for a Fishing Operation (foreign key)
COURSE_NUM	NUMBER	1.0	N	The course change number
DATA_SOURCE	VARCHAR2	7	N	datasource for this record
COURSE_TIME	VARCHAR2	4	Y	Time when course altered
COURSE_DEGREES	NUMBER	3.0	Y	degrees to which the course was altered

### 19.2.12 EGEAR

Electronic gear information of a particular vessel derived from AFZ and RTMP observer data.

Column Name	Type	Size	Null	Comment
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identifier (foreign key) (AFZ, RTMP)
DATA_SOURCE	VARCHAR2	7	N	datasource for this record (AFZ, RTMP)
SAT_NAV	VARCHAR2	1	Y	Does vessel have a Transit Satellite Navigator? (AFZ, RTMP)
SAT_NAV_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
SAT_NAV_2	VARCHAR2	1	Y	Does vessel have a second Transit Satellite Navigator? (AFZ)
SAT_NAV_2_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
GPS	VARCHAR2	1	Y	Does vessel have a Global Positioning System? (AFZ, RTMP)
GPS_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
GPS_2	VARCHAR2	1	Y	Does vessel have a second GPS? (AFZ)
GPS_2_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)



OMEGA_NAV	VARCHAR2	1	Y	Does vessel have an Omega Navigator? (AFZ, RTMP)
OMEGA_NAV_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
RADIO_DIR_FINDER	VARCHAR2	1	Y	Does vessel have a Radio Direction Finder? (AFZ, RTMP)
RADIO_DIR_FINDER_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
RADAR	VARCHAR2	1	Y	Does vessel have a radar (AFZ, RTMP)
RADAR_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
RADAR_2	VARCHAR2	1	Y	Does vessel have a second radar? (AFZ)
RADAR_2_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
WEATHER_FAX	VARCHAR2	1	Y	Does vessel have a Weather FAX? (AFZ, RTMP)
WEATHER_FAX_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
TRACK_PLOTTER	VARCHAR2	1	Y	Does vessel have a Track Plotter? (AFZ, RTMP)
TRACK_PLOTTER_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
SOUNDER	VARCHAR2	1	Y	Does vessel have a Sounder? (AFZ, RTMP)
SOUNDER_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
SOUNDER_2	VARCHAR2	1	Y	Does vessel have a second Sounder? (AFZ)
SOUNDER_2_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
SONAR	VARCHAR2	1	Y	Does vessel have a Sonar? (AFZ, RTMP)
SONAR_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
CURRENT_MONITOR	VARCHAR2	1	Y	Does vessel have a Current Monitor? (AFZ, RTMP)
CURRENT_MONITOR_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
NOAA_SAT	VARCHAR2	1	Y	Does vessel have a NOAA Satellite Receiver? (AFZ, RTMP)
NOAA_SAT_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
SST_RECORDER_1	VARCHAR2	1	Y	Does vessel have a Sea Surface temperature Recorder? (AFZ, RTMP)
SST_RECORDER_1_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
SST_RECORDER_2	VARCHAR2	1	Y	Does vessel have a second Sea Surface temperature Recorder? (AFZ)
SST_RECORDER_2_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
BATHYTHERM	VARCHAR2	1	Y	Does vessel have a Bathythermograph? (AFZ, RTMP)
BATHYTHERM_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
LINE_CASTER	VARCHAR2	1	Y	Does vessel have a Line Caster Controller? (AFZ)
LINE_CASTER_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
OTHER_1	VARCHAR2	20	Y	Other equipment description (AFZ)
OTHER_1_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
OTHER_2	VARCHAR2	20	Y	Other equipment description (AFZ)
OTHER_2_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
OTHER_3	VARCHAR2	20	Y	Other equipment description (AFZ)
OTHER_3_MM	VARCHAR2	20	Y	Manufacturer and model (AFZ)
VESSEL_ID	NUMBER	6.0	Y	

### 19.2.13 FGEAR

Fishing and seabird deterrent gear information for a particular vessel.

Column Name	Type	Size	Null	Comment
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identifier (foreign key)
DATA_SOURCE	VARCHAR2	7	N	datasource for this record
TORI_POLE	VARCHAR2	1	Y	Does the vessel use a Tori Pole?
BAIT_THROWER	VARCHAR2	1	Y	Does the vessel have an automated bait thrower?
MAGNET_BIRD_DETER	VARCHAR2	1	Y	Does the vessel have a magnetic seabird deterrent device?
HYD_HAULER	VARCHAR2	1	Y	Does the vessel have a hydraulic line hauler?
HYD_THROWER	VARCHAR2	1	Y	Does the vessel have a hydraulic line thrower?
MLINE_LENGTH	NUMBER	3.0	Y	Length of the mainline rope (in kilometres)
MLINE_MATERIAL	VARCHAR2	2	Y	material mainline is made from
MLINE_DIAMETER	NUMBER	4.1	Y	Diameter of mainline
FLINE_MATERIAL	VARCHAR2	2	Y	material floatlines are made from
FLINE_LENGTH1	NUMBER	2.0	Y	length of one type of floatlines (in metres)
FLINE_LENGTH2	NUMBER	2.0	Y	length of second type of floatlines (in metres)
BIRDPOLE_LENGTH	NUMBER	3.0	Y	Bird pole length (in metres)
BIRDPOLE_MATERIAL	VARCHAR2	20	Y	Bird pole material
BIRDPOLE_POSITION	VARCHAR2	20	Y	Bird pole position
BIRDLINE_LENGTH	NUMBER	3.0	Y	bird line length (in metres)
BIRDLINE_MATERIAL	VARCHAR2	20	Y	bird line material
BIRDLINE_DIAMETER	NUMBER	2.0	Y	birdline diameter (in mm)
BIRDSTRMR_LENGTH	NUMBER	3.0	Y	bird streamer length (in metres)
BIRDSTRMR_MATERIAL	VARCHAR2	20	Y	bird streamer material
BIRDSTRMR_DIAMETER	NUMBER	2.0	Y	bird streamer diameter (in mm)
BIRDSTRMR_COLOUR	VARCHAR2	1	Y	bird streamer colour

BIRDSTRMR_DISTANCE	NUMBER	4.1	Y	bird streamer distance apart (in metres)
BRLINE_LENGTH	NUMBER	2.0	Y	Branch line length
BRLINE_MATERIAL	VARCHAR2	2	Y	the material the branch line is made from
BIRDPOLE_HT1	NUMBER	3.1	Y	first height of the bird pole
BIRDPOLE_HT2	NUMBER	3.1	Y	second height of the bird pole
VESSEL_ID	NUMBER	6.0	Y	
BIRDPOLE_ANGLE	NUMBER	3.0	Y	
BIRDLINE_COLOUR	VARCHAR2	1	Y	
BIRDSTRMR_NUMBER	NUMBER	3.0	Y	

## 19.2.14 LOGBOOK\_ASSESSMENT

Details on how well fishing operation data is recorded in the logbooks

Column Name	Type	Size	Null	Comment
CRUISE_ID	NUMBER	38.10	N	Unique UDE number assigned this cruise.
DATA_SOURCE	VARCHAR2	7	N	The code for the source of the data eg AFO9404
ACY_POSN	VARCHAR2	1	Y	Accuracy of position information
ACY_GEAR	VARCHAR2	1	Y	Accuracy of gear details (no. hooks, etc)
ACY_SPECIES	VARCHAR2	1	Y	Accuracy of species identification
ACY_SIZE	VARCHAR2	1	Y	Accuracy of size gradings information (SBT only)
ACY_BYCATCH	VARCHAR2	1	Y	Accuracy of bycatch information
ACY_MATHS	VARCHAR2	1	Y	Accuracy of mathematics/book-keeping used in lobook
ACY_WEIGH_EQP	VARCHAR2	1	Y	Accuracy of weighing equipment
ACY_WPROC_TUNA	VARCHAR2	1	Y	Accuracy of weighing procedure tuna
ACY_WPROC_OTHER	VARCHAR2	1	Y	Accuracy of weighing procedure other species
ACY_MEAS_EQP	VARCHAR2	1	Y	Accuracy of measuring equipment (SBT only)
ACY_MPROC	VARCHAR2	1	Y	Accuracy of measuring procedure (SBT only)
ACY_ALLREC	VARCHAR2	1	Y	were all species required by AFZ log recorded?
MEAS_EQP_PRIME	VARCHAR2	1	Y	Type of primary measuring equipment
MEAS_EQP_SEC	VARCHAR2	1	Y	Type of secondary measuring equipment
MEAS_EQP_OTHER	VARCHAR2	20	Y	Type of other measuring equipment
WEIGH_EQP_PRIME	VARCHAR2	1	Y	Type of primary weighing equipment
WEIGH_EQP_SEC	VARCHAR2	1	Y	Type of secondary weighing equipment
WEIGH_EQP_OTHER	VARCHAR2	20	Y	Type of other weighing equipment
WEQP_LOC_PRIME	VARCHAR2	1	Y	Location of weighing equipment
WEQP_LOC_OTHER	VARCHAR2	20	Y	Other location of weighing equipment
DEHYD_SMALL	NUMBER	2.0	Y	Freezer dehydration deduction for small tuna
DEHYD_MED	NUMBER	2.0	Y	Freezer dehydration deduction for medium tuna
DEHYD_LARGE	NUMBER	2.0	Y	Freezer dehydration deduction for large tuna
DTOB_INTERCOM	VARCHAR2	1	Y	Information passed from deck to bridge by intercom periodically?
DTOB_HANDSIG	VARCHAR2	1	Y	Information passed from deck to bridge by hand signals periodically?
DTOB_CREWMAN	VARCHAR2	1	Y	Information passed from deck to bridge by crewman periodically?
DTOB_ICEMASTER	VARCHAR2	1	Y	Information passed from deck to bridge by icemaster who records and transfers later?
DTOB_OTHER	VARCHAR2	30	Y	Information passed from deck to bridge by other method
ACYSIMULT_LABELS	VARCHAR2	1	Y	Accuracy of Information on several fish landed simultaneously is ensured by labels?
ACYSIMULT_NUMBERS	VARCHAR2	1	Y	Accuracy of Information on several fish landed simultaneously is ensured by numbers scratched on the operculum?
ACYSIMULT_ICEMASTER	VARCHAR2	1	Y	Accuracy of Information on several fish landed simultaneously is ensured by icemaster maintains fish in order during processing?
ACYSIMULT_SUSPECT	VARCHAR2	1	Y	Accuracy of Information on several fish landed simultaneously is ensured by no apparent method - data od large hauls is suspect?
ACYSIMULT_OTHER	VARCHAR2	30	Y	Accuracy of Information on several fish landed simultaneously is ensured by other method
LENGTH_MEAS_COMMENTS	VARCHAR2	255	Y	Comments on the equipment and procedures used to measure fish length (RTMP Observers only)
WEIGHT_MEAS_COMMENTS	VARCHAR2	255	Y	Comments on the equipment and procedures used to measure fish weight (RTMP Observers only)

## 19.2.15 OBS\_PERIOD

Information on the times that the observer was actually on deck during a

fishing operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	9.0	N	Unique identifier for a Fishing Operation (foreign key)
OBS_PERIOD_NUM	NUMBER	1.0	N	The observer period number (1 - 3)
DATA_SOURCE	VARCHAR2	7	N	datasource for this record
START_BEACON	NUMBER	2.0	Y	Number of beacon hauled prior to commencing observation period
START_TIME	VARCHAR2	6	Y	Time of commencing observation period
START_LAT	NUMBER	13.5	Y	Latitude of commencing observation period
START_LON	NUMBER	13.5	Y	Longitude of commencing observation period
END_BEACON	NUMBER	2.0	Y	Number of last Beacon hauled prior to termination of observation period
END_TIME	VARCHAR2	6	Y	Time of termination of observation period
END_LAT	NUMBER	13.5	Y	Latitude of termination of observation period
END_LON	NUMBER	13.5	Y	Longitude of termination of observation period
START_TIME2	DATE	7	Y	
END_TIME2	DATE	7	Y	

## 19.2.16 OBS\_SNOOD

Information on the observed snoods of a particular vessel used during a fishing operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	9.0	N	Unique identifier for a fishing operation (foreign key)
SNOOD_NUM	NUMBER	2.0	N	The snood number (1 - 12)
DATA_SOURCE	VARCHAR2	7	N	datasource for this record
SNOOD_CODE	VARCHAR2	1	N	The snood code of this record for the vessel eg A, B, C
BAIT	VARCHAR2	15	Y	Type of bait used on snood
BAIT_SIZE	VARCHAR2	1	Y	Size of bait on snood
WEIGHT	NUMBER	4.0	Y	Weight (in grams) placed on snood, if weighted
WEIGHT_DIST	NUMBER	3.0	Y	If weighted, distance of weight on first snood (in metres)

## 19.2.17 OCRUISE

The summary of an Observer Cruise - only AFMA and RTMP observer data is stored in this table Added Total\_Hooks\_Pas and Days\_Obs\_Pas

Column Name	Type	Size	Null	Comment
CRUISE_ID	NUMBER	38.10	N	Unique UDE number assigned this cruise.
VESSEL_REC_NUM	NUMBER	6.0	Y	Current vessel info: Ref to Vessel_Register Table
DATA_SOURCE	VARCHAR2	7	N	The code for the source of the data eg AFO9404
OBSERVER	VARCHAR2	3	N	Observer code of the Observer
START_DATE	DATE	7	N	Observer Boarding date
START_TIME	VARCHAR2	4	Y	Observer boarding time
START_LAT	NUMBER	13.5	Y	Observer boarding latitude (degrees)
START_LON	NUMBER	13.5	Y	Observer boarding longitude (degrees)
BOARD_METHOD	VARCHAR2	1	Y	Observer boarding Method
END_DATE	DATE	7	N	Disembarkment date
END_TIME	VARCHAR2	4	Y	Disembarkment time
END_LAT	NUMBER	13.5	Y	Disembarkment Latitude (degrees)
END_LON	NUMBER	13.5	Y	Disembarkment Longitude (degrees)
DISEM_METHOD	VARCHAR2	1	Y	Disembarkment method
TOTAL_HOOKS	NUMBER	6.0	Y	Total hooks hauled while observer on board
TOTAL_HOOKS_OBS	NUMBER	6.0	Y	Total Hooks actually observed
TOTAL_DAYS	NUMBER	3.0	Y	Total days the observer was on board the vessel
DAYS_FISH	NUMBER	3.0	Y	Total number of days the vessel spent fishing while the observer was on
DAYS_OBS	NUMBER	3.0	Y	Number of days (hauls) that the observer collected data on the vessel's operation and catch
DAYS_STEAM	NUMBER	2.0	Y	Number of days spent steaming whilst observer was on board
DAYS_BKDN	NUMBER	2.0	Y	Number of days lost due to breakdown while observer was on board
DAYS_WEATHER	NUMBER	2.0	Y	Number of days lost due to bad weather while the observer was on board
TIME_ZONE	NUMBER	2.0	Y	time zone used to record hours (GMT + nn hours)
GENERAL_AREA	VARCHAR2	2	Y	general area of fishing activity while observer was on board
HOME_DEPART	DATE	7	Y	date when the vessel departed its home port
HOME_RETURN	DATE	7	Y	date when the observer will return to its home port

TOTAL_HOOKS_PAS	NUMBER	6.0	Y	Total hooks hauled while observer passively observed
DAYS_OBS_PAS	NUMBER	2.0	Y	Number of days (hauls) that the observer passively observed
VESSEL_ID	NUMBER	6.0	Y	Current vessel ID: Ref to VESSEL and VESSEL_HISTORY tables

## 19.2.18 ROBS\_CATCH\_INDIVIDUAL

Details on individual fish caught in a Fishing Operation.

Column Name	Type	Size	Null	Comment
FOP_KEY	NUMBER	6.0	N	Numeric Foreign Key (see FOP table)
OPERATION_DATE	DATE	7	N	Duplicated from the FOP table
VESSEL_REC_NUM	VARCHAR2	6	N	Duplicated from the FOP table
DATA_SOURCE	VARCHAR2	7	N	Source of this data
FISH_SEQ_NO	NUMBER	3.0	N	Sequence number within this FOP FOP_Key + FSN = Key
SPECIES_CODE	VARCHAR2	3	Y	Standard TLA for species (SPECIES_CODES table)
ORIG_SPECIES_CODE	VARCHAR2	6	Y	Code from original data if not standard code
BEACON_NUM	VARCHAR2	2	Y	number of last beacon observed landed prior to each record
LANDING_TIME	VARCHAR2	6	Y	Time of landing this fish
LIFE_STATUS	VARCHAR2	1	Y	The life status of this fish upon landing
RETAINED	VARCHAR2	1	Y	Is the fish retained or trashed?
DAMAGE	VARCHAR2	1	Y	tag or scar present, net damage
SEX_CODE	VARCHAR2	1	Y	Sex code (see CODES table)
LENGTH	NUMBER	3.0	Y	LCF (Caudal fork) length (cm). MUST BE LCF.
LENGTH_OTH1	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH1_CODE	VARCHAR2	3	Y	code for alternate length
LENGTH_OTH2	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH2_CODE	VARCHAR2	3	Y	code for alternate length
LENGTH_OTH3	NUMBER	3.0	Y	non-LCF or additional measurement length (cm)
LENGTH_OTH3_CODE	VARCHAR2	3	Y	code for alternate length
WWEIGHT	NUMBER	38.10	Y	Weight of whole fish before processing
WWEIGHT_CODE	VARCHAR2	2	Y	Code for derivation of whole weight
DWEIGHT	NUMBER	38.10	Y	Dressed or Processed Weight
DWEIGHT_CODE	VARCHAR2	2	Y	Type of processing (e.g. Whole, TRunked, etc)
SAMPLE_KEY	NUMBER	38.10	Y	Key to SAMPLES table Set by sequence SEQ_UDE_SAMPLES
COMMENTS	VARCHAR2	30	Y	
COHORT_8	NUMBER	2.0	Y	
AGE_CODE_8	VARCHAR2	1	Y	
COHORT_10	NUMBER	2.0	Y	
AGE_CODE_10	VARCHAR2	1	Y	
COHORT_11	NUMBER	2.0	Y	
AGE_CODE_11	VARCHAR2	1	Y	
HOOK_NUMBER	NUMBER	4.0	Y	

## 19.2.19 ROBS\_FOP

Fishing Operation Table uniquely describes single fishing operation with data recorded by an observer

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	Initial date of operation (AFZ, RTMP)
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identity number (in VESSEL_REGISTER) (AFZ, RTMP)
FOP_KEY	NUMBER	9.0	Y	Internal primary key (Sequence: seq_fop_key) (AFZ, RTMP)
VES_FOP_KEY	NUMBER	9.0	Y	Pointer to the corresponding Vessel logbook sourced FOP record (AFZ, RTMP)
ACTIVITY_CODE	VARCHAR2	3	N	Vessel Activity, e.g. fishing/not fishing/in port/bad weather.. (AFZ, RTMP)
CRUISE_ID	NUMBER	6.0	Y	Cruise id number in CRUISE table (Unique UDE sequence) (AFZ, RTMP)
CRUISE_NUM	VARCHAR2	10	Y	Alphanumeric cruise identifier eg DDMMYY<callsign> or RTMP9413 (AFZ, RTMP)
FISHING_METHOD_CODE	VARCHAR2	2	Y	Gear and Deployment Methodology used for this FOP (AFZ, RTMP)
AGENCY	VARCHAR2	8	Y	Data source for this record (see AGENCY table) (AFZ, RTMP)
PROJECT_CODE	VARCHAR2	9	N	Code taken from PROJECT table (AFZ, RTMP)
DATA_SOURCE	VARCHAR2	7	N	Source, year and part no of data (AFZ, RTMP)
OPERATION_LAT	NUMBER	13.5	Y	reported normative operation pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
OPERATION_LON	NUMBER	13.5	Y	reported normative operation pos longitude in seconds, S<0, N>0 (AFZ, RTMP)

Field Name	Field Type	Length	Nullable	Description
STATISTICAL_AREA	NUMBER	8.0	Y	Australian SBT statistical area derived from operation pos (AFZ, RTMP)
POS_DERIVED_CODE	VARCHAR2	3	Y	derivation code for normative pos (AFZ, RTMP)
NOON_LAT	NUMBER	13.5	Y	vessel reported noon pos latitude in seconds, W<0, E>0 (RTMP)
NOON_LON	NUMBER	13.5	Y	vessel reported noon pos longitude in seconds, S<0, N>0 (RTMP)
S_SET_LAT	NUMBER	13.5	Y	reported start set pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
S_SET_LON	NUMBER	13.5	Y	reported start set pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
E_SET_LAT	NUMBER	13.5	Y	reported end set pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
E_SET_LON	NUMBER	13.5	Y	reported end set pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
S_HAUL_LAT	NUMBER	13.5	Y	reported start haul pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
S_HAUL_LON	NUMBER	13.5	Y	reported start haul pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
E_HAUL_LAT	NUMBER	13.5	Y	reported end haul pos latitude in seconds, W<0, E>0 (AFZ, RTMP)
E_HAUL_LON	NUMBER	13.5	Y	reported end haul pos longitude in seconds, S<0, N>0 (AFZ, RTMP)
SET_DISTANCE	NUMBER	6.1	Y	distance traveled start-to-finish for set and haul (AFZ, RTMP)
S_SET_TIME	DATE	7	Y	reported start set pos date-time (AFZ, RTMP)
E_SET_TIME	DATE	7	Y	reported end set pos date-time (AFZ, RTMP)
S_HAUL_TIME	DATE	7	Y	reported start haul pos date-time (AFZ, RTMP)
E_HAUL_TIME	DATE	7	Y	reported end haul pos date-time (AFZ, RTMP)
OPERATION_TIME	DATE	7	Y	normative pos date-time (AFZ, RTMP)
S_SET_SST	NUMBER	3.1	Y	Start set Sea Surface Temperature (AFZ, RTMP)
E_SET_SST	NUMBER	3.1	Y	End set Sea Surface Temperature (AFZ, RTMP)
S_HAUL_SST	NUMBER	3.1	Y	Start Haul Sea Surface Temperature (AFZ, RTMP)
E_HAUL_SST	NUMBER	3.1	Y	End Haul Sea Surface Temperature (AFZ, RTMP)
WIND_DIR	NUMBER	3.0	Y	Wind Direction (degrees) (AFZ, RTMP)
WIND_SPEED	NUMBER	2.0	Y	Wind speed (Beaufort wind scale) (AFZ, RTMP)
PRESSURE	NUMBER	4.0	Y	barometer pressure reading (Hectopascals) (AFZ, RTMP)
PRESSURE_TREND	VARCHAR2		Y	Barometer trend (rising or falling) (AFZ)
SEA_DIR	NUMBER	3.0	Y	sea Direction (degrees) (AFZ, RTMP)
SEA_HEIGHT	NUMBER	2.0	Y	Sea Height (metres) (AFZ, RTMP)
AIR_TEMP	NUMBER	4.1	Y	ambient air temperature (Celcius) (AFZ, RTMP)
SEA_TEMP	NUMBER	4.1	Y	Sea surface temperature (Celcius) (AFZ)
SWELL_DIR	NUMBER	3.0	Y	swell direction (degrees) (AFZ, RTMP)
SWELL_HEIGHT	NUMBER	2.0	Y	swell height (Metres) (AFZ, RTMP)
CLOUD_COVER	NUMBER	1.0	Y	Cloud cover (eights) (AFZ, RTMP)
WEATHER_TIME	VARCHAR2	4	Y	Time of recording weather details (AFZ)
SET_PATTERN	VARCHAR2	2	Y	Description of set shape (AFZ, RTMP)
SET_SPEED	NUMBER	4.1	Y	Setting speed of vessel (knots) (AFZ, RTMP)
ENGINE_RPM	NUMBER	3.0	Y	Main engine RPM during set (AFZ)
LT_SPEED	NUMBER	4.1	Y	Line Thrower speed (m/s) (AFZ)
TIMER	NUMBER	4.1	Y	Interval between beeps on setting timer (seconds) (AFZ)
MIN_HOOK_D	NUMBER	3.0	Y	Minimum hook depth (metres) (AFZ, RTMP)
MAX_HOOK_D	NUMBER	3.0	Y	Depth of deepest hook (metres) (AFZ, RTMP)
HOOKS_BUOY	NUMBER	2.0	Y	Number of hooks per bouy (AFZ, RTMP)
DISTANCE_BUOYS	NUMBER	3.0	Y	Distance between bouys (metres) (AFZ, RTMP)
DISTANCE_SNOOD	NUMBER	3.0	Y	Distance between snoods (metres) (AFZ, RTMP)
OBSREC_HOOK_CNT	NUMBER	6.0	Y	number of hooks in shot (recorded by observer) (AFZ, RTMP)
VESREC_HOOK_CNT	NUMBER	6.0	Y	number of hooks in shot (recorded by vessel) (AFZ, RTMP)
OBSREC_BASKET_CNT	NUMBER	6.0	Y	number of baskets in shot (recorded by observer) (AFZ, RTMP)
VESREC_BASKET_CNT	NUMBER	6.0	Y	number of baskets in shot (recorded by Vessel) (AFZ, RTMP)
OBSREC_BEACON_CNT	NUMBER	6.0	Y	number of beacons in shot (recorded by observer) (AFZ, RTMP)
OBSERVER_ON_BOARD	VARCHAR2	3	Y	Code of Observer on board ship when FOP was taken (AFZ, RTMP)
HOOK_CNT	NUMBER	6.0	Y	Total hooks observed (AFZ, RTMP)
CATCH_CNT	NUMBER	6.0	Y	Total observed fish of all species caught in this haul (AFZ, RTMP)
SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul (AFZ, RTMP)
SBT_WWEIGHT_TOT	NUMBER	8.2	Y	Total whole weight of SBT caught in this haul (AFZ, RTMP)
SBT_WWEIGHT_CNT	NUMBER	6.0	Y	Total count of SBT measured for wh. weight (AFZ, RTMP)
SBT_WWEIGHT_CODE	VARCHAR2	2	Y	Code describing method observer used to derive WWeight (AFZ, RTMP)
VESREC_SBT_CNT	NUMBER	6.0	Y	Total SBT caught in this haul (vessel records) (AFZ, RTMP)
VESREC_SBT_WWEIGHT_TO	NUMBER	8.2	Y	Total whole weight SBT caught in this haul (vessel records) (AFZ,
VESREC_SBT_WWEIGHT_CN	NUMBER	6.0	Y	Count of SBT measured for whole weight (vessel records) (AFZ, RTMP)
VESREC_SBT_WWEIGHT_CO	VARCHAR2	2	Y	Code describing method for deriving WWeight (vessel records) (AFZ,
TORI_POLE	VARCHAR2		Y	Tori pole in use today? (AFZ)
BAIT_THROWER	VARCHAR2		Y	Bait thrower in use today? (AFZ)
MAGNET_DETER	VARCHAR2		Y	Magnetic seabird deterrent device used today? (AFZ)
BAIT_THAWING	VARCHAR2	1	Y	How was the bait thawing routine today? (AFZ)
ALBALTROSS_CNT	VARCHAR2	2	Y	Estimated albatrosses during setting observations (AFZ)

OTHER_CNT	VARCHAR2	3	Y	Estimated number of other birds during line setting observation (AFZ)
BWIND_SPEED	NUMBER	2.0	Y	Wind speed during bird observations (AFZ)
BSEA_HEIGHT	NUMBER	2.0	Y	Sea height during bird observations (AFZ)
BSWELL_HEIGHT	NUMBER	2.0	Y	Swell height during bird observations (AFZ)
BMOON_LITE	VARCHAR2	1	Y	Moonlight during bird observations (AFZ)
BSTART_TIME	VARCHAR2	4	Y	Start time for recording bird observations (AFZ)
BEND_TIME	VARCHAR2	4	Y	End time for recording bird observations (AFZ)
TIME_ZONE	NUMBER	2.0	Y	
OBS_HOOKS_T	NUMBER	4.0	Y	
HAUL_DIR	VARCHAR2	1	Y	

## 19.2.20 ROBS\_SAMPLE

Detail table for Observer biological samples

Column Name	Type	Size	Null	Comment
SAMPLE_KEY	NUMBER	6.0	N	Unique key taken from sequence SEQ_UDE_SAMPLES
LABELNO	VARCHAR2	6	Y	Label number of this sample
SAMPLE_CODE	VARCHAR2	2	N	Code for type of sample taken
SAMPLE_CNT	NUMBER	2.0	N	Number of samples taken with this label number
DATA_SOURCE	VARCHAR2	7	N	Data distribution source
FOP_KEY	NUMBER	9.0	N	Foreign key link to fishing operation
FISH_SEQ_NO	NUMBER	6.0	N	FSN (Foreign key link to individual fish)

## 19.2.21 SNOOD

Information on the snoods of a particular vessel. Included with the fishing gear information.

Column Name	Type	Size	Null	Comment
VESSEL_REC_NUM	NUMBER	6.0	N	Unique vessel identifier (foreign key)
DATA_SOURCE	VARCHAR2	7	N	datasource for this record
SNOOD_CODE	VARCHAR2	1	N	The snood code of this record for the vessel eg A, B, C
BRANCHL_LENGTH	NUMBER	2.0	Y	The branch line length
BRANCHL_MATERIAL	VARCHAR2	2	Y	The branch line material
BRANCHL_COLOUR	VARCHAR2	1	Y	The branch line Colour
SEKIYAMA_LENGTH	NUMBER	2.0	Y	The sekiyama length
SEKIYAMA_MATERIAL	VARCHAR2	2	Y	The sekiyama material
LEADER_LENGTH	NUMBER	2.0	Y	The leader length
LEADER_MATERIAL	VARCHAR2	2	Y	The leader material
LEADER_BRKSTRN	NUMBER	3.0	Y	The leader breaking strain
TOTAL_LENGTH	NUMBER	5.0	Y	The total snood length
SNOOD_COMMENT	VARCHAR2	20	Y	Comment of the snood
VESSEL_ID	NUMBER	6.0	Y	

## 19.2.22 TUNA\_PROCESSING

Information on the methods employed in the processing of tuna.

Column Name	Type	Size	Null	Comment
CRUISE_ID	NUMBER	6.0	N	foreign key link to OCRUISE table
DATA_SOURCE	VARCHAR2	7	N	The source of this data
KILL_IKI	VARCHAR2	1	Y	Method of killing - iki-jima
KILL_TAN	VARCHAR2	1	Y	Method of killing - tanigichi
KILL_OTHER	VARCHAR2	1	Y	Method of killing - other
KILL_OTHER_DESC	VARCHAR2	20	Y	Method of killing - other description
KILL_NONE	VARCHAR2	1	Y	Method of killing - none
BLCUT_TAIL	VARCHAR2	1	Y	Bleeding cuts - tail cut
BLCUT_PECT	VARCHAR2	1	Y	Bleeding cuts - pectoral fins recess cut
BLCUT_GILL	VARCHAR2	1	Y	Bleeding cuts - gill arch cut
BLCUT_AORTA	VARCHAR2	1	Y	Bleeding cuts - aorta cut
BLCUT_OTHER	VARCHAR2	1	Y	Bleeding cuts - other
BLCUT_OTHER_DESC	VARCHAR2	20	Y	Bleeding cuts - other description
BLCUT_NONE	VARCHAR2	1	Y	Bleeding cuts - none
BLLIVE_BATH	VARCHAR2	1	Y	Method of bleeding live fish - bath

BLLIVE_SHOWER	VARCHAR2	1	Y	Method of bleeding live fish - shower
BLLIVE_HOSE	VARCHAR2	1	Y	Method of bleeding live fish - hose through operculum
BLLIVE_OTHER	VARCHAR2	1	Y	Method of bleeding live fish - other
BLLIVE_OTHER_DESC	VARCHAR2	20	Y	Method of bleeding live fish - other description
BLLIVE_NONE	VARCHAR2	1	Y	Method of bleeding live fish - none
BLDEAD_BATH	VARCHAR2	1	Y	Method of bleeding dead fish - bath
BLDEAD_SHOWER	VARCHAR2	1	Y	Method of bleeding dead fish - shower
BLDEAD_HOSE	VARCHAR2	1	Y	Method of bleeding dead fish - hose through operculum
BLDEAD_OTHER	VARCHAR2	1	Y	Method of bleeding dead fish - other
BLDEAD_OTHER_DESC	VARCHAR2	20	Y	Method of bleeding dead fish - other description
BLDEAD_NONE	VARCHAR2	1	Y	Method of bleeding dead fish - none
COMMENTS	VARCHAR2	30	Y	comments

### 19.2.23 VCREW

Crew information of a particular vessel - details on captains and fishing masters experience as well.

Column Name	Type	Size	Null	Comment
VESSEL_REC_NUM	NUMBER	6.0	N	
DATA_SOURCE	VARCHAR2	7	N	
CAPT_LNAME	VARCHAR2	30	Y	Captains Lastname
CAPT_FNAME	VARCHAR2	15	Y	Captains First name
CAPT_EXP_SBT	NUMBER	2.0	Y	Captains SBT longlining experience (yrs)
CAPT_EXP_YFT	NUMBER	2.0	Y	Captains YFT longlining experience (yrs)
CAPT_EXP_BET	NUMBER	2.0	Y	Captains BET longlining experience (yrs)
CAPT_EXP_TOTAL	NUMBER	2.0	Y	Captains Total longlining experience (yrs)
FMAST_LNAME	VARCHAR2	30	Y	Fishing Masters first name
FMAST_FNAME	VARCHAR2	15	Y	Fishing Masters last name
FMAST_EXP_SBT	NUMBER	2.0	Y	Fishing masters SBT longlining experience (yrs)
FMAST_EXP_YFT	NUMBER	2.0	Y	Fishing Masters YFT longlining experience (yrs)
FMAST_EXP_BET	NUMBER	2.0	Y	Fishing Masters BETT longlining experience (yrs)
FMAST_EXP_TOTAL	NUMBER	2.0	Y	Fishing Masters Total longlining experience (yrs)
TOTAL_CREW	NUMBER	3.0	Y	Total crew size
VESSEL_ID	NUMBER	6.0	Y	

## 19.3 Aggregated Catch-and-effort data tables

### 19.3.1 CE\_JPN

The aggregated Japanese fleet catch-and-effort data taken from the "Yellow Book".

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	The date of the first day in the month of the catch
OPERATION_LAT	NUMBER	13.5	N	Latitude of northern border of the 5-degree grid
OPERATION_LON	NUMBER	13.5	N	Longitude of western border of the 5-degree grid
STATISTICAL_AREA	NUMBER	2.0	Y	The SBT statistical area of the catch
DATA_SOURCE	VARCHAR2	7	N	The source of the data
SET_CNT	NUMBER	4.0	Y	Number of longline sets
HOOK_CNT	NUMBER	7.0	Y	Number of hooks set
NBT_CNT	NUMBER	5.0	Y	Northern Bluefin Tuna catch count
SBT_CNT	NUMBER	5.0	Y	Southern Bluefin Tuna catch count
ALB_CNT	NUMBER	5.0	Y	Albacore Tuna catch count
BET_CNT	NUMBER	5.0	Y	Big Eye Tuna catch count
YFT_CNT	NUMBER	5.0	Y	Yellowfin Tuna catch count
SKJ_CNT	NUMBER	5.0	Y	Skipjack catch count
STM_CNT	NUMBER	5.0	Y	Striped Marlin catch count
BUM_CNT	NUMBER	5.0	Y	Blue Marlin catch count
BAM_CNT	NUMBER	5.0	Y	Black Marlin catch count
BBL_CNT	NUMBER	5.0	Y	Broadbill Swordfish catch count
SLF_CNT	NUMBER	5.0	Y	Sailfish and Shortbilled Spearfish catch count
OPERATION_TYPE	NUMBER	1.0	N	Type of operation, all are 1 (Japan based)
VESSEL_SIZE	NUMBER	1.0	N	Size of the vessel in gross tonnes, 1=20-49, 2=50-99, 3=100-199,
BAIT_USED	NUMBER	1.0	N	Type of bait used, 1=Mackerel, 2=squid, 3=other,mixed
COVERAGE	VARCHAR2	1	Y	unused partial data is stored in CE_JPN_PARTIAL
SBT_REL_CNT	NUMBER	5.0	Y	Southern Bluefin Tuna caught but released (up to 25 kg)

### 19.3.2 CE\_JPN\_PARTIAL

Partial years data that is replaced the following year. The aggregated Japanese fleet catch-and-effort data taken from the "Yellow Book".

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	The date of the first day in the month of the catch
OPERATION_LAT	NUMBER	13.5	N	Latitude of northern border of the 5-degree grid
OPERATION_LON	NUMBER	13.5	N	Longitude of western border of the 5-degree grid
STATISTICAL_AREA	NUMBER	2.0	Y	The SBT statistical area of the catch
DATA_SOURCE	VARCHAR2	7	N	The source of the data
SET_CNT	NUMBER	4.0	Y	Number of longline sets
HOOK_CNT	NUMBER	7.0	Y	Number of hooks set
NBT_CNT	NUMBER	5.0	Y	Northern Bluefin Tuna catch count
SBT_CNT	NUMBER	5.0	Y	Southern Bluefin Tuna catch count
ALB_CNT	NUMBER	5.0	Y	Albacore Tuna catch count
BET_CNT	NUMBER	5.0	Y	Big Eye Tuna catch count
YFT_CNT	NUMBER	5.0	Y	Yellowfin Tuna catch count
SKJ_CNT	NUMBER	5.0	Y	Skipjack catch count
STM_CNT	NUMBER	5.0	Y	Striped Marlin catch count
BUM_CNT	NUMBER	5.0	Y	Blue Marlin catch count
BAM_CNT	NUMBER	5.0	Y	Black Marlin catch count
BBL_CNT	NUMBER	5.0	Y	Broadbill Swordfish catch count
SLF_CNT	NUMBER	5.0	Y	Sailfish and Shortbilled Spearfish catch count
OPERATION_TYPE	NUMBER	1.0	N	Type of operation, all are 1 (Japan based)
VESSEL_SIZE	NUMBER	1.0	N	Size of the vessel in gross tonnes, 1=20-49, 2=50-99, 3=100-199,
BAIT_USED	NUMBER	1.0	N	Type of bait used, 1=Mackerel, 2=squid, 3=other,mixed
COVERAGE	VARCHAR2	1	Y	Unused. Partial data is stored in CE_JPN_PARTIAL_PARTIAL
SBT_REL_CNT	NUMBER	5.0	Y	



### 19.3.3 INDONESIA\_LF

Indonesian catch at length from Tim Davis

Column Name	Type	Size	Null	Comment
YEAR	NUMBER	4.0	N	catch year
MONTH	NUMBER	2.0	Y	catch month
LENGTH	NUMBER	3.0	Y	fork length
COHORT	NUMBER	2.0	Y	cohort age

### 19.3.4 LF\_JPN

The Japanese fleet SBT sampling data on an 5x5 (pre 92) and 5x10 basis

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	The date of the first day in the quarter of the sample
LAT	NUMBER	13.5	N	Latitude of northern border of the 5x10-degree grid
LON	NUMBER	13.5	N	Longitude of western border of the 5x10-degree grid
LAT_55	NUMBER	13.5	Y	Latitude of northern border of the 5x5-degree grid
LON_55	NUMBER	13.5	Y	Longitude of western border of the 5x5-degree grid
STATISTICAL_AREA	NUMBER	2.0	N	The SBT statistical area of the catch
DATA_SOURCE	VARCHAR2	7	N	The source of the data
COVERAGE	VARCHAR2		N	Unused. Partial data is stored in LF_JPN_PARTIAL_PARTIAL
L_OR_W	VARCHAR2		N	Is the sample measurement length or weight
MEASURING_UNIT	NUMBER	1.0	N	precision of measurement 1, 2 or 5 cm/kg
SPATIAL_SCALE	NUMBER	1.0	Y	Accuracy of position estimate (pre 1992 data)
VESSEL_TYPE	NUMBER	1.0	Y	Type of vessel measuring SBT
MEASURING_PLACE	NUMBER	1.0	N	Place where measuring took place
REF_NO_CODE	NUMBER	1.0	Y	Reference number code (pre 1992 data)
SAMP_SIZE	NUMBER	5.0	N	the size (length/weight) measured
SAMP_NUMBER	NUMBER	6.0	N	the number measured at this size
COHORT_8	NUMBER	2.0	Y	Age of SBT based on length-age method 8

### 19.3.5 LF\_JPN\_PARTIAL

Contains the partial years data from the Japanese fleet SBT sampling data on an 5x5 (pre 92) and 5x10 basis

Column Name	Type	Size	Null	Comment
OPERATION_DATE	DATE	7	N	The date of the first day in the quarter of the sample
LAT	NUMBER	13.5	N	Latitude of northern border of the 5x10-degree grid
LON	NUMBER	13.5	N	Longitude of western border of the 5x10-degree grid
LAT_55	NUMBER	13.5	Y	Latitude of northern border of the 5x5-degree grid
LON_55	NUMBER	13.5	Y	Longitude of western border of the 5x5-degree grid
STATISTICAL_AREA	NUMBER	2.0	N	The SBT statistical area of the catch
DATA_SOURCE	VARCHAR2	7	N	The source of the data
COVERAGE	VARCHAR2	1	N	Unused. Partial data is stored in LF_JPN_PARTIAL_PARTIAL
L_OR_W	VARCHAR2	1	N	Is the sample measurement length or weight
MEASURING_UNIT	NUMBER	1.0	N	precision of measurement 1, 2 or 5 cm/kg
SPATIAL_SCALE	NUMBER	1.0	Y	Accuracy of position estimate (pre 1992 data)
VESSEL_TYPE	NUMBER	1.0	Y	Type of vessel measuring SBT
MEASURING_PLACE	NUMBER	1.0	N	Place where measuring took place
REF_NO_CODE	NUMBER	1.0	Y	Reference number code (pre 1992 data)
SAMP_SIZE	NUMBER	5.0	N	the size (length/weight) measured
SAMP_NUMBER	NUMBER	6.0	N	the number measured at this size

### 19.3.6 SBT\_LF

Table of aggregated SBT catch at length data from the Australian domestic fishery

Column Name	Type	Size	Null	Comment
PROJECT_CODE	VARCHAR2	8	N	descriptor of project code/data type
DATA_SOURCE	VARCHAR2	8	N	code of agency supplying the data
FLAG_COUNTRY	VARCHAR2	3	N	country code of fishing vessels' flag
QUOTA_COUNTRY	VARCHAR2	3	N	catch/quota country code

OPERATION_TYPE	VARCHAR2	3	N	HSF=high sea, DOM=domestic, JTV=joint venture, BLT=bilateral,
CATCH_YEAR	NUMBER	4.0	N	catch year
TSTRAT	VARCHAR2	1	N	time stratification (D-daily, H-halfmonthly, M-monthly, Q-quarterly,
PERIOD	NUMBER	3.0	N	number of the tstrat interval during which the catch was landed
PERIOD_START	DATE	7	N	
STATISTICAL_AREA	VARCHAR2	3	Y	number of catch area: 0-10 Japanese, 11-14 Australian
LCLASS_WDTH	NUMBER	2.1	Y	width of length class in cm.
LCLASS	NUMBER	3.0	Y	midlength of length class in cm.
CATCH_CNT	NUMBER	10.1	Y	number of fish caught during the tstrat period
CATCH_PWT	NUMBER	10.1	Y	procesed weight of catch (kg) during the tstrat period
CATCH_WWT	NUMBER	10.1	Y	whole weight of catch (kg) during the tstrat period
LENCODE	VARCHAR2	1	Y	type of length data M=measured, W=from weight, U=unkn.
PWTCODE	VARCHAR2	1	Y	type of processed weight data M=measured, W=from wwt., L=from length, U=unkn.
WWTCODE	VARCHAR2	1	Y	type of whole weight data M=measured, P=from pwt., L=from length,
LOAD_DATE	DATE	7	Y	

## 19.4 Tagging program data tables

### 19.4.1 FINDERS

List of tag finders

Column Name	Type	Size	Null	Comment
FINDER_CODE	NUMBER	5.0	N	Unique identifier for each tag finder
FAMILY_NAME	VARCHAR2	20	N	Surname
FIRST_NAME	VARCHAR2	10	Y	Given name
MID_INITIAL	VARCHAR2	1	Y	First middle initial
TITLE	VARCHAR2	3	Y	Mr. Mrs. Prof. Etc.
ADDRESS	VARCHAR2	60	Y	Home address
CITY	VARCHAR2	25	Y	City of address
STATE	VARCHAR2	20	Y	Which state
POSTCODE	VARCHAR2	9	Y	Postcode
COUNTRY	VARCHAR2	3	Y	Country abbreviation

### 19.4.2 RECAPTURES

Tagged fish recapture data

Column Name	Type	Size	Null	Comment
RELEASE_NUMBER	NUMBER	6.0	N	Release number - unique identifier for release record
RECAPTURE_NUMBER	NUMBER	1.0	N	Number of consecutive recapture
PRIMTAG_RECOV	VARCHAR2	1	N	Primary tag recovery code. Codetype:recovery_code
COMPTAG_RECOV	VARCHAR2	1	Y	Companion tag recovery code. Codetype:recovery_code
RECAPTURE_TYPE	VARCHAR2	1	Y	Type of recapture (W - wild, F - farm, B - beached tag).
RECAPTURE_DATE	DATE	7	Y	Date of recapture
RECAPT_DATEQUAL	VARCHAR2	1	Y	Recapture date quality. Codetype:date_quality
RECAPTURE_LAT_DEG	NUMBER	2.0	Y	Recapture latitude - degrees
RECAPTURE_LAT_MIN	NUMBER	2.0	Y	Recapture latitude - minutes
RECAPTURE_LAT_CODE	VARCHAR2	1	Y	Latitudal code (S - South, N - North)
RECAPTURE_LON_DEG	NUMBER	3.0	Y	Recapture longitude - degrees
RECAPTURE_LON_MIN	NUMBER	2.0	Y	Recapture longitude - minutes
RECAPTURE_LON_CODE	VARCHAR2	1	Y	Longitudal code (E - East, W - West)
RECAPT_POSQUAL	VARCHAR2	1	Y	Recapture position quality. Codetype:position_quality
DISTANCE_TRVLD	NUMBER	6.1	Y	Long circle distance from release to recapture. Calculated field.
RECAPTURE_LENGTH	NUMBER	3.0	Y	Length at recapture, cm
RECAPT_LENQUAL	VARCHAR2	1	Y	Recapture length quality code. Codetype:measurement_quality
RECAPT_LENMEASR	VARCHAR2	1	Y	Recapture length measurerer code. Codetype:measurerer_code
RECAPTURE_WHWGHT	NUMBER	4.1	Y	Whole weight at recapture
RECAPT_WHWTQUAL	VARCHAR2	1	Y	Whole weight quality code. Codetype:measurement_quality
RECAPT_WHWTMEASR	VARCHAR2	1	Y	Whole weight measurerer code. Codetype:measurerer_code
RECAPTURE_DRWGHT	NUMBER	4.1	Y	Dressed weight at recapture
RECAPT_DRWTQUAL	VARCHAR2	1	Y	Dressed weight measurement quality code.
RECAPT_DRWTMEASR	VARCHAR2	1	Y	Dressed weight measurerer code. Codetype:measurerer_code
FISH_SEX	VARCHAR2	1	Y	Fish sex
FINDER_CODE	NUMBER	5.0	Y	Code of tag finder. Finder_code in table finders
RECAPT_VESSELCODE	NUMBER	5.0	Y	Code of recapture vessel. Id in vessel table
RECAPTURE_METHOD	VARCHAR2	1	Y	Recapture method code. Codetype:capture_method
OBSERVER_PRESENT	VARCHAR2	1	Y	Flags observer's presence Y/N
WATER_TEMP	NUMBER	3.1	Y	Water temperature
BAIT_USED	VARCHAR2	10	Y	Bait
DEPTH_RANGE	VARCHAR2	10	Y	Depth range
GUT_CONTENT	VARCHAR2	10	Y	Gut content
OTOLITH_CLCTD	VARCHAR2	1	Y	Otoliths collected Y/N
BODY_RETAINED	VARCHAR2	1	Y	Flags if fish retained for examination Y/N
REWARD_GIVEN	VARCHAR2	10	Y	Type of reward sent to the finder
CRTF_PRINTED	VARCHAR2	1	Y	Y if certificate has been printed
TAG_COLLECTOR	VARCHAR2	1	Y	Code of the tag collector (if any). Codetype:tag_collector
RE_RELEASE	VARCHAR2	1	Y	Re-release code. Codetype:re_release_code

ENTRY_DATE	DATE	7	Y	Date of record entry
ENTERED_BY	VARCHAR2	10	Y	Account from which entry was made
LAST_CHANGE	DATE	7	Y	Date of last modification
CHANGED_BY	VARCHAR2	10	Y	Account from which change was made
RECAPTURE_COMMENT	VARCHAR2	255	Y	Notes on fish recapture
TOW_CAGE_ID	NUMBER	6.0	Y	

### 19.4.3 RELEASES

#### SBT tag release data

Column Name	Type	Size	Null	Comment
RELEASE_NUMBER	NUMBER	6.0	N	Unique identifier of release record
PRIMTAG_NUMBER	NUMBER	6.0	N	Primary tag number
PRIMTAG_PREFIX	VARCHAR2	1	Y	Primary tag prefix
PRIMTAG_COLOUR	VARCHAR2	1	N	Primary tag colour
PRIMTAG_SIDE	VARCHAR2	1	Y	Primary tag insertion side
PRIMTAG_INSQUAL	VARCHAR2	1	Y	Primary tag insertion quality. Codetype:insertion_quality
COMPTAG_NUMBER	NUMBER	6.0	Y	Companion tag number
COMPTAG_PREFIX	VARCHAR2	1	Y	Companion tag prefix
COMPTAG_COLOUR	VARCHAR2	1	Y	Companion tag colour
COMPTAG_SIDE	VARCHAR2	1	Y	Companion tag insertion side
COMPTAG_INSQUAL	VARCHAR2	1	Y	Companion tag insertion quality. Codetype:insertion_quality
RELEASE_DATE	DATE	7	Y	Tagging date
RELEASE_TYPE	VARCHAR2	1	Y	Type of release (W - wild, F - farm). Codetype:release_type
SPECIES_CODE	VARCHAR2	3	N	Tagged species code. Codetype:species_code
RELEASE_LENGTH	NUMBER	3.0	Y	Length at tagging in cm
LENQUAL_CODE	VARCHAR2	1	Y	Length measurement quality. Codetype:measurement_quality
COHORT_AGE	NUMBER	2.0	Y	Cohort age of tagged fish. Calculated field.
RELEASE_LAT_DEG	NUMBER	2.0	Y	Tagging latitude - degrees
RELEASE_LAT_MIN	NUMBER	2.0	Y	Tagging latitude - minutes
RELEASE_LAT_CODE	VARCHAR2	1	Y	Latitudal code (S - South, N - North)
RELEASE_LON_DEG	NUMBER	3.0	Y	Tagging longitude - degrees
RELEASE_LON_MIN	NUMBER	2.0	Y	Tagging longitude - minutes
RELEASE_LON_CODE	VARCHAR2	1	Y	Longitudal code (E - East, W - West)
TAGGER_CODE	NUMBER	5.0	Y	Tagger code. Tagger_code from taggers table.
VESSEL_CODE	NUMBER	5.0	Y	Tagging vessel code. ID from vessel table
CAPTURE_METHOD	VARCHAR2	1	Y	Method of fish capture. Codetype:capture_method
FISHCOND_CODE	VARCHAR2	1	Y	Condition of tagged fish (irrespective of tagging).
INJURY_TYPE	VARCHAR2	1	Y	Type of injury suffered during tagging. Codetype:injury_type
INJURY_SIZE	VARCHAR2	1	Y	Size of tagging injury. Codetype:injury_severity
TIME_OOW	NUMBER	3.0	Y	Time out of water, seconds
STRONT_DOSE	NUMBER	2.0	Y	SrCl2 dosage
OXYTET_USED	VARCHAR2	1	Y	Oxytetracycline used flag Y/N
OXYTET_DOSE	NUMBER	3.0	Y	Oxytetracycline dosage
ASEPT_USED	VARCHAR2	1	Y	Antiseptic used flag Y/N
SCHOOL_NUMBER	NUMBER	3.0	Y	Daily school number
RECAPTURE_CNT	NUMBER	1.0	Y	Number of times fish has been recaptured
ENTRY_DATE	DATE	7	Y	Date of record entry
RELEASE_COMMENT	VARCHAR2	100	Y	Notes on release

### 19.4.4 TAGGERS

#### Details on personnel who have tagged fish

Column Name	Type	Size	Null	Comment
TAGGER_CODE	NUMBER	5.0	N	Unique identifier
FAMILY_NAME	VARCHAR2	20	N	Surname
FIRST_NAME	VARCHAR2	10	Y	Given name
MID_INITIAL	VARCHAR2	1	Y	Middle initial
DEXTERITY	VARCHAR2	2	Y	Left/right handed or ambidextrous
EXPERIENCE	NUMBER	5.0	Y	Total number of fish tagged. Calculated field
EXP90S	NUMBER	5.0	Y	

## 19.5 Aerial survey data tables

### 19.5.1 ENV\_INTERVALS

Environmental readings split into sections of transect. Each interval is wholly contained within a block and stratum.

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of survey
PLANE	VARCHAR2	2	N	Plane identity (A or B)
REPLICATE	NUMBER	2.0	N	Replicate of interval
BLOCK	NUMBER	3.1	N	Block number of interval
TRANSECT	NUMBER	2.0	N	Transect number of interval
OBS_DATE	DATE	7	N	Date
START_OBS_TIME	DATE	7	N	Starting time of interval
END_OBS_TIME	DATE	7	N	End time of interval
STRATA	NUMBER	2.0	Y	Stratum of interval
DURATION	NUMBER	10.6	Y	Length of time from start to finish of interval
LENGTH	NUMBER	11.6	Y	Length (NM) of interval
WIND_SPEED	NUMBER	2.0	Y	Wind speed reading
AIR_TEMPERATURE	NUMBER	4.1	Y	Air temperature reading
SEA_SHADE	NUMBER	2.0	Y	Sea shade reading
GLARE_L	NUMBER	2.0	Y	Glare left side of plane
GLARE_C	NUMBER	2.0	Y	Glare centre of plane
GLARE_R	NUMBER	2.0	Y	Glare right side of plane
LOW_CLOUD	NUMBER	2.0	Y	Amount of low cloud
HAZE	NUMBER	2.0	Y	Amount of haze
SWELL	NUMBER	2.0	Y	Amount of sea swell
SEA_TEMPERATURE	NUMBER	4.1	Y	Sea temperature reading

### 19.5.2 ENVIRONMENT

Environmental readings

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	Y	Year of survey
PLANE	VARCHAR2	2	N	Plane identity (A or B)
REPLICATE	NUMBER	2.0	N	Replicate number
BLOCK	NUMBER	3.1	N	Block number
TRANSECT	NUMBER	2.0	N	Transect number
OBS_DATE	DATE	7	N	Date
OBS_TIME	DATE	7	N	Time of observation
ACT_CODE	VARCHAR2	2	Y	Action code
LINE_TYPE	VARCHAR2	4	Y	Type of transect line (NS, ZZ)
WIND_SPEED	NUMBER	2.0	Y	Wind speed reading
AIR_TEMPERATURE	NUMBER	4.1	Y	Air temperature reading
SEA_SHADE	NUMBER	2.0	Y	Amount of sea in shade
GLARE_L	NUMBER	2.0	Y	Glare left of plane
GLARE_C	NUMBER	2.0	Y	Glare centre of plane
GLARE_R	NUMBER	2.0	Y	Glare right of plane
LOW_CLOUD	NUMBER	2.0	Y	Amount of low cloud
HAZE	NUMBER	2.0	Y	Amount of haze
SWELL	NUMBER	2.0	Y	Amount of sea swell
LATITUDE	NUMBER	10.6	Y	Latitude of observation
LONGITUDE	NUMBER	10.6	Y	Longitude of observation

### 19.5.3 SEA\_TEMP\_INTS

Intervals of sea temperature readings with start and end times. Each interval is

contained within one block and stratum

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of survey
PLANE	VARCHAR2	2	N	Plane identity (A or B)
REPLICATE	NUMBER	2.0	N	Replicate number
BLOCK	NUMBER	3.1	N	Block number
TRANSECT	NUMBER	2.0	N	Transect number
STRATA	NUMBER	2.0	Y	Stratum of interval
OBS_DATE	DATE	7	N	Date
START_OBS_TIME	DATE	7	N	Starting time of interval
END_OBS_TIME	DATE	7	N	End time of interval
DURATION	NUMBER	10.6	Y	Length of time of interval
LENGTH	NUMBER	11.6	Y	Length (NM) of interval
TEMPERATURE	NUMBER	4.1	Y	Sea surface temperature reading

### 19.5.4 SEA\_TEMPERATURE

Sea surface temperature readings taken from the plane

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of survey
PLANE	VARCHAR2	2	N	Plane identity (A or B)
OBS_DATE	DATE	7	N	Date
OBS_TIME	DATE	7	N	Time of reading
LATITUDE	NUMBER	10.6	Y	Latitude of reading
LONGITUDE	NUMBER	10.6	Y	Longitude of reading
ALTITUDE	NUMBER	4.0	Y	Altitude of plane when reading was taken
TEMPERATURE	NUMBER	4.1	Y	Sea surface temperature reading
PITCH	NUMBER	3.1	Y	Pitch of plane
OBS_ROW	NUMBER	3.1	Y	

### 19.5.5 SIGHTING

Information on each individual sighting

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of survey
PLANE	VARCHAR2	2	N	Plane identity (A or B)
REPLICATE	NUMBER	2.0	N	Replicate number
BLOCK	NUMBER	3.1	N	Block number
TRANSECT	NUMBER	2.0	N	Transect number
STRATA	NUMBER	2.0	N	Stratum of sighting
STRATA_TRANSECT	NUMBER	2.0	Y	Strata transect of sighting
OBS_DATE	DATE	7	N	Date of observation
OBS_TIME	DATE	7	N	Time of observation
NO_OF_PATCHES	NUMBER	4.0	Y	Number of patches of fish spotted
SCHOOL_SIZE_PILOT	NUMBER	7.2	Y	Size of school estimated by the pilot
SCHOOL_SIZE_SPOTTER	NUMBER	7.2	Y	Size of school estimated by the spotter
FISH_SIZE_PILOT	NUMBER	5.2	Y	Size of fish estimated by the pilot
FISH_SIZE_SPOTTER	NUMBER	5.2	Y	Size of fish estimated by the spotter
LATITUDE	NUMBER	10.6	Y	Latitude of fish
LONGITUDE	NUMBER	10.6	Y	Longitude of fish
DISTANCE	NUMBER	11.6	Y	Perpendicular distance of fish from the transect line
SIGHTING_NO	NUMBER	3.0	Y	Sequential number of the sighting for the day
OBSERVER	VARCHAR2	10	Y	Observer
WAY_POINT_1_LATITUDE	NUMBER	10.6	Y	Latitude of plane when the sighting was first made
WAY_POINT_1_LONGITUD	NUMBER	10.6	Y	Longitude of plane when the sighting was first made
WAY_POINT_2_LATITUDE	NUMBER	10.6	Y	Latitude of plane on the transect line and perpendicular to fish
WAY_POINT_2_LONGITUD	NUMBER	10.6	Y	Longitude of plane on the transect line and perpendicular to fish
WAY_POINT_3_M_S	VARCHAR2	2	Y	Multiple or single sighting
OLD_STRATA	NUMBER	2.0	Y	Stratum number using old boundary definitions
SIDE_OF_PLANE	CHAR	1	Y	Side of plane that the sighting was made from
PATCH_LENGTH	NUMBER	5.1	Y	Length of the patch
PATCH_WIDTH	NUMBER	5.1	Y	Width of the patch

### 19.5.6 STRATA\_SECTIONS

Boundaries of the strata. Each record defines a 4-sided region in 1 block and stratum

Column Name	Type	Size	Null	Comment
BLOCK	NUMBER	3.1	Y	Block of boundary
STRATA	NUMBER	2.0	Y	Stratum of boundary
START_LONGITUDE	NUMBER	9.6	Y	Start longitude of boundary
END_LONGITUDE	NUMBER	9.6	Y	End longitude of boundary
START_LATITUDE_1	NUMBER	9.6	Y	Start latitude of vertical boundary 1
END_LATITUDE_1	NUMBER	9.6	Y	End latitude of vertical boundary 1
START_LATITUDE_2	NUMBER	9.6	Y	Start latitude of vertical boundary 2
END_LATITUDE_2	NUMBER	9.6	Y	End latitude of vertical boundary 2
SLOPE_1	NUMBER	9.6	Y	Slope of horizontal boundary 1
INTERCEPT_1	NUMBER	9.6	Y	Intercept of horizontal boundary 1
SLOPE_2	NUMBER	9.6	Y	Slope of horizontal boundary 2
INTERCEPT_2	NUMBER	9.6	Y	Intercept of horizontal boundary 2

### 19.5.7 STRATA\_TRANSECT

Lengths of transect split into sections that are contained wholly within one

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of Survey
REPLICATE	NUMBER	2.0	N	Replicate of section
BLOCK	NUMBER	3.1	N	Block of section
STRATA_TRANSECT	NUMBER	2.0	N	Strata Transect number
STRATA	NUMBER	2.0	N	Stratum that section is contained within
OBS_DATE	DATE	7	Y	Date
START_OBS_TIME	DATE	7	Y	Start time of section
END_OBS_TIME	DATE	7	Y	End time of section
DURATION	NUMBER	10.6	Y	Length of time from start to end of section
LENGTH	NUMBER	11.6	Y	Length (NM) of section

### 19.5.8 STRATA\_TRANSECT\_SECTIONS

Sections of a transect contained within one stratum

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of Survey
REPLICATE	NUMBER	2.0	N	Replicate of section
BLOCK	NUMBER	3.1	N	Block of section
TRANSECT	NUMBER	2.0	N	Transect number of section
STRATA	NUMBER	2.0	N	Stratum that section is contained within
STRATA_TRANSECT	NUMBER	2.0	Y	Strata transect of section
OBS_DATE	DATE	7	N	Date
START_OBS_TIME	DATE	7	Y	Start time of section
END_OBS_TIME	DATE	7	Y	End time of section
START_LATITUDE	NUMBER	10.6	Y	Start latitude of section
START_LONGITUDE	NUMBER	10.6	Y	Start longitude of section
END_LATITUDE	NUMBER	10.6	Y	End latitude of section
END_LONGITUDE	NUMBER	10.6	Y	End longitude of section
DURATION	NUMBER	10.6	Y	Length of time from start to end of section
LENGTH	NUMBER	11.6	Y	Length (NM) of section
DIRECTION	VARCHAR2	2	Y	Direction from start to end

### 19.5.9 SURVEY

Holds the years of all surveys in the database

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of Survey

### 19.5.10 SURVEY\_DAY

Replicate, block and times flown for each plane and day of the survey

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of Survey
PLANE	VARCHAR2	2	N	Plane (A or B)
REPLICATE	NUMBER	2.0	N	Replicate number
BLOCK	NUMBER	3.1	N	Block number
OBS_DATE	DATE	7	N	Observation date
START_OBS_TIME	DATE	7	Y	Start time
END_OBS_TIME	DATE	7	Y	End time

### 19.5.11 SURVEY\_PARTICIPANT

Information about each participant in the survey

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of Survey
ID	VARCHAR2	1	N	Participant ID number
NAME	VARCHAR2	40	Y	Participant name

### 19.5.12 TRANSECT

Details of an individual transect line

Column Name	Type	Size	Null	Comment
SURVEY	NUMBER	2.0	N	Year of survey
PLANE	VARCHAR2	2	N	Plane ID (A or B)
REPLICATE	NUMBER	2.0	N	Replicate of transect
BLOCK	NUMBER	3.1	N	Block of transect
TRANSECT	NUMBER	2.0	N	Transect number
OBS_DATE	DATE	7	N	Date
START_OBS_TIME	DATE	7	N	Start time of transect
END_OBS_TIME	DATE	7	N	End time of transect
STRATA	NUMBER	2.0	Y	Stratum number of transect
DURATION	NUMBER	10.6	Y	Length of time from start to end of transect
LENGTH	NUMBER	11.6	Y	Length (NM) of transect
START_LATITUDE	NUMBER	10.6	Y	Start latitude of transect
START_LONGITUDE	NUMBER	10.6	Y	Start longitude of transect
END_LATITUDE	NUMBER	10.6	Y	End latitude of transect
END_LONGITUDE	NUMBER	10.6	Y	End longitude of transect
DIRECTION	VARCHAR2	2	Y	Direction of transect (NE, NW, etc.)



## 19.6 Vessel tables

### 19.6.1 VESSEL

Unique codes to ID individual vessels

Column Name	Type	Size	Null	Comment
ID	NUMBER	6.0	N	Primary Key: Unique number assigned to each vessel record
NAME	VARCHAR2	35	N	Vessel name
CALLSIGN	VARCHAR2	8	Y	International call sign, state reg. #, or other realworld ID
FLAG	VARCHAR2	3	Y	Flag of Registry (3-char ISO country code)

### 19.6.2 VESSEL\_HISTORY

Data on individual vessels

Column Name	Type	Size	Null	Comment
ID	NUMBER	6.0	N	Foreign Key: To Vessel table
VESSEL_REC_NUM	NUMBER	6.0	Y	Primary Key: Unique identifier field
EFFECTIVE_DATE	DATE	7	Y	Date this record is effective
TERMINATED_DATE	DATE	7	Y	Date when details are known to be obsolete
NAME	VARCHAR2	35	N	Name of vessel
CALLSIGN	VARCHAR2	10	Y	Distinguishing symbol - Radio callsign or registration for Aust domestic vessels
FLAG	VARCHAR2	3	Y	Vessel flag - Country of registration
HOME_PORT	VARCHAR2	20	Y	Home Port
VESSEL_LEN	NUMBER	3.0	Y	Vessel Length (metres)
VESSEL_YEAR	NUMBER	4.0	Y	Vessel year of construction
ENGINE_MAN	VARCHAR2	20	Y	Manufacturer of the vessels engine (NZ)
ENG_POWER	NUMBER	4.0	Y	Vessel engine power (kW)
VESSEL_FUEL	NUMBER	4.0	Y	Vessel fuel capacity (tonnes)
VESSEL_FREEZ	NUMBER	4.0	Y	Vessel freezer capacity (tonnes)
VESSEL_CONS	NUMBER	4.1	Y	Fuel consumption (tonnes/day while fishing)
VESSEL_BLAST	NUMBER	4.1	Y	The vessels blast freezer capacity (tonnes)
GROSS_TONNAGE	NUMBER	6.0	Y	Vessel gross tonnage
HOLD_CAP	NUMBER	5.2	Y	The vessel hold capacity (tonnes)
CREW	NUMBER	2.0	Y	The number of crew members on the vessel
COMMENTS	VARCHAR2	60	Y	Any comments and a list of data sources
DATA_SOURCE	VARCHAR2	7	Y	The recent source of this data
AFMA_VESSEL_ID	NUMBER	6.0	Y	For AFMA Vessel Table (ALO4, Obs and later)
AFMA_BOAT_REC_NUM	NUMBER	6.0	Y	For AFZ Vessel data: Link to AFMA AFZIS database, vessel_rec_no
RESEARCH_NUM	NUMBER	8.0	Y	YYNN - RTMP Japanese vessel obscured research number
VESSEL_TYPE	VARCHAR2	2	Y	The type of vessel eg longliner, poling, etc

## 19.7 Reference tables

### 19.7.1 AGE\_AT\_LENGTH

SBT age at length matrix by various methods

Column Name	Type	Size	Null	Comment
METHOD	VARCHAR2	6	Y	Age method code from master CODES table
YEAR	NUMBER	4.0	Y	Length cutpoints are calculated for Jan 1 of the year
COHORT	NUMBER	2.0	Y	Age at Length
CUTOFF_LENGTH	NUMBER	5.2	Y	Cut off point for Age. Assign fish longer than Length to Age

### 19.7.2 AGENCY

Official agencies involved with SBT data

Column Name	Type	Size	Null	Comment
CODE	VARCHAR2	8	N	key
CODEX	VARCHAR2	80	N	descriptor
COUNTRY	VARCHAR2	3	Y	3-char ISO country code

### 19.7.3 CODES

Master code table used in UDE and RTMP

Column Name	Type	Size	Null	Comment
CODETYPE	VARCHAR2	10	N	Designator for grouping codes
CODE	VARCHAR2	10	N	Code item (usually 3 chars)
CODEX	VARCHAR2	80	Y	Code item descriptor
ALIAS	VARCHAR2	10	Y	True code to map to if Alias not null
COUNTRY	VARCHAR2	3	Y	ISO Code e.g. JPN, AUS, NZL
PROJECT	VARCHAR2	8	Y	Project using this Alias (may be null)
LENGTH	NUMBER	2.0	Y	Normal character length for this code class
COMMENTS	VARCHAR2	255	Y	Longer description if necessary

### 19.7.4 SPECIES\_CODES

Species codes used in UDE

Column Name	Type	Size	Null	Comment
SPECIES_CODE	VARCHAR2	3	N	3-character RTMP fish code
SPECIES_COMMON	VARCHAR2	35	Y	common name of fish
CSIRO_SPECIES_CODE	NUMBER	6.0	Y	6-digit CSIRO numeric code
SPECIES_LATIN	VARCHAR2	35	Y	Latin name of fish
ALIAS	VARCHAR2	3	Y	Points to "real" code
CATEGORY	VARCHAR2	3	Y	See SPP_CATEGORIES table
PROJECT	VARCHAR2	8	Y	Project which uses the Alias code
MAX_WT	NUMBER	3.0	Y	max kg. - used as input data check
MAX_LEN	NUMBER	3.0	Y	max cm. - used as input data check
MIN_WT	NUMBER	3.0	Y	min kg. - used as input data check
MIN_LEN	NUMBER	3.0	Y	min cm. - used as input data check

### 19.7.5 TAGGING\_CODES

codes for various tables in SBT tagging system

Column Name	Type	Size	Null	Comment
DATA_TYPE	VARCHAR2	10	N	type of data of this record - code value or code type
CODE_VALUE	VARCHAR2	3	N	code value
CODE_TYPE	VARCHAR2	30	N	type of code
CODE_LENGTH	NUMBER	1.0	N	Length of code (<= 3 chars)

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CODE_DESCRIPTION	VARCHAR2	45	N	more verbose description of code value or code type
SCREEN_ORDER	NUMBER	2.0	Y	Order of the record in lookup list

### 19.7.6 SBT\_WEIGHT\_LENGTH\_PARMS

Weight to length parameters for Southern Bluefin Tuna

Column Name	Type	Size	Null	Comment
STATISTICAL_AREA	NUMBER	2.0	Y	Standard statistical area
QUARTER	NUMBER	1.0	Y	Calendar quarter: 1 to 4
CUTOFF	NUMBER	9.6	Y	Cutoff weight. Below this weight use juvenile parms
A_ADULT	NUMBER	38.10	Y	Adult a parameter
B_ADULT	NUMBER	38.10	Y	Adult b parameter
A_JUV	NUMBER	38.10	Y	Juvenile a parameter
B_JUV	NUMBER	38.10	Y	Juvenile b parameter

## 19.8 Generated Tables

### 19.8.1 SBT\_AGE\_SUMMARY

This table is generated from data recorded in the FOP and Catch individual tables to allow easy access to SBT aging data by set

Column Name	Type	Size	Null	Comment
FOP_KEY		NUMBER	8.0	Y
PROJECT		VARCHAR2	10	Y
OPERATION_DATE		DATE	7	Y
VESSEL_REC_NUM		NUMBER	6.0	Y
CALLSIGN		VARCHAR2	8	Y
HOOK_CNT		NUMBER	6.0	Y
SBT_CNT		NUMBER	6.0	Y
STATISTICAL_AREA		NUMBER	6.0	Y
OPERATION_LAT		NUMBER	8.0	Y
OPERATION_LON		NUMBER	8.0	Y
AGE_VECTOR_8		VARCHAR2	66	Y
AGED_SBT		NUMBER	3.0	Y
UNKN_SBT		NUMBER	3.0	Y
SBT_WWEIGHT_TOT		NUMBER	8.2	Y
SBT_WWEIGHT_CNT		NUMBER	6.0	Y
OBSERVER_ON_BOARD		VARCHAR2	3	Y
FISHING_METHOD_CODE		VARCHAR2	2	Y

## 20 APPENDIX G - CODES USED IN THE SBT DATABASE

### 20.1 General codes

Category	Code	Description
<b>ACTIVITY</b>	DIS	Observer is monitoring discards from the starboard rail.
	DSM	Observer disembarked before haul data recorded
	FSH	Fishing
	NOT	Not fishing, bad weather
	OTH	Not Fishing, other reasons
	PAS	Passively monitored the set (Observer data)
	PRT	In port
	STM	In transit
	UNK	Not fishing, unknown or not recorded
<b>AGE_METHOD</b>	1	VB growth curve Lucas, 1974
	10	Two stanza age model with upper 60/upper 80 cutoff points
	11	Two stanza age model with lower 60/lower 80 cutoff points
	12	Two stanza age model with mid 60/upper 80 cutoff points
	13	Two stanza age model with mid 60/lower 80 cutoff points
	14	Two stanza age model with upper 60/upper 80 midpoints
	15	Two stanza age model with lower 60/lower 80 midpoints
	16	Two stanza age model with mid 60/upper 80 midpoints
	17	Two stanza age model with mid 60/lower 80 midpoints
	2	VB Growth curve Murphy, 1977
	3	VB Growth curve Hearn, 1979
	4	VB growth curve Kirkwood, 1983
	5	VB Growth curve Kirkwood, 1983
	6	VB growth curve Hampton, 1989
	7	VB growth curve Hearn, 1993
	8	Two stanza age model with year transition #1
	9	Two stanza age model with cohort transition #1
<b>AGE_RESULT</b>	E	Invalid argument passed to procedure AGELEN
	M	Age derived from measured length
	N	No data: both length and weight are 0 or null
	W	Age derived from whole or dressed weight
	X	Data was suspect, age not derived
<b>BAIT</b>	HMK	Horse Mackerel
	MAK	Mackerel
	MAS	Blue Mackerel
	MIX	Mixed bait species
	OTH	Other
	PIL	Pilchard
	PSQ	Plastic squid
	SQD	Squid
	SRY	Saury
	UNK	Unknown or indeterminate bait

Category	Code	Description
<b>BAIT_SIZE</b>	L	Large
	M	Medium
	S	Small
<b>BAIT_TYPE</b>	FRZ	Bait is frozen
	FSH	Bait is fresh
	MIX	Bait is mixed fresh and frozen
	UNK	Unknown bait type
<b>BOTTOM_TYPE</b>	CRL	Coral
	MUD	Mud
	RCK	Rock
	SHL	Shelly Sand
	SLT	Silt
	SND	Sand
	SSL	Sandy silt
<b>CAPTURE_METHOD</b>	F	farm recapture
	G	gillnet
	H	handlining
	L	longlining
	P	pole and line
	R	rod and reel
	S	purse seining
	T	trolling
X	other/unknown	
<b>CAPTURE_TYPE</b>	B	beach recovery - fish not recaptured
	F	from the farm
	W	from the wild
<b>CATCH_STRG</b>	FREEZER	Freezer
	ICE	Ice
	RSW	Refrigerated sea water
<b>CATEGORY</b>	BCN	Beacon or Radio Buoy
	SBD	Seabird, not part of SBT program
	SBT	SBT official data, legitimate part of UDE

<b>Category</b>	<b>Code</b>	<b>Description</b>
<b>CLOUD</b>	AC	Alto cumulus
	AS	Alto stratus
	CB	Cumulonimbus
	CC	Cirrocumulus
	CI	Cirrus
	CS	Cirrostratus
	CU	Cumulus
	NC	No Cloud
	NS	Nimbostratus
	SC	Stratocumulus
	ST	Stratus
<b>CLOUDCOVER</b>	0	Cloudless
	1	Trace
	10	Precipitation
	2	Quarter
	3	Three eighths
	4	Half
	5	Five eighths
	6	Three quarters
	7	Seven eighths (overcast with openings)
8	Completely overcast	
9	Sky obscured by fog, haze, smoke, etc	
<b>COLOUR</b>	B	brown
	G	green
	L	black
	M	multi-colour
	Orange	or
	P	pink
	R	red
	U	blue
	W	white/clear
Y	yellow	
<b>COLOUR_CODE</b>	B	blue
	G	green
	O	orange
	R	red
	Y	yellow

Category	Code	Description
<b>COMPASS</b>	E	90
	ENE	67
	ESE	112
	N	0
	NE	45
	NNE	22
	NNW	337
	NW	315
	S	180
	SE	134
	SSE	157
	SSW	202
	SW	225
	W	270
	WNW	292
WSW	247	
<b>COUNTRY_CODE</b>	AUS	Australia
	IND	Indonesia
	JPN	Japan
	KOR	Korea
	LIT	Lithuania
	MAL	Malaysia
	NZL	New Zealand
	PHI	Philippines
	PNG	Papua-New Guinea
	POL	Poland
	RPA	South Africa
	RUS	Russia
	THA	Thailand
TWN	Taiwan	
<b>DAMAGE</b>	0	No scaring or damage observed
	1	Multiple net damage stripes (AFZ Obs)
	2	Minor brush like damage (AFZ Obs)
	3	Serious net damage (AFZ Obs)
	4	Healed net damage (AFZ Obs)
	C	Cookie cutter shark damage (RTMP Obs)
	E	Either tag or tag scar (RTMP Obs)
	H	Head only of fish caught (bitten off by shark)
	K	Killer whale or shark damage (RTMP Obs)
	L	Damage caused by longlining (RTMP Obs)
	N	Unspecified net caused damage (RTMP Obs)
	S	Tag scar present (AFZ Obs)
	T	Tag present (AFZ Obs)
U	Unspecified damage (RTMP Obs)	
<b>DATATYPE</b>	LOGBOOK	Logbook data
	OBSERVER	Observer Data
	RADIO	Radio Reported Data



<b>Category</b>	<b>Code</b>	<b>Description</b>
<b>DATE_QUALITY</b>	A	exact date reported
	D	day uncertain
	M	month uncertain
	Y	year uncertain
<b>DEXTERITY_CODE</b>	AD	ambidextrous
	LH	left handed
	RH	right handed
<b>DISTRIBUTE</b>	DST	Data set has been distributed
	NOT	Data set not ready for distribution
	RDY	Data set ready for distribution
<b>DWEIGHT</b>	FF	Fins and Fillets retained
	FL	Filletted
	FO	Fins only
	FT	Fins kept and trunked
	GF	Gilled, gutted & tail flukes removed
	GG	Gilled and gutted
	GI	Gilled, Gutted, tail kept
	GT	Gilled, gutted, tailed, opercular off
	HO	Heads off
	NS	Not specified
	TA	Whole - tail
	TR	Trunked
	UN	Unknown or not measured
	UP	Unknown Process not Whole
	WH	Whole weight
<b>FISHERY</b>	FGN	Foreign gillnetting
	FSQ	Foreign squid
	FTR	Foreign trawling
	GAB	Great Australian Bight
	NP	Northern prawn
	NWD	North West Deep Water Trawl
	SAP	South Australian Prawn
	SET	South East Trawl
	SS	Southern Shark
	TS	Torres Strait
	TUN	Tuna
<b>FISH_CONDITION</b>	A	good condition
	B	bite marks
	C	cookie-cutter marks
	F	fin damage
	M	mouth damage
	P	parasites
	T	tail damage
	W	old wound/scar
	X	other

Category	Code	Description
<b>FISH_SEX_CODE</b>	F	female
	I	indeterminate
	M	male
<b>GEARTYPE</b>	AGN	Anchored gillnetting
	ASJ	Automatic squid jigging
	DGN	Drifting gillnetting
	DL	Dropline (bottom handline)
	DS	Danish seine
	GN	Gillnetting
	HL	Handline
	LL	Longline
	MSJ	Manual squid jigging
	PLB	Pole and live bait
	PPS	Poling with purse seiner assisting
	PRN	Prawn trawling
	PS	Purse seine
	PSP	Purse seine with pole boat assisting
	PTL	Pair trawling
	SJ	Squid jigging
	STL	Stern trawling (Otter trawling)
TRL	Trawling	
TRO	Trolling	
<b>INJURY_SEVERITY</b>	E	extreme injury
	H	high injury
	M	medium injury
	S	slight injury
<b>INJURY_TYPE</b>	B	mouth bleeding
	D	dropped on deck
	G	gill rupture
	H	hit side of boat
	L	unusually lethargic
	M	mouth torn
	S	swam away slowly
	T	long time on deck
X	other	
<b>INSERTION_QUALITY</b>	A	tag correctly inserted
	B	tag badly placed and badly inserted
	D	tag doubtfully inserted
	F	tag forward
	H	tag high
	I	tag badly inserted
	L	tag low
	N	tag number unknown
	O	tag lost overboard
	P	tag badly placed
	R	tag rejected
X	other ...	

<b>Category</b>	<b>Code</b>	<b>Description</b>
<b>LENGTH</b>	BFL	Bill to total fork length
	CFL	Cleithrum to caudal fork length
	CL	Carapace Length
	LCF	Length to caudal fork
	LFL	Lower jaw to caudal fork length
	OFL	Orbital to caudal fork length
	OVL	Orbit to vent
	SCP	Snout to caudal pit length (sharks only)
	STL	Standard Length
	TOT	Total length
	UDL	Upper jaw to 2nd dorsal fin notch length
<b>LICENSE</b>	BI	Foreign vessel operating under a bilateral arrangement
	DO	Domestic vessel
	JV	Foreign vessel operating under a joint venture agreement
<b>LIFE</b>	A	Live (no details)
	D	Dead
	F	Dead, flexible
	G	Dead, damaged
	J	Alive just (injured, bleeding, shark damage)
	N	Not observed
	R	Dead, in rigor
	V	Alive, vigorous - no obvious major injuries
<b>MATERIAL</b>	BS	bait strap (usually blue)
	CN	cotton/nylon
	CO	cord
	FG	fibreglass
	HO	honin
	KM	kuramora
	KU	kuralon
	KV	Kevlon?
	MO	mono-filament
	NB	nylon braided (multi stranded)
	NM	nylon mono (single stranded)
	NY	nylon
	PO	polypropylene
	RB	ribbon
	RO	rope
	SS	stainless steel
	ST	streamer
	TE	teteron
WI	wire	
<b>MEASURER</b>	0	Unknown
	1	Observer
	2	Crew

Category	Code	Description
<b>MEASURERER_CODE</b>	C	CSIRO staff
	F	fishing crew
	I	trained & independent staff
	O	observer
	S	factory staff
	X	other
<b>MEASUREMENT_QUALITY</b>	A	correctly measured
	E	estimated - average of school
	F	Frozen when measured
	G	guessed
	H	probably head/tail off measurement
	I	measured but inaccurate
	U	unknown
W	weight and length inconsistent	
<b>MORPHOLOGY</b>	2D	Second dorsal fin length
	AN	Anal fin length
	GL	Gill raker count (lower arch)
	GU	Gill raker count (upper arch)
	L4	Length from snout to fourth tail finlet
	L5	Length from snout to fifth tail finlet
	L6	Length from snout to sixth tail finlet
LJ	Lower jaw length	
<b>POSDERIVED</b>	HE	Haul End
	HS	Haul Start
	NN	Noon position
	SE	Set End
	SS	Set Start
	ZP	No position recorded
<b>POSITION_QUALITY</b>	G	fishing ground reported
	L	general location reported
	P	exact position reported
	X	unknown
<b>RE_RELEASE_CODE</b>	C	re-released by CSIRO tagging staff
	D	re-released twice by CSIRO tagging staff
	E	re-released by fishermen
	F	re-released into a farm
	G	recaptured after f
	R	re-released and recaptured
	S	recaptured after E
	T	recaptured after D
X	not re-released - terminal recapture	

Category	Code	Description
<b>RECOVERY_CODE</b>	B	tag found on beach
	D	tag probably left in fish
	F	tag not found, obvious fresh wound in fish
	L	tag left in fish
	M	tag recovered from dead fish
	N	tag not recovered
	P	tag previously recovered
	R	tag recovered and sent
	S	tag shed from fish
	U	condition unknown
	W	tag recovered but not sent
<b>RELEASE_TYPE</b>	F	Into the farm
	W	into the wild
<b>REPORTING</b>	OO	Catch data reported by observer, supplied by observer
	OV	Catch data reported by observer, supplied by vessel
	VV	Catch data reported by vessel, supplied by vessel
<b>RETAINED</b>	A	Landed and returned to the sea alive
	B	Landed and thrown back (RTMP Obs)
	C	Cut or jerked free without landing
	D	Landed and returned to the sea dead (AFZ Obs)
	F	Retained and fins kept (RTMP Obs)
	I	Landed alive and returned to sea alive with a reduced chance of survival
	L	Unknown meaning, need to check with AFMA (AFZ Obs)
	N	Not retained -no reason given (<93 AFZ Obs)
	O	Other (RTMP Obs)
	R	Retained
	T	Tagged fish and returned to sea alive
V	Retained for vessel consumption (RTMP Obs)	
<b>SAMPLE</b>	CC	Caudal Centra
	EL	Electrophoresis
	EY	Eye
	GO	Gonad
	HE	Heart
	LI	Liver
	MU	Muscle
	OH	Other type of sample not listed on form
	OT	Otoliths
	SC	Scales
	SP	Spine
	ST	Stomach Contents
	TI	Tissue
	TS	Tail stock
	WH	Whole fish

<b>Category</b>	<b>Code</b>	<b>Description</b>
<b>SETPATTERN</b>	B	Essentially a straight set but with a bend in it
	L	L Shaped set
	O	Circular set
	SQ	Square / Rectangular set
	ST	Straight line
	TR	Triangular set
	U	U Shaped set
	W	Several zig-zags
	Z	Zig-zag set
<b>SEX</b>	F	Female
	I	Sex Indeterminate
	M	Male
	U	Sex Unknown or Unexamined
<b>STATECODES</b>	AC	Australian Capital Territory
	NS	New South Wales
	NT	Northern Territory
	QU	Queensland
	SA	South Australia
	TA	Tasmania
	VI	Victoria
WA	Western Australia	
<b>TABCONTENT</b>	C	Code table
	D	Data table
	L	Lookup table with list of information
	S	System table
<b>TAG_COLLECTOR</b>	A	Australian fishermen
	C	CSIRO staff
	F	Japanese fishermen
	J	Japanese industry
	M	Amateur
	N	New Zealand Observer
	O	Australian Observer
	P	Maritime police
	R	Japanese researchers
	S	Japanese speakers
	V	Japanese Observer
	W	W.W. Fishery (K.W.& D.W.)
	X	Other
<b>THAWING</b>	F	Fair bait thawing routine
	G	Good bait thawing routine
	P	Poor bait thawing routine

Category	Code	Description
<b>TIMECODE</b>	CSS	Central standard summer time
	LOC	Local time
	TZ	Time zone as in time_zone
	UTC	Greenwich mean time
<b>TRAWL_TYPE</b>	A	All-purpose (demersal and midwater)
	D	Demersal
	M	Midwater
<b>VENTURE</b>	CHT	Charter
	JV	Joint Venture
<b>WIND_FORCE</b>	0	Calm (0-1 knots)
	1	Light air (1-3 knots)
	10	Storm (48-55 knots)
	11	Violent storm (56-63 knots)
	12	Hurricane (64 knots upwards)
	2	Light breeze (4-6 knots)
	3	Gentle breeze (7-10 knots)
	4	Moderate breeze (11-16 knots)
	5	Fresh breeze (17-21 knots)
	6	Strong breeze (22-27 knots)
	7	Moderate gale (28-33 knots)
	8	Fresh gale (34-40 knots)
	9	Strong gale (41-47 knots)
99	Variable	
<b>WWEIGHT</b>	A	Derived from Average of Rest of Catch
	C	Composite measurement
	E	Estimated Whole Weight by Guess or Unknown Method
	M	Measured Whole Weight
	P	Derived from processed weight
	S	Presumed actual measurement
	U	Unknown or not measured
	X	Indeterminate data -- Weight data is suspect
<b>YESNO</b>	N	No
	Y	Yes

## 20.2 Species codes

Code	Common Name	Latin Name	CSIRO Code
ALB	Albacore	Thunnus alalunga	441005
ATS	Albatross		
AMS	Amsterdam albatross		
ATG	Archival tag recovered		
ABO	Australian Bonito	Sarda Australis	441020
ASE	Australian Salmon-Eastern	Arripis trutta marginata	344003
ABT	Australian blacktip shark	carcharhinus tilstoni	18014
BAR	Barracuda	Thursites atuns	439001
BSS	Barracuda, Southern Sennet (J RTMP)	Sphyaena picuda	
BCN	Beacon Number	Beacon Number	
BET	Bigeye Tuna	Thunnus obesus	441011
BSP	Bigscale pomfret (J RTMP Obs)	Taractichthys spp.	
BAM	Black Marlin	Makaira indica	444006
XPE	Black Petrel		
BKS	Black Shark	Dalantias licha	20002
BBA	Black-browed albatross		
GRE	Blue Grenadier	Macruronus novaezelandiae	227001
BUM	Blue Marlin	Makaira mazara	444003
BLW	Blue Whaler Shark	Prinace glauca	18004
BBL	Broadbill Swordfish	Xiphias gladius	442001
BRW	Bronze whaler shark	Carcharhinus brachyurus	18001
BUL	Buller's albatross		
BUF	Butterfishes	Stromateoidei spp	
BUT	Butterfly Mackerel	Gasterochisma melampus	441019
CIG	Cigarfishes	Nomeidus Cubiceps	
CCT	Cookie Cutter Shark	Isistius brasiliensis	20014
CRS	Crest Fish (J RTMP Obs)	Lophotus capelleri	
CRD	Crocodile Shark	Pseudocarcharias kamoharai	9003
CR1	Crustaceas	Crustaceas	700000
DST	Deep Sea Trevalla	Hyperoglyphe antarctia	445001
DSL	Deep sea lobster	Metanephrops Australiensis	703001
DOG	Dog Shark	Squalidae	20000
DGT	Dogtooth Tuna	Gymnosarda unicolor	441029
DOP	Dolphin		
DOL	Dolphin Fish	Coryphaena hippurus	338001
DSK	Dusky Shark	Carcharhinus obscurus	18003
EEL	Eel	Family Nemichthyidae	76000
BOF	Escolar or Black Oil fish	Lepidocybium flavobrunneum	439008
LAM	Family Lamnidae	10900	
COS	Family Malacosteidae	Malacosteidae family	11000
CAR	Family whalers, etac	Caracharhinidae Family	18900
FLF	Flying Fish	Cypselurus melanocerus	233008
FMA	Frigate Mackerel	Auxis thazard	441009
GEM	Gemfish or couta	Rexea solandri	439002
GSK	Giant Skilfish	Erilepis Zonifer	
GPF	Golden Promfret	Xenobrama microlepis	342002
GRB	Great Barracuda	Sphyaena barracuda	
JAW	Great White or White Pointer Shark	Carcharodon carcharias	10003
GHA	Grey-headed albatross		
HAM	Hammerhead Shark	Sphyrnich spp	19000
JSM	Japanese spanish mackerel	scomberomous nipponius	



LBO	Leaping Bonito	Cybiosarda elegans	441008
LSA	Light-mantled sooty albatross		
X01	Line Cut		
X02	Line Cut (2nd time during set)		
X03	Line Cut (3rd time during set)		
Y01	Line Recovered		
Y02	Line Recovered(2nd time during set)		
Y03	Line recovered(3rd time during set)		
MAD	Lobster	Metanephrops Andamamicus	703005
MBO	Lobster	Metanephrops Boschmai	703006
LLN	Long Nosed Lancet Fish	Alepisaurus ferox	128001
LTT	Long Tail Tuna	Thunnus tonggol	441013
LBM	Long finned Bream	Taratichthys longipinnis	
MK2	Longfinned Mako	Isurus paucus	10002
MAS	Mackeral Blue	Scomber Australasicus	441001
MKT	Mackeral Tuna or Little Tuna	Euthynnus affinis	441010
MTF	Mackerel & Tuna family	Scombridae family	441900
MAN	Manta Ray		
PR7	Mixed Prawns	Prawns	701907
XMM	Mollus (grey/black headed, shy)		
NBT	Northern Bluefin Tuna	Thunnus thynnus	441017
OAR	Oarfishes (J RTMP Obs)	Regalecus russelli	
OSF	Ocean Sunfish	Mola mola	
OWT	Oceanic White Tipped shark	Carcharinus longimanus	18032
OIL	Oilfish	Ruvettus pretiosus	439003
OPI	Opah (RTMP Obs)	Lampris Immaculatus	
OPA	Opah or Moonfish	Lampris guttatus	
OPL	Opahs	Lamprididae	
OTH	Other (See Comments)	Other species	999999
ALT	Other albatross		
RAY	Pelagic Ray	Dasyatis violacea	35010
PTS	Pelagic Thresher Shark	Alopias pelagicus	
PEN	Penguin		
PET	Petrel		
BRM	Pomfret	Bramid	342000
POD	Pompano Dolphin	Coryphaena aquisetis	
POR	Porbeagle Shark	Lamna nasus	10004
PR1	Prawns	Prawns	701002
PR3	Prawns	Prawns	701004
PR4	Prawns	Prawns	701005
PR6	Prawns	Prawns	701009
PR5	Prawns	Prawns	701008
PR2	Prawns	Prawns	701003
RBY	Radio buoy		
RBM	Ray's Bream	Brama brama	342001
RBA	Redbait	Emmelichthys nitidus	345001
REQ	Requiem Sharks(total)	Requiem sharks	
RIB	Ribbon or Deal Fish	Trachiptends	271001
ROY	Royal Albatross		
RDF	Rudderfish	Centrolophus niger	445004
SLF	Sailfish	Istiophorus platypterus	444005
SSS	Sailfish and spearfish (jap aggreg)		
SAS	Salmon shark	lamna ditropis	
SAN	Sandbar shark	carcharhinus plumbeous	
SAO	Sarda Orientalis	441006	
SAR	Sardines, family	Clupidae family	85900
SCH	School Shark	Galeorhinus australis	18002
SCM	Scomberomorus munroi	Scomberomorus munroi	441015

OSB	Seabirds (All)	Seabirds	
SBD	Seabirds (All)	Seabirds	
SEA	Seal		
SHK	Sharks (Commercial catch)	Sharks (Commerical catch)	
SHA	Sharks other	Sharks other	901036
SBS	Short Bill Spearfish	Tetrapterus angustirostris	444007
SLN	Short Nosed Lancet Fish	Alepisaurus brevirostrus	128002
SUN	Short Sunfish	Mola ramsayi	470002
MAK	Shortfinned Mako or Blue Pointer	Isurus oxyrinchus	10001
SHY	Shy albatross		
SLK	Silky Shark	carcharhinus falsiformis	
SKJ	Skipjack Tuna	Katsuwonus pelamis	441003
SNB	Slender Barracuda	Sphyaena jello	382004
SLT	Slender Tuna	Allothunnus fallai	441021
SSB	Slender snake blenny	Sticharium dorsale	411005
SNM	Snake mackerel	Genpylus serpens	
SOO	Sooty albatross		
SBT	Southern Bluefin Tuna	Thunnus maccoyii	441004
SRB	Southern Rays Bream	342010	
SPL	Spiny Lobster	Metanephrops	703002
SQD	Squid (RTMP Obs)	Cephalopoda	
STM	Striped Marlin	Tetrapterus audax	444002
SWD	Swordfish (RTMP Ves)		
TTS	Thintail Thresher Shark	Alopius vulpinus	12001
TSR	Thresher Shark	Alopius superciliosus	12002
TIG	Tiger shark	Galeocerdo cuvier	18022
TOD	Toadfish/blowfish		
TRV	Trevally	Carangidae	337900
TUR	Turtle		
UDF	Unidentified Dogfishes	Squaliformes	
RAU	Unidentified Ray	Rajiformes	
MAR	Unidentified marlin		
TWU	Unidentified tooth whale	Odonticeti	
TRU	Unidentified tresher sharks	Alopiidae	
TNU	Unidentified tuna (RTMP Obs)		
SRU	Unidentifies stingray	Dasyatidae	
UNK	Unknown	Species incognita	0
OT7	Unknown species		
DGF	Velvet Dogfish	Zameus squamulosis	
WAH	Wahoo	Acanthocybium solandri	441024
WAN	Wandering albatross		
WHA	Whale		
YNA	Yellow-nosed albatross		
YFT	Yellowfin Tuna	Thunnus albacares	441002
YTL	Yellowtail	seriola aureovittata	
YTS	Yellowtail Scad	Trachurus novaezelandiae	337003
YKF	Yellowtail kingfish	Seriola lalandi	337006
BRS	brier shark	deania calcea	20003
JMK	jack mackerel	trachurus declivis	337002
OGG	ogilbys ghostshark	hydrolagus ogilbyi	42001
RRU	rainbow runner	elagatis bipinnulata	
RGP	red gurnard perch	helicolenus percoides	287001
SHH	scalloped hammerhead	sphyrna lewini	19001
SPT	spot-tail shark	carcharhinus sorrah	18013
TIF	tiger flathead	neoplatycephalus richardsoni	296001
OT8	unknown species		
OT9	unknown species		