Database documentation for the Ministry for Primary Industries, Fisheries Statistics Unit database new_fsu

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NIWA Fisheries Data Management
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Revision History

Version	Date	Change	Responsible
1.0	November 2002	First release	David Fisher
1.1	July 2003	This version involves a thorough revision of this document with most sections revised, particularly sections 2.3 to 2.5. The major changes are noted below. Added call_sign, pair_vess_key, pair_vess_no, mth, cal_year, date_from, date_to & comments to t_forms table. Added unit_type, total_units, surface_temp, bottom_temp & call_sign to t_fishing_event table. Deleted nationality from t_fishing_event table. Added unit_type, unit_num & unit_weight to t_estimated_subcatch table. Added key, gw_type, unit_type, vessel_no & call_sign to t_processing_event table. Added factory_code, gw_type, destination_type & call_sign to t_landing_event table. Renamed amount_landed to proc_weight & altered unit_num to decimal(7,1) in t_landing_event table. New sections added:	David Fisher
		2.6 Lining data	David Fisher
		2.7 Set net data	Brian Sanders
	August 2003	2.8 Trawl data & 2.9 Other pots	David Fisher
1.2	September 2003	Moved vessel_name from t_fishing_event to t_forms and master_name from t_vessel to t_forms. Added trip to t_landing_event table. New sections added:	
	September 2003	2.10 Squid jig	David Fisher
	October 2003	2.11 Other nets	David Fisher
	November 2003	2.12 Danish seine	David Fisher
	December 2003	2.13 Troll	David Fisher
	December 2003	2.14 Dredge	Brian Sanders
	March 2004	2.15 Bottom Longline	David Fisher
	April 2004	2.16 Purse seine. Renamed database from fsu to new_fsu. Dropped page_no from all tables except t_forms. Renamed page_no to logbook_no. Changed event_key from char15 to char12.	Brian Sanders
1.3	July 2004	Added 1989 rock lobster data to section 2.3	David Fisher
	August 2004	Revised section 2.14.4 Dredge data	Brian Sanders
1.4	Dec2005	Corrected code for handlining to HL for FSU method 51 in Appendix 2	David Fisher
1.5	April 2007	Corrected comments for t_landing_event.form_type	David Fisher
1.6	June 2009	Clarified form_type code for form_type 15, Added some memo codes to Appendix 2. Added text clarifying t_processing_event data for form 17	David Fisher
1.7	December 2010	Named primary keys. Enforced t_landing_event.key as pk	Fred Wei
	January 2011	Added text on assignment of target species for Purse seine data. Updated t_landing_event.fishstock comment.	David Fisher
	September 2011	Updated t_estimated_subcatch comment	
2.0	September 2011	Set stat_area, inside_12mile values. Populated trip for form_type = 16.	David Fisher and Fred Wei
2.1	June 2014	Added t_port_codes table to documentation	David Fisher
2.2	June 2015	Postgres version	D. F. & F. W.
2.3	Oct 2016	Added memo codes to Appendix 2, & table to Appendix 3	David Fisher

Contents

List of Figures

1 Introduction to the Database Document series

The National Institute of Water and Atmospheric Research (NIWA) currently carries out the role of Data Manager and Custodian for the fisheries research data owned by the Ministry for Primary Industries (MPI) formerly the Ministry of Fisheries.

This MPI data set, incorporates historic research data, data collected by MAF Fisheries prior to the split in 1995 of Policy to the Ministry of Fisheries and research to NIWA, and data collected by NIWA and other agencies for the Ministry of Fisheries and subsequently for MPI.

This document describes the new Fisheries Statistics Unit catch-effort database **new_fsu** and is part of the database documentation series produced by NIWA. To clarify the distinction between references to the database that this document describes, and references to the Fisheries Statistics Unit of the 1980s, any reference to the Fisheries Statistics Unit or FSU refers to the Fisheries Statistics Unit of the 1980s. References to this database refer to **new_fsu**.

All documents in this series include a summary of the database design, a description of the main data structures accompanied by an Entity Relationship Diagram (ERD), and a listing of all the main tables. The ERD graphically shows how all the tables link together.

This document is intended as a guide for users and administrators of the **new_fsu** database.
This database has been implemented as a schema within the Postgres database called **fish**.

Access to this database is restricted to nominated personnel as specified in the current Data Management contract between the Ministry of Fisheries and NIWA. Any requests for data should in the first instance be directed to the Ministry of Fisheries.

2 Fisheries Statistics Unit

The collection, processing and dissemination of the commercial fisheries statistics became the responsibility of the Ministry of Agriculture and Fisheries (MAF) Fisheries Statistics Unit (FSU) which was set up in 1982. In January 1983 MAF Fisheries Research Division launched a new domestic fisheries statistics system that emphasised the collection and processing of fisheries catch-effort data.
The FSU was disbanded in November 1988. The 1988 datasets are therefore generally incomplete. For some fisheries, collection of statistics back to 1972 was undertaken which are included in this database. In this document fisheries statistics prior to 1983 are referred to as ‘Pre-FSU’.

2.1 Data sources

Data were originally received by the Fisheries Statistics Unit staff from commercial fishers. There were 16 different types of data collection form and most domestic fishermen completed one form each month, for each fishing method and included details of their daily fishing effort and catch. The foreign trawl fleet and the larger domestic trawlers completed tow by tow catch-effort logs with additional details such as position and depth of each trawl shot.

Since 2002 we have had access to two main sources of this FSU data. The first, a copy of flat (ASCII) files on a CD, which are in a similar format to that in which the data was originally punched into electronic files. These files are typically structured as one file per year per form type. These files are typically in the format of a header record, which includes fields for the form type, vessel ID, month and year. These header records are followed by one or more daily records, which have details of area, fishing effort and catches.

The second source of data is tables on the MFish catch-effort database **warehou** held by MFish. All these tables have names starting with **'fsu'** or **'prefsu'**. Typically there is a set of three tables for each form type, with a table for each of header, catch and landing data. Generally we have used the data from these MFish tables to load to this database. We understand that the data in these fsu tables in the MFish database was sourced from a copy of the files referred to on the CD.

The data in the MFish database tables include attributes not present in the original data that contain keys for joining the data from separate tables such as the attribute **fsu_key**. This number typically contained the year as its first 2 digits followed by a 4 digit number that usually uniquely identified a single data form or set of data for one vessel for one month. The MFish fsu_key has been used in this new_fsu database as the *dcf_key* where it was correctly generated. Taking the dcf_key and concatenating a 2 digit record sequence number to the right hand end formed the attribute *event_key*. For those forms that captured fishing effort and catch for one months fishing, with one line per day, the attribute *event_key* identifies a single line of data from the original form, and may be used to join the fishing event and landing event tables to re-create each line from the form.

2.2 Data validation

Data collected by the Fisheries Statistics Unit were subjected to data validation and error checking processes by FSU staff before being entered into the computer system in use at that time. This new_fsu database enforces data validation and integrity rules with the use of referential constraints and range checks.

These data have undergone further validation and error checking as part of loading to this new_fsu database. The data have initially been inserted into a set of 'original' tables in the database. These 'original' tables all have the suffix '_o' as the end of their table name. Data are transferred from these 'original' tables to the final tables, e.g., *t_fishing_event*. This process includes Perl, Unix and SQL scripts where invalid dates are corrected and various codes are updated to the current MFish Catch Effort reference codes where there is a one to one relationship. E.g., FSU fishing method code 41 becomes 'RLP'. Where data are changed in the final tables, the *memo* attribute in that table is set to a value that documents the change made. The *memo* attribute however does not document where codes are updated to the current MFish Catch Effort reference codes, (as this effects all or virtually all records).

The meaning of some species codes have changed from the FSU era to the present including SQU which was for unidentified squid and is now for arrow squid. Similarly the now obsolete code ASQ was the code for arrow squid in the FSU data but the current code is SQU. These codes were updated to the current codes. At the request of MFish the research code of SHA for 'shark' was changed to OSD for 'other sharks and dogs'. Twelve different form types used this SHA code. Other species code changes, more specific to individual datasets or form types, are documented in the respective section for each dataset below. The *memo* codes are documented in the *t_memo_codes* table and in **Appendix 2**.

Validation of data in this new_fsu database at a general level has included the following:

1. Comparing 20 to 30 raw forms of data where these were available to the authors, with data in this database to confirm the integrity of the data loading process.
2. Comparing the number of records in the MFish database tables with the number of records in the corresponding files on the CD referred to above.
3. Comparing the total catch by species by year from this new_fsu database with the published figures from the FSU era.

(See subsequent sections of this document describing the process for each dataset in more detail.)

As fish may be processed at sea before a whole or green weight is recorded a conversion factor must be applied to records where the catch of a species is not landed whole to determine a green weight. Deriving an appropriate conversion factor is not a simple process. In addition values for conversion factors change over time reflecting changing processing techniques and additional information obtained. The FSU maintained a file of conversion factors for calculating green weights for fisheries statistics that they considered were appropriate at the time. These values were revised when suitable additional information became available. Other compilations of conversion factors existed at the time and included those written in legislation and those obtained by fisheries scientists. We have obtained a paper copy of a list of conversion factors as used by the FSU in the file FISHSTATS>CODES>CONVERSION_FACTORS. These conversion factors as used by the FSU were revised on occasion but we have generally used one value per species, state and unit_type for this dataset. Alternate sources of conversion factors include: the 'Fisheries (Conversion Factors) Notice 1986' and copies of archival MAF Fisheries conversion factors prior to 1983. It is likely that this process will have generated some values that are different from those that were in use at the time, which will result in small discrepancies in the reported green weights for some species. The deepwater trawl dataset recorded both the processed weights and calculated green weights of their catch from approximately 1981. This dataset also has values of calculated green weight as recorded by the fishers in the *t_processing_event* table.
See the section on this deepwater trawl dataset for more detail.

2.3 Rock Lobster Potting data

For this new_fsu database rock lobster potting data were initially available for the calendar years 1979 to 1988. Data for 1989 was added in July 2004. This rock lobster potting data includes both Pre-FSU and FSU data sets. For the FSU data set (1983 – 1988) we extracted these data from the MFish database. The Pre-FSU data set (from 1979 to 1982) had a considerable number of invalid dates, but the day fished had not been loaded correctly into the MFish database so for this new_fsu database we extracted the data from the corresponding files on CD. These 2 data sets (1979 – 1982 and 1983 – 1988) were collected on different forms **(see Appendix 3)**. The later form has the additional field for the 'maximum number of pots in water, at any one time during the month'. The form type for this later form is printed on the form as '04' in the top left corner, and is stored in the MFish database as '4'which is how it appears in this new_fsu database. The earlier form had no preprinted form type number, but to be able to group the two data sets together while still retaining the distinction between them, the 1979–1982 data set has a form type of '04' in this database.

The '1989' data included 6 forms from 1988 and 2 forms from 1990. The electronic copy of these data was not able to be located, so these data were entered again for this project. These 1989 data were assigned a form type of '04'.

Another difference between the Pre-FSU rock lobster form and the FSU version is that the earlier form has spaces to record 'port of landing' and 'base port' where the FSU version has a box for port of landing only. The Pre-FSU dataset stored the two fields as character fields as recorded by the fishers that are held in this database in the attributes *land_port* and *base_port* respectively. The FSU dataset stored the port of landing as a numeric code of 6 digits, which is stored in the attribute *port_code*. The descriptions for these port codes are listed in **Appendix 2.** Note that one *port_code* in some cases corresponds to 2 or more names for the same port. The 1989 data have the port of landing entered as a character string as recorded by the fishers on the form in the attribute *land_port.*

For the 1983 to 1988 data the values for the attributes *dcf_key* and *event_key* were generated in the standard manner as described in section 2.1 above. That is the *dcf_key* was sourced from the MFish tables as fsu_key, and the *event_key* was derived from the *dcf_key* with a 2 digit record sequence number concatenated to the right hand end. For the 1979 to 1982 data, the Perl program that checked and formatted the data generated the dcf_key. This Perl program used the same format as the MFish generated values, with the first 2 digits identifying the calendar year, followed by a number that started with 20001 for each calendar year and incremented for each new form.
The 1989 data followed a similar procedure for allocating the *dcf_key* and *event_key* as used for the 1979 to 1982 data.

One of the checks performed on these Pre-FSU data was to check that the vessel number in the vessel header record was the same as the vessel number on the following daily records. In the file for 1980 there were 5 occurrences when an error was noted when the vessel numbers were not the same. In addition there was one of these errors in each of the 1981 and 1982 files. These were corrected in the files before loading to the database so are not documented by the memo attribute.

The CD files had some vessel records with no associated effort or catch which were probably 'Nil returns'. These nil return records generated a record for the *t_forms* table with it's associated *dcf_key* for the Pre-FSU dataset. As nil return records are not in the database for the 1983 - 1988 dataset these nil return records were deleted to be consistent. The only consequence is some gaps in the *dcf_key* sequence.

A Unix shell script 'correctDate.sh' was written that reassigned invalid dates, i.e. those beyond the last day of the month. The rule was that the dates were 'shuffled up' the month as required to fit any invalid dates, keeping the date fished unique for any one vessel where possible. In the small number of cases where un-fished days were not available in the month, the dates were reassigned to the beginning of the following month if these days were 'available'. If erroneous dates still existed these were reassigned to the last day of the month as a duplicate date. It is likely that some of these dates where more days were ticked on the form than existed in the month were recorded as days fished in error. The memo attribute was updated accordingly to document these changes. See **Appendix 2** for the memo codes and descriptions.

The Unix shell script to correct the invalid dates and move the data from the original tables (i.e., table names with an '_o' suffix,) to the main tables results in 2 less records in table *t_landing_event* for these rock lobster data. There are 2 records of octopus catch that are duplicated namely on 16/08/1980 of 3.0 kg and on 1/04/1981 of 11.0 kg. These records are genuine duplicates so 1 of each is omitted

The rock lobster form had provision to record the day fished by ticking a box next to a preprinted day of the month. This date as recorded has been loaded to both the start date and the end date attributes *date_s* and *date_f* in the *t_fishing_event* table respectively. This does not imply any 'soak time' for the pots that were hauled. Soak time or time since the pots were last emptied and baited was not recorded.

For the 1983 data there were both Pre-FSU and FSU versions each in their separate formats, both for the files on CD and the tables in the MFish database. These datasets were different and it is a complex and time-consuming process to compare them in any detail. After some initial comparisons showed the difficulties of this process, a decision was made to use the more recent FSU version of these 1983 data.

A comparison of the two datasets for 1983 did show that there were more invalid dates (i.e., 42) in the Pre-FSU dataset than the FSU version with 4 invalid dates. The other Pre-FSU files also had considerably more invalid dates than the FSU years. Similarly there are more records of rock lobster landed in the Tailed state outside the only legal tailing at sea area of the southern fishery, in the Pre-FSU dataset compared with the later FSU dataset. This suggests that either the files for this Pre-FSU data were captured prior to the checks made at the time or that the checks in earlier years were less rigorous.

Twenty original rock lobster fishing return forms were selected in a random manner and the data on them compared with the data as captured in this new_fsu database. All the data were in exact agreement except for one catch record where the fisher had not used the decimal place printed on the form and his recording of the decimal place was slightly faint. This resulted in a catch record of 140 kg of whole rock lobster where my interpretation is of a catch of 14.0 kg.

The largest values for the number of pots were identified and checked where the raw data was available, which was for most of the period from 1980 to 1988. This identified a small number of records for one vessel where the values for the number of pots hauled were aggregates of two or more days fishing. These aggregated values for the number of pots hauled were prorated across the days fished and documented in the *memo* attribute with a code of 'SEF'. In one month this vessel recorded only two lines of effort data but the number of pots hauled on each line on the form was well in excess of the number recorded for the maximum number of pots in the water during the month (*effort_num*), and was clearly an aggregate of several days fishing. These records for the

number of pots hauled (*effort_total_num*) were set to the value of *effort_num,* and 11 additional records with up to this value of *effort_num* were created for the previous days until the original number of pots hauled was reached. The *memo* attribute was set to 'XEF' for these extra records. While checking values on some of the original data forms, a form was noted that recorded "average 50 every 3rd day" for the number of pots hauled, in the Pre-FSU dataset. Nine additional records were created to represent this effort and documented in the *memo* attribute with the value of 'XEF'.

The maximum value remaining after the corrections above for the number of pots hauled is 505. These values were confirmed on the original data forms and are from an area where fishers are known to have fished a large number of pots. Similarly the maximum number of pots in the water during the month is 680. All values greater than or equal to 600 for this field were checked and found to be from one vessel and confirmed as correctly recorded from the raw data forms.

Some records in table *t_fishing_event_o* are missing effort data of the number of pots lifted that day. To update these missing values in table *t_fishing_event* the average number of pots lifted for the month was applied where some pot lift data were available for that vessel in the month. For the data up to 1988 this update was applied to 23 164 records from 3 640 forms and is documented in the *memo* attribute with a code of 'AEF'. The results of the addition of the average number of pots are shown in Table 1 below.

A check was made for duplicate records with the same date for one vessel in the table *t_fishing_event.* This identified 14 records on 3 forms that had dates duplicated, mostly from confusion over the month fished. These duplicates were corrected and documented in the *memo* attribute with a value of 'DAD'.

The attribute *fishyear* was populated in the tables *t_fishing_event* and *t_landing_event* based on the associated date for each record. The current rock lobster fishing year from 1 April to 31 March was used. Note that for the by-catch species including all finfish species the fishing year is incorrect for these data with form type of '4' or '04'.

The attribute *target_sp* was set to red rock lobster (CRA) for all these data with form type of '4' or '04'. This is a 'good assumption' but is likely to be incorrect for a small number of fishers for whom the target species was actually packhorse lobsters (PHC). There was only 1 vessel that on an annual basis reported a significant number of catches of PHC greater than that for CRA. This vessel could perhaps have had the target species assigned as 'PHC' but he also caught CRA. So all records from the rock lobster fishing return form had the *target_sp* attribute set to 'CRA'.

Some fishers recorded their catch as a monthly total, typically on the last day of the month. These fishers often recorded the number of pots lifted as one daily value and sometimes did not record the number of days fished for the month. These forms understate the fishing effort. However no attempt has been made to estimate the number of days fished. Occasionally fishers recorded that they averaged a particular number of pots per day and the total catch for the month without indicating the number of days fished. These forms again clearly understate the effort but no attempt has been made to guess the number of days fished in these cases. For the data up to 1988 inclusive there are 3 208 forms equating to approximately 5 percent where there is no data on the number of pots hauled.

Year	Total pot lifts	Total pot lifts with average effort added	Published data [1] Estimated number of pot lifts
1979	3 848 847	3 874 109	Not Available
1980	3 995 840	4 033 009	4 092 602
1981	3 937 474	4 176 795	4 225 093
1982	4 129 599	4 537 373	4 629 784
1983	4 787 094	5 105 453	5 283 590
1984	5 498 406	5 827 940	6 072 310
1985	5 815 093	5 969 656	6 193 520
1986	5 798 507	5 853 603	6 147 080
1987	5 077 642	5 165 170	Not Available
1988	1 804 972	1 840 065	Not Available
1989	1 440 351	1 489 132	Not Available

Table 1. **Comparison of the number of pots lifts recorded in this fsu database by calendar year, with previously published data. The estimated number of pot lifts from the published data was calculated from the average number of pots hauled per day fished (where the number of pot lifts were given) multiplied by total days fished (Sanders, 1984).**

The FSU rock lobster form had provision to record 2 measures of effort, namely the number of pots hauled each day fished and from 1983 the maximum number of pots in the water at any one time during the month. These numbers were stored the in the *t_fishing_event* table in the attributes *effort_total_num* and *effort_num* respectively.

Species codes were checked and invalid codes corrected as documented in the *memo* attribute. While the rock lobster form does not have a formal way of recording a state code for species other than rock lobster, on a small number of occasions fishers annotated their data to indicate an alternative state such as headed and gutted (HGU). There were 6 records with a species code of 'HGU', which was in fact the state code for the species blue cod. These were corrected and the memo attribute set to 'HGU'.

The original data has a 1 character state code of 'G' for green i.e., whole, or 'T' for rock lobster tails. However the state code 'T' for finfish referred to 'Trunked/Headed and Gutted', so for the small number of records for finfish species that had a state code of 'T' recorded, the state code was set to 'HGU'. For rock lobster with a state code of 'T' the state code was set to 'RLT'.

A check was made for records of tailed rock lobster caught outside the tailing at sea area, which was defined for this exercise as statistical area codes 922 to 929. This identified 17 records where the *stat_area* code was corrected based on adjacent records and improbable distances moved per day. These records had the *memo* attribute set to 'ARU'. For the data up to 1988 inclusive there were 5 393 records in table *t_landing_event,* which had a state code of 'RLT' but were not in the tailing at sea area. These records were updated with the state code set to 'GRE', the conversion factor = 1 and the *memo* attribute set to 'RLT'. It is possible that a small number of these tailed rock lobster records may have been genuine, but for consistency all records of rock lobster tails outside these defined statistical areas were changed. Approximately 0.5 % of the records from

[1] Sanders B.M., McKoy J.L. and Annala J.H. (1982), Sanders B.M. (1983a, 1983b, 1984, 1985, 1986 & 1988)

1979 to 1982 have no value for the *stat_area* attribute and no attempt has been made to generate values for this field.

For the 1989 data, some fishers simply recorded the area as 1, 2, 3 etc through to 9. These were interpreted as the CRA management areas CRA1, CRA2, CRA3 thru CRA9 and were updated accordingly. While these are not valid stat area codes they are recorded in the *stat_area* attribute and should be obvious as such.

Data from these rock lobster potting forms have been assigned a fishing *method* code of 'RLP'. However some vessels particularly in the 1989 data recorded catches of significant amounts of tuna species etc. These tunas and associated kahawai were almost certainly caught by trolling, but a separate fishing event record has not been generated to assign the trolled species to. Similarly some vessels that caught significant quantities of blue cod were probably cod potting. One vessel that recorded catching blue cod and no rock lobster had the fishing method updated to 'CP' for cod potting and the memo set to RLP.

Year	Total green weight (kg) from the **new_fsu** database	FSU published data (kg) [2]
1979	4 475 496	Not Available
1980	4 495 569	4 533 976
1981	4 482 360	4 510 879
1982	4 747 319	4 746 790
1983	4 956 580	4 938 061
1984	5 392 755	5 402 729
1985	5 437 834	5 430 015
1986	5 231 628	5 219 399
1987	4 269 664	Not Available
1988	1 224 534	Not Available
1989	96 6690	Not Available

Table 2. Rock lobster reported as landed from this new_fsu database compared with the published data from Sanders and Sanders et al. The data from the database are consistent with the published data, all within one percent of the published data.

[2] Sanders B.M., McKoy J.L. and Annala J.H. (1982), Sanders B.M. (1983a, 1983b, 1984, 1985, 1986 & 1988)

2.4 Hand-gathering data

Hand-gathering data was collected on the **Hand Gathering Return** form 9 **(see Appendix 3)** from 1983 to 1988. These data were extracted from the MFish database tables fsu_hand_header, fsu_hand_catch and fsu_hand_landing. A count of the number of forms and days fished (6 346 and 33 523 respectively) from the MFish database matched exactly the counts from the files on the CD. This hand-gathering dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event* and *t_landing_event*. The measures of effort, namely the number of people, and the hours each spent hand-gathering were loaded to the attributes *effort_num* and *duration* respectively. There were no invalid dates in this dataset. Conversion factors were obtained from a copy of the FSU file 'CONVERSION_FACTORS'. See **Appendix 2** for the conversion factors used. The only conversion factor not sourced from this file was for cockle meat i.e. *state_code* SHU which was assigned a conversion factor of 5.0 based on the conversion factor for this state for the species pipi.

The hand gathering form had tick boxes to indicate if the quantity landed was green weight or meat weight. Meat weight values were stored with a state code of 'M' in the historical data. These records with a state code of 'M' were updated to the state code 'SHU' for shucked and shelled in the *t_landing_event* table of this new_fsu database. Similarly where 'Sugar bags' were ticked on the form, the historic data stored this as 'BA'. These records have the unit type set to 'BAG' in this database.

The hand gathering form had boxes to record the 'Shore fishing permit no.' and the 'Name of permit holder'. The historic data did not have dedicated fields for these data, which were stored in the *vessel_no* and *vessel_name* fields respectively if fishing was conducted from the shore and a vessel was not involved. Preference was given to recording the vessel details if both shore permit details and vessel details were given.

The attribute *dcf_key* for this hand gathering dataset was extracted from the MFish database tables as the attribute 'fsu_key'. This number contained the year as its first 2 digits followed by a 4 digit number that uniquely identified a set of data for one vessel for one month, typically the data from 1 form. Taking the dcf_key, and concatenating the MFish 2 digit record sequence number to the right hand end formed the attribute *event_key*. The event_key uniquely identifies each daily record on a hand gathering form, and can be used to join the *t_fishing_event* and *t_landing_event* tables if required.

There are approximately three percent of the records in the table *t_fishing_event* where the *stat_area* attribute is null, no attempt has been made to generate values for this field.

The *fishyear* attribute in the tables *t_fishing_event* and *t_landing_event* was set to the 1 October to 30th September fishing year for all these hand gathering data. This includes the small amount of rock lobster caught by hand gathering method(s) that currently has an April to March fishing year.

A check for likely errors in the effort data resulted in 19 records with diving times greater than 24 hours for the day. Without access to the raw data forms, closer inspection of these and associated records did not reveal any clear corrections that should be applied to these data. Some of these high values may be aggregate times from more than one days fishing.

Values for catch in kg per hour were calculated for each vessel by month and those months with a value over 500 kg/hour were checked, as they are sure to be in error. Some of these high catch rates result from missing effort data and others may have recorded the wrong unit type, e.g., sacks instead of kg. Daily catch effort was also calculated and values for paua over 1000 kg per hour were examined. Where the catches for that vessel were consistently reported in kg for the other months of that year but units were recorded as bags these were changed to kg, and documented in the *memo* attribute.

Published details of effort data summarising the particular measures of fishing effort recorded on each form, such as the number of people or hours fished are not available for the hand gathering data set. A comparison of the number of vessels and the number of days fished with previously published results for hand gathering (assumed to include diving) is displayed in table 3 below.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1983	465	8 899	441 [3]	8 821 [3]
1984	269	9 558	265 [4]	9 492 [4]

Table 3. Measures of effort from this new_fsu database for form type 9, compared with FSU published data for hand gathering.

A comparison of the catch data in this **new_fsu** database with previously published results for hand gathering (includes diving) is displayed in tables 3 and 4 below.

[3] King 1986

[4] King et.al. 1987

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [5]
COC	64	64
CRA	17	16
CRB	< 1	Not Available
MSB	2	
MSG	38	
MUS	2	2
PAU	1 183	1 202
PPI	43	43
SEO	31	Not Available
SUR	259	249 or 259 [6]
TUA	93	92

Table 4. Catch totals (tonnes) from the hand gathering dataset for the year January to December 1983, compared with FSU published data.
NB PAU had a Total green weight value of 1 197 t before updates correcting high catch per unit effort as documented in the memo attribute.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [7]
COC	212	209
CRA	27	27
HOR	19	Not Available
LIM	< 1	Not Available
MSB	5	
MSG	8	19
MUS	1	
PAA	< 1	Not Available
PAU	1 535	1 532
PPI	97	97
SEO	< 1	Not Available
SUR	308	301
TUA	78	76

Table 5. Catch totals (tonnes) from the hand gathering dataset for the year January to December 1984, compared with FSU published data.

[5] King 1986
[6] Table 12 or Table 19 respectively from King 1986
[7] King et.al. 1987

Tables 4 and 5 show that generally the reported catches agree with the data in this **new_fsu** database. For most of the differences the **new_fsu** database figures are slightly higher which is to be expected with additional vessels catches included in each of these years (see table 3).
The 1983 total for paua (PAU) is approximately 1.6% less from this **new_fsu** database than the historically published value for 1983. This small discrepancy may be due to different conversion factors applied for this species, probably for the unit_weight for bags. For the mussel species MUS, MSB and MSG, the data appear to have been reported differently in these 2 years. For 1983 the published value for 'Mussels' code MUS matches the value for species code MUS in this **new_fsu** database, excluding the catches for blue mussels (MSB) and green mussels (MSG). However for 1984 the published value for species code MUS must have included the data for blue and green mussels.

2.5 Eel Fishing data

The eel fishing dataset has data from 1983 to 1988. However it appears the 1988 data are incomplete due to the disestablishment that year of the FSU.

Data from the **Eel Fishing Return** form have been extracted from tables fsu_eel_header, fsu_eel_catch, fsu_eel_landing held in the Ministry of Fisheries database. A small amount of eel catch is also recorded on other form types from other fishing methods. A check on the count of records extracted for total days fished, for each year matched exactly the counts from each respective annual file, held on the CD version of the FSU dataset. No invalid dates were found in this dataset. All species recorded on the eel fishing form were in the green state, therefore there are no issues with conversion factors for this dataset.

The eel fishing form provided for one measure of effort per day fished, the number of nets or pots hauled. These numbers were stored in the *effort_total_num* attribute. A large number of records (4 088 out of 67 838) were missing effort. This was reduced to 2 841 records by making a number of passes, assigning missing effort, where effort had been recorded on the form at least once, until all cases where effort could be confidently allocated were completed.

In some cases records of daily effort appear to be totally missing, i.e., days not ticked on the form, however there is no way of confidently allocating days fished in such cases.

There are 156 records where species has been recorded as EEL, an obsolete code for unspecified marine eels. These are likely to be fresh water eels, but as it is not possible to rule out marine eels being caught in estuary situations, the codes have been left unchanged.

Missing *stat_area* code for eel statistical areas have been filled in for 5 forms where a distinct area code was provided for some days only. Missing area was not filled in for several forms where area codes were provided for two adjoining areas. There were also a number of forms for which area was totally missing and that could obviously not be assigned area codes.

A comparison of the number of vessels and the number of days fished with previously published results for eel fishing is displayed in the table below.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1983	224	11 899	222 [8]	11 719 [8]
1984	222	14 852	223 [9]	14 758 [9]

Table 6. Measures of effort from this new_fsu database compared with FSU published data from the 1983 and 1984.

[8] King 1986

[9] King et.al. 1987

Year	Total green weight (t) for species (LFE, SFE, EEU) from the **new_fsu** database.	Fishery Assessment Plenary, May 2002 MFish (t)
1983	1186	1206
1984	1377	1401
1985	1481	1505
1986	1155	1166
1987	993	1044
1988	524	989

Table 7. Comparison of catch totals for the combined fresh water eel codes for eel fishing forms (excludes any catch from other forms) with figures from the Report from the Fishery Assessment Plenary, May 2002: stock assessments and yield estimates, reported as MFish (t) figures from FSU, 1983 to 1989-90.

	Fyke Nets	Eel Pots	Set Nets	Total
new_fsu	1 181	5		1 186
Report	1 167	Not Available	20	1 192

Table 8. Catch totals (tonnes) from eel fishing dataset for the year January to December 1983, compared with FSU published data.

	Fyke Nets	Eel Pots	Set Nets	Total
new_fsu	1 366	10		1 376
Report	1 356	Not Available	24	1 394

T**able 9. Catch totals (tonnes) from eel fishing dataset for the year January to December 1984, compared with FSU published data.**

Table 7 shows some discrepancy between the figures from this **new_fsu** database and those reported previously, however the figures in table 7 are within 2% for 1983 to 1986, then increasing gaps for 1987 and 1988. In tables 8 and 9, where a direct comparison can be made for method Fyke Nets, the database figures are slightly higher, which could be due to additional data being submitted to the database after publication or differences in combination of species codes used.

2.6 Lining data

Data were collected on the **Line Fishing Return** form, which has a *form_type* of 5 **(see Appendix 3)** from 1983 to 1988. These data have been extracted from tables fsu_line_header, fsu_line_catch and fsu_line_landing held in the Ministry of Fisheries database. This data set corresponds to the data in the six files**:** line83.dat, line84.dat thru line88.dat on the CD.

The number of records in the MFish database tables for header records and effort records (in tables fsu_line_header and fsu_line_catch respectively) were exactly the same as the corresponding number of records in the files on the CD. However in the table fsu_line_catch the allocation of the system generated record sequence number was corrupted for the form with a *dcf_key* of 8812711 by the presence of an invalid record with a record indicator of 'W'. This resulted in three records with a duplicated record sequence number. One of these records from the table fsu_line_catch had 13 associated landing records, which were duplicated when the catch table was joined with the landing table to capture the landing date. These were all corrected in the final tables and documented in the *memo* attribute.
There were no raw data forms available to us to confirm that the data had been captured correctly. There were no records with invalid dates in the MFish tables and this was confirmed from the files on CD.
There were 5 records where the dcf_form_key in the table fsu_line_header that corresponds to the *form_type* attribute in this **new_fsu** database had a value of 0 (zero). These records were all consecutive and the values in both the 3 original tables and the 3 final tables were updated back to 5. The memo attribute documents this change in the 3 final tables that this dataset was loaded to, *namely t_forms, t_fishing_event* and *t_landing_event*. Obsolete species codes were updated to the current codes including SNP (premium snapper) and ASQ (arrow squid), which become SNA and SQU respectively.

The attribute *dcf_key* for this lining dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database. This number uniquely identifies a set of data for one vessel for one month, typically the data from 1 form. Taking the *dcf_key* and concatenating the MFish 2 digit record sequence number to the right hand end formed the attribute *event_key*.

The measure of effort, namely the number of hooks set or the number of handlines was loaded to the attribute *hook_no*. The distribution of effort and particularly the maximum effort was examined for each of the lining methods. The maximum number of hooks set, or number of lines is shown below.

Method code	Maximum hook_no
BLL	24 000
DL	5 000
HL	1 700
LL	14 000
SJ	1 500
SLL	1 500
TL	10 000

Table 10. The maximum number of hooks set or the number of hand lines by fishing method.

Some of these values are likely to be too high or they may be recorded as hand lining when it is most likely that they were using one of the long lining methods. For example all the 6 records of 24 000 hooks set which are recorded by one vessel in July 1988 should probably be 2 400. No changes have been made to these values for *hook_no* due to uncertainty regarding the correct values.

		From the **new_fsu** database		FSU published data	
Calendar Year	Fishing method	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1983	Long Line	1 085	37 590	1 068	37 238
1983	Hand Line	268	2 809	268	2 809
1984	Long Line	890	36 708	870	36 383
1984	Hand Line	218	3 066	216	3 054

Table 11. Measures of effort for lining methods from this new_fsu database compared with FSU published data from the 1993 and 1984 calendar years.

Species	Fishing method	Total green weight (t) from the **new_fsu** database	FSU published data [10]
BCO	Hand Line	171	159
BNS	Long Line	573	573
GUR	Long Line	235	235
LIN	Long Line	1 662	1 656
POR	Long Line	13	13
SCH	Long Line	1 310	1 306
SNA	Long Line	2 898	2 898
STN	Hand Line	82	82

Table 12. Catch totals (tonnes) from the line dataset for the year January to December 1983, compared with FSU published data.

[10] King 1986

Species	Method	Total green weight (t) from **new_fsu** database	FSU published data [11]
BCO	Hand Line	222	224
BNS	Long Line	664	664
GUR	Long Line	265	265
LIN	Long Line	1 076	1 075
POR	Long Line	14	13
SCH	Long Line	1 306	1 302
SNA	Long Line	2 958	2 946
STN	Hand Line	70	70

Table 13. Catch totals (tonnes) from the line dataset for the year January to December 1984, compared with FSU published data.

The species in tables 12 and 13 above were selected because they had catches reported by lining methods in the publications by King 1986 and King et al 1987. Long Line data in these two tables from this **new_fsu** database includes all long lining methods, namely BLL, DL, LL, TL and SLL, because it appears that these two publications by King include the catches from all the long line methods in this way.

Tables 12 and 13 generally show good correlation between the reported catches in this **new_fsu** database and the previously published figures, with most of the species tabulated within 3%. The catches of BNS and GUR agree for both years and the difference in the SNA catch is less than 0.5%. As shown in table 11 there were more vessels and more days fished in this **new_fsu** database compared with the published figures in all categories shown except hand lining in 1983. Hence we would expect a corresponding increase in the catch of some species, which is generally shown by tables 12 and 13. Discrepancies such as the 7% increase for BCO in the 1983 hand line catch can largely be explained due to different conversion factors being used over time. The publication by King (1986) refers to a conversion factor of 1.9 for BCO fillets, whereas the figures shown above in table 8 uses a conversion factor of 2.3 for BCO fillets, which results in approximately 13 t more BCO calculated green weight.

Since we have adopted one conversion factor for each species and state for this dataset but some conversion factors were revised during the FSU era, for example in July 1985, there may be some discrepancies for other species compared with the previously published results.

[11] King *et al* 1987

2.7 Set-net data

Set-net data was collected on form 8 **(see Appendix 3)** from 1983 to 1988. These data were extracted from the MFish database tables, fsu_set_net_header, fsu_set_net_catch and fsu_set_net_landing. This set-net dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event* and *t_landing_event*. The only measure of effort recorded on the set net form, the total length of net set (metres), was loaded into the attribute *effort_total_num*. No invalid dates were found in this dataset. Conversion factors applied were from the FSU file FISHSTATS>CODES>CONVERSION_FACTORS. See **Appendix 2** for the conversion factors used.

The attribute *dcf_key* for this set netting dataset was extracted from the MFish database tables as the attribute 'fsu_key'. This number contained the year as its first 2 digits followed by a 4 digit number that uniquely identified a set of data for one vessel for one month, contained on one form. Taking the dcf_key, then concatenating the MFish 2 digit record sequence number, to the right hand end, formed the attribute *event_key*. The *event_key* uniquely identifies each day of fishing on a set net form.

Missing *stat_area* codes have been filled in for 5 forms where the area was missed for some days and a distinct area code was provided for other days within the same return form. Forms with missing area, where area codes were provided for more than one area (3 vessels), or area was totally missing, have not been assigned area codes. There are approximately two percent of the records in the table *t_fishing_event* where the stat_area *attribute* is null, for set netting because it is not possible to reliably generate values.

The *fishyear* attribute in the tables *t_fishing_event* and *t_landing_event* was set to the 1 October to 30th September fishing year for all these set netting data. This includes the small amount of rock lobster caught by set net method, which currently has an April to March fishing year.

As a check on the data, catch by net length (kg/m) were calculated for each vessel using the daily records by species. This process produced some improbable catch rates. In a small number of cases, it appears the number of nets or sets, rather than total net length has been recorded on the return form. There are 66 records with less than 20 m and 46 of these have less than 10 m total net length. The catch rate exceeds 100kg/m for 23 records (3 vessels), going as high as 2 024 kg/m (net 'length' only 5 m). Set net returns with any records having over 5.0 kg/m and less than 30 m of net were checked. None of the checked forms provided alternative figures that could be applied as corrections, therefore no alterations have been made to any net length values. An alternative would be to set the total net length to null, below a certain cut off, however it is felt decisions on data constraints that apply to the effort figures in this dataset should be left to end users.

A comparison of the number of vessels and the number of days fished with previously published results for set netting is displayed in table 14 below.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1983	1 628	63 320	1 625	63 508
1984	1 121	61 550	1 120	61 343

Table 14. Measures of effort for set net data from this new_fsu database compared with FSU published data from the 1983 and 1984 calendar years.

A comparison of the catch data in this **new_fsu** database with previously published FSU results for set netting is displayed in tables 15 and 16 below. As there are in excess of 100 species caught by set netting, only the species with published data are included in the tables. The published data included some groupings of species, also repeated for comparison.

Species	Total green weight from the **new_fsu** database (t)	FSU published data (t) [12]	% **new_fsu** database of published FSU data
Total	12 504	12 367	101.11%
SPO	3 093	3 021	102.38%
SCH	1 881	1 820	103.35%
FLO *	1 129	1 123	100.53%
GMU	1 022	1 047	97.61%
KAH	628	626	100.32%
WAR	583	582	100.17%
MOK	515	514	100.19%
TAR	403	393	102.54%
ELE	394	388	101.55%
HPB *	326	321	101.56%
LIN	223	224	99.55%
SPD	125	202	61.88%
BUT	138	136	101.47%
KIN	125	125	100.00%
POR	107	107	100.00%
PAR	87	87	100.00%
BNS	80	80	100.00%
SKI	54	54	100.00%
RCO	46	43	106.98%
STA	34	38	89.47%
SOL *	31	31	100.00%
CRB *	21	21	100.00%
GSH	14	14	100.00%
HOK	4	4	100.00%

Table 15. Catch totals from the set netting dataset for the year January to December 1983, compared with FSU published data, for species where published figures are available.
* FLO includes species codes: FLO, BFL, SFL and YBF.
* HPB includes species codes: HAP and BAS.
* SOL includes species codes: SOL, ESO and LSO.
* CRB includes species codes: CRB and PAD.
There are 107 distinct species codes recorded in the dataset for 1983.

[12] King 1986

Species	Total green weight from the **new_fsu** database (t)	FSU published data (t) [13]	% **new_fsu** database of published FSU data
Total	14 370	14 236	100.94%
SCH	2 941	2 906	101.20%
SPO	2 896	2 846	101.76%
FLO *	1 138	1 136	100.18%
GMU	1 055	1 060	99.53%
MOK	717	706	101.56%
TAR	612	593	103.20%
KAH	548	547	100.18%
HPB *	439	439	100.00%
WAR	409	408	100.25%
ELE	339	339	100.00%
SPD	286	286	100.00%
BNS	226	226	100.00%
BUT	153	153	100.00%
KIN	118	118	100.00%
POR	101	101	100.00%
SKI	97	97	100.00%
CRB *	93	93	100.00%
PAR	69	69	100.00%
STA	41	45	91.11%
SOL *	30	30	100.00%
GSH	22	22	100.00%
SKA	18	18	100.00%
HOK	11	11	100.00%

Table 16. Catch totals from the set netting dataset for the year January to December 1984, compared with FSU published data, for species where published figures are available.
* FLO includes species codes: FLO, BFL, SFL and YBF.
* HPB includes species codes: HAP and BAS.
* SOL includes species codes: SOL, ESO and LSO.
* CRB includes species codes: CRB and PAD.
There are 126 distinct species codes recorded in the dataset for 1984.

Tables 15 and 16 show that generally, the reported catches agree with the data in this **new_fsu** database. There will have been some additional catch reported after these results were published, as the number of vessels in table 14 indicates, and possibly some amendments. Some discrepancies may also be due to different conversion factors applied to various species. 'Standard' conversion factors (see Appendix 2) were applied to all years, for each species by state in this **new_fsu** database. In practice, the conversion factor used by the FSU in the 1980's varied across years in some instances. The main set net species with notable variation is spiny dogfish (SPD) in 1983. The bulk of SPD was landed in the Headed and Gutted (HGU) state. The FSU conversion factor file comments that an earlier conversion factor for SPD, state HGU was 3.0. This explains why the database figure for 1983 is lower than that published, as the conversion factor used in this **new_fsu**

[13] King 1986

database for SPD, state HGU is 1.7. If a conversion factor of 3.0 is used for SPD in the HGU state, the total SPD catch is 210 t for this set net dataset. The real life conversion back to green weight will not have varied to any great extent, hence the database figures have been left as they are, as they should be more realistic.

Set net effort was recorded on the set net form, as the total length of net set in metres, for each day fished. (Stored in *effort_total_num)*. Published statistical area summaries for domestic fishing (1983 and 1984) includes set net effort figures provided set net ranked in the top 3 fishing methods. Conversely, published set net length data is not available for other areas. The following two tables compare the published figures for total net length with the values from this **new_fsu** database.

Stat area	**new_fsu** database total net length (m)	Published total net length (m).	**new_fsu** days effort given.	Published days effort given.	**new_fsu** days effort not given.	Published days effort not given
002	1 627 269	1 627 269	2 505	2 505	71	71
007	8 426 488	8 396 988	9 458	9 433	319	319
012	147 580	147 580	195	195	0	0
015	510 390	510 390	659	659	4	4
016	1 261 955	1 261 955	2 029	2 029	32	32
018	5 818 909	5 811 599	4 458	4 457	226	226
020	1 311 101	1 281 601	1 362	1 350	49	46
022	4 817 880	4 807 980	2 984	2 979	115	115
024	1 047 518	1 047 518	814	814	142	120
026	179 350	179 350	195	195	1	1
027	133 190	133 190	71	71	10	10
029	24 500	24 500	43	43	0	0
030	475 880	475 880	333	333	5	5
032	68 850	68 850	67	67	5	5
033	497 260	497 260	307	306	29	29
034	520 220	520 220	199	199	19	19
035	601 150	601 150	383	367	30	30
039	994 632	994 632	1 172	1 172	46	46
040	2 537 044	2 537 044	1 507	1 494	9	8
041	2 067 076	2 067 076	2 313	2 312	56	56
042	1 287 193	1 287 193	2 233	2 233	121	121
043	3 548 659	3 548 659	5 855	5 855	114	114
044	4 007 026	4 004 526	6 061	6 056	106	106
046	787 080	787 080	1 275	1 275	85	85
049	6 660	6 660	87	87	9	9

Table 17. Effort totals from the set netting dataset for the year January to December 1983 compared with FSU published data, for statistical areas where published figures are available.
The published effort figures are only available, where set net ranked in the top 3 methods for domestic fishing.

Stat area	**new_fsu** database total net length (m)	Published total net length (m).	**new_fsu** days effort given	Published days effort given.	**new_fsu** days effort not given.	Published days effort not given
002	1 634 544	1 634 544	2 197	2 193	76	76
007	9 513 919	9 513 919	9 865	9 865	338	338
009	1 784 845	1 784 845	2 146	2 146	173	173
010	545 895	545 895	649	649	51	51
012	210 260	208 260	198	197	0	0
015	639 756	639 756	540	540	14	14
016	960 410	960 410	1 482	1 482	26	26
018	6 364 919	6 364 919	4 342	4 340	267	267
020	1 517 818	1 517 818	1 180	1 176	85	85
022	4 464 741	4 464 741	2 071	2 071	78	78
024	1 371 215	1 371 215	989	989	83	83
025	490 463	490 463	539	539	10	10
026	174 215	174 215	162	162	10	10
027	234 870	234 870	198	198	1	1
029	114 700	114 700	109	109	0	0
030	717 850	717 850	382	382	5	5
031	85 330	47 550	169	43	19	19
032	56 522	56 522	131	131	0	0
035	549 800	549 800	371	371	22	22
036	129 155	129 155	63	63	5	5
037	217 224	217 224	105	105	6	6
038	1 484 770	1 484 770	1 496	1 496	100	100
039	670 910	670 910	797	797	54	54
040	2 868 875	2 868 875	1 553	1 553	60	60
041	2 079 677	2 079 677	2 078	2 078	74	74
042	1 559 340	1 559 340	2 072	2 072	71	71
043	3 677 433	3 621 333	5 601	5 540	72	72
044	5 471 141	5 466 641	6 961	6 956	301	301
046	637 320	637 320	949	949	41	39
049	7 693	7 693	93	93	29	29
050	24 710	24 710	97	97	0	0

Table 18. Effort totals from the set netting dataset for the year January to December 1984 compared with FSU published data, for statistical areas where published figures are available.
The published effort figures are only available, where set net ranked in the top 3 methods for domestic fishing.

As described earlier (table 14), this database includes some additional data compared to the FSU published data, therefore it would be expected the effort totals to have also increased for some areas. The allocation of area codes to a small number of vessels, referred to earlier, will also be reflected as differences in the comparisons. Given the above constraints, the exact match of total set net length in a number of statistical areas for both 1983 and 1984 confirms the set net effort recorded in the **new_fsu** database against the published data.

2.8 Trawl data

The trawl fishing dataset comprises data from three sets of forms, with the forms used depending on the size and type of vessel. Smaller domestic trawlers completed the trawl fishing return, with one line per tow or one line for each days fishing, whichever suited the fisher best. Larger domestic 'specified trawlers' ranging in length from 22 to 43 metres completed a separate form for each tow. Both of these forms had an associated landed catch form. The third dataset comprises larger deep water or factory trawlers, which process their catch at sea, and includes domestic, foreign chartered and foreign licensed vessels. These vessels completed Trawl catch effort logbooks.

2.8.1 Trawl fishing return

Data was collected on the **Trawl fishing return (see Appendix 3)** from 1983 to 1988. This form was for smaller domestic trawlers and had a *form_type* of 1. The associated landing data was recorded on the landed catch form **(see Appendix 3)**, which has a *form_type* of 15. This dataset corresponds to the data in the six files: trawl83.dat, trawl84.dat thru trawl88.dat on the CD.

The association between the landed catch records in these files on the CD with the associated effort and estimated catch is based on the sequential order of the records in the file, as the first day fished and last day fished from the landed catch form are not recorded in the source files on the CD. The data in the MFish database tables fsu_trawl_catch and fsu_trawl_landing did not correctly record the association of the lines on the trawl form with those from the landed catch form, so this data set has been extracted from the files on the CD. The format and values of the attribute fsu_key from the MFish database table fsu_trawl_header has been retained, and these values have been used as the *dcf_key* in this **new_fsu** database. To retain the values of the *vessel_key* assigned by MFish in their database table fsu_trawl_header, the data for the table *t_forms* has been extracted directly from the table fsu_trawl_header.

The number of records in the MFish database tables for header records, and effort records (in table fsu_trawl_catch) were exactly the same as the corresponding number of records in the files on the CD. There were no raw data forms for this time series available to us to confirm that the data had been captured correctly. There were no records with invalid dates in the MFish tables and this was confirmed from the files on CD.

The daily catch and effort records typically recorded the total estimated catch as the first estimated catch record on each line, followed by a maximum of 3 species. However for 12 records these totals were omitted and 11 estimated catch values for species ESO and one for FLO were recorded in the TOT column. These records were updated with these amounts transferred to the estimated subcatch table.

The values for the quantity of estimated catch in the source data have a maximum value of 32767. However 'duplicate' records occur for TOT and individual species records associated with these records with values of 32767. These 'duplicate' records were combined for individual species or if for 'TOT' records these quantities were added to the *totalcatch* attribute in the *t_fishing_event* table.

Vessels completing the trawl form also completed the **landed catch form**, which has a form type of 15 **(see Appendix 3)**. The landed catch form and associated records were typically associated with a header record and a group of effort and estimated catch records. This association was presumably based on the dates recorded on the landed catch form for first day fished and last day fished, but these dates were not recorded in the data available. For these records we took the date from the previous daily record as the landed date. However some groups of landed catch records did not have any associated daily effort and estimated catch data. So for these landed catch records in table *t_landing_event* the landed date is null, but both the calendar year and fishing year attributes are populated and the month can be obtained by joining these landing records to the corresponding records in the *t_forms* table with the attribute *dcf_key*. In the *t_landing_event_o* table the *land_date* attribute has the first 2 characters of the date set to '00' for the day for these landing records where there is no associated daily record to extract a date from. Data from the landed catch form with a form type of 15 have been loaded to the *t_landing_event* table. These data have been assigned the form type of their associated fishing event, in this case the form type of 1, so each data set can be identified.

The attribute *dcf_key* for this trawl dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database. This number uniquely identifies a set of data for one vessel for one month, typically the data from 1 form. Taking the dcf_key, and concatenating a 2 digit record sequence number to the right hand end formed the attribute *event_key*.

Values for the *trip* attribute were generated based on each group of 1 or more landing event records. This *trip* attribute can be used to associate 1 or more fishing event records with the corresponding landing event records.

For some other datasets (i.e., form types,) the tables *t_fishing_event* and *t_landing_event* can be joined using the *event_key* attribute to correctly associate a catch from *t_landing_event* with effort or area data from *t_fishing_event.* This join cannot always be made for this dataset because some landing event records do not have a corresponding fishing event record.

For the table *t_estimated_subcatch* the FSU documentation stated that cases (outside Wellington) had a factor or unit weight of 30, and cases (Wellington) had a factor of 45, so the unit type '1' (i.e. 'Baskets, cases or bins') was set to 'BAS' for Wellington and 'BIN' for outside Wellington, to retain the distinction. These values were assigned to the attribute *unit_weight* accordingly.

In the table *t_fishing_event* 12 values for the *stat_area* attribute were invalid, i.e., greater that 052. These values were updated to valid codes based on adjacent records in the CD files and the memo attribute set to 'ARI'.
Obsolete or erroneous species codes were updated, including code SAL for salps, which was updated to SAM for salmon, based on FSU documentation. One record with a species code of DOR, for unspecified dory, was updated to JDO for John Dory. The original species code was assigned to the *memo* attribute. There were 26 records with the species coded as MEA and a state code of GRE, which had these attributes updated to UNI and MEA respectively.

Comparisons of this dataset with previously published data are presented in the next section, where summaries are presented for domestic trawling which combines these two sections.

2.8.2 Specified trawl

Trawl data was collected on the form in the booklet labelled '**Trawl log for specified vessels**' **(see Appendix 3)** from 1983 to 1988. This form has a *form_type* of 16. The associated landing data was recorded on the landed catch form, which has a *form_type* of 15.

Data from these forms have been extracted from tables fsu_strawl_header and fsu_strawl_catch with landed catch data from the table fsu_strawl_landing held in the Ministry of Fisheries database. This dataset corresponds to the data in the six files: specified83.dat, specified84.dat thru specified88.dat on the CD.

The number of records in the MFish database tables for header records were exactly the same as the corresponding number of records in the files on the CD, namely 59 243. There were no raw data forms for this time series available to us to confirm that the data had been captured correctly. There were no records with invalid dates in the MFish tables and this was confirmed from the files on CD.

The attribute *dcf_key* for this specified trawl dataset was generated by extracting the attribute 'fsu_key' from the MFish database. As the specified trawl form has one form per tow or fishing event, the attributes *dcf_key* that uniquely identifies a form and *event_key,* which uniquely identifies a fishing event are the same for this dataset.

The specified trawl form had provision to record only one date being that for the start of the tow. The date for the finish of the tow was set if the tow times were not null. If the start time was less than the finish time then the finish date was set equal to the start date. If the start time was greater than the finish time the finish date was initially set to the following day. However some times are in error so the finish date will be incorrect in some cases. A closer look was made where the finish date was now greater than the start date and the time start was before 1500 or the time finish was after 0900, i.e., looking for tows of erroneously long duration. This exercise resulted in 43 tows identified. Of these 43, 2 looked plausible and 4 had the finish date set to null, as it was not clear when the tow finished. A further 34 of these records had the date finish set equal to the date start with the memo attribute set to 'TIM', and 3 records had the start time updated with the memo attribute set to 'TSU'.

Longitude values east of 180 degrees east were stored as values from 180 potentially up to 360 degrees. These values were updated (back to how they would have originally been recorded) consistent with the convention for recording longitude as values east or west of up to a maximum of 180 degrees.

Obsolete target species were updated, with codes ASQ becoming SQU, DOR becoming OEO and COD becoming RCO. The updated codes of OEO and RCO were based on the estimated catches, which were confirmed as oreo dory and red cod respectively. Obsolete species codes were updated including SNP for premium snapper updated to SNA, ASQ for arrow squid updated to SQU, and SAL for salps updated to SAM (salmon) based on FSU documentation. At the request of MFish the species code EPT was updated to CDL, and SHA to OSD. The original target species, or species codes were assigned to the *memo* attribute. All 251 records with the species coded as MEA, which had a state code of GRE, had these attributes updated to UNI and MEA respectively.

For each tow the specified trawl form had provision to record the estimated catch as the total number of "Cases / Baskets", and the number of Cases / Baskets for the main species, with 33 of the main species pre-printed on the form. The historic FSU documentation refers to a default case

weight of 30 kg. However an earlier folder of historic FSU documents contains a page headed 'Vessels completing trawl logs for specified vessels as at 1 January 1983'. This page lists case weights by vessel, which range from 30-35 to 45 kg. Given the variability of case weights by vessel, average case weights were back calculated for each vessel by year and for each vessel for this dataset. Rounded off values based on these calculated case weights were applied to the estimated total catch and estimated catch by species to generate the values for the attributes *totalcatch* in the table *t_fishing_event* and *weight* in the table *t_estimated_subcatch*. The values used for the case weights are stored in the attribute *unit_weight* in the table *t_estimated_subcatch*.

There were seven records in the table *t_estimated_subcatch_o* where a species was repeated for a tow, i.e., for an *event_key*. These records were combined in the *t_estimated_subcatch* table, but the second of each repeated species may have been a misrecording of a different species because all of the seven repeated species were those that were pre-printed on the form and the values were small so there would be no issue with electronic storage of the values. These combined records in the *t_estimated_subcatch* table are identified by memo values of 'SP2'.

As with the smaller domestic trawlers the landed catch records did not have a landing date recorded in the data currently available. For these landing records we took the maximum date from the associated daily records for the landed date in the *t_landing_event* table.

The 69 006 specified trawl records in the *t_landing_event_o* table, when combined by species and state code resulted in 68 618 records in the *t_landing_event table*. Most of these multiple records for a species and state for one event_key are because the maximum value stored was 99 999 kg. So for landings of 100 000 kg or more, 2 or more records were required. For some landing events two smaller records of a landing for a species and state code combination were recorded for some reason. For some blocks of landing data there are up to 4 consecutive lines (once) in the original files, or 3 consecutive lines (on 36 occasions). These landing data were all assigned the *dcf_key* and *event_key* of the previous fishing event record in the MFish database tables and this relationship is maintained.
Data from the landed catch form (form type = 15) in the *t_landing_event* table have been assigned the form type of their associated fishing event, in this case the form type of 16, so each data set can be identified.

		From the **new_fsu** database		FSU published data	
Calendar Year	Fishing method	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1983	Single Trawl	414	25 897	429	32 534
1983	Pair Trawl	106	6 087	106	6 811
1984	Single trawl	422	29 374	438	38 079
1984	Pair Trawl	72	4 654	73	4 822

Table 19. Measures of effort for trawling (form types 1 and 16), from this new_fsu database compared with FSU published data from the 1993 and 1984 calendar years.

Table 19 shows that for some reason the number of trawl vessels and vessel days recorded from this fsu database are less than those previously published values for 1983 and 1984. The exception is the number of vessels that reported pair trawling is consistent at 106 for 1983 and 1 vessel different for 1984. We can not fully explain this discrepancy, but with 460 and 448 vessels

completing either the trawl form with a form type of 1 or the specified trawl forms for the years 1983 and 1984 respectively we are confident that we have captured all the data.

The data for the two New Zealand vessels in the deepwater fleet for these years (1983 and 1984) have been included in the data summarised in the next 2 tables below. The catches of these two vessels are generally not significant for the species summarized in the 2 tables below except for ORH and OEO. These two vessels recorded 443 and 337 vessel days for 1983 and 1984 respectively.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [14]
BAR	14 597	12 977
GUR	4 569	3 353
HOK	7 877	7 698
JMA	628	458
OEO *	1 782	1 472
ORH	18 206	18 099
RCO	7 193	6 650
SKI	1 677	1 550
SNA	7 215	4 289
SPO	822	666
TAR	4 005	3 759
TRE	4 605	2 619

Table 20. Catch totals (tonnes) from the trawl dataset (form types 1 and 16 plus the two NZ factory trawlers) for the year January to December 1983, compared with FSU published data for methods Single Trawl and Pair Trawl combined.
* OEO includes species codes: OEO, BOE and SSO.

[14] King 1986

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [15]
BAR	12 564	12 092
GUR	4 184	3 274
HOK	9 245	9 240
JMA	491	381
OEO *	2 418	1 472
ORH	21 209	21 068
RCO	11 584	11 189
SNA	6 675	4 236
SPO	764	639
TAR	4 020	3 864
TRE	4 388	2 594

Table 21. Catch totals (tonnes) from the trawl dataset (form types 1 and 16 plus the two NZ factory trawlers) for the year January to December 1984, compared with FSU published data for methods Single Trawl and Pair Trawl combined.
* OEO includes species codes: OEO, BOE and SSO.

The summarised catch data for the domestic trawl fishery shown in tables 20 and 21 does not show good consistency between the catches summarised from this database and the previously published figures. Species ORH shows the best consistency with the figures less that 1% different for both years, but TRE catches from this database have values over 70% higher than the previously published figures. It is not totally clear from the published data exactly which combination of form types and fishing methods are included. The highest discrepancies occur with species that have high relative catches from pair trawling, and it is possible there are some discrepancies as to how the reported catch was assigned or apportioned to those vessels reporting catches by pair trawling. As with all form types and methods there may be small discrepancies associated with different conversion factors used for the respective summaries.

The *trip* attribute in the fishing event and landing event tables was not initially populated for this dataset as the data was sourced from the MFish tables which did not contain a trip attribute.
Values for the *trip* attribute were generated in September 2011 as part of an upgrade to these data, based on a landing defining the end of a trip. Values for the *trip* attribute were assigned to tables *t_fishing_event* and *t_landing event* for *form_type* 16. This *trip* attribute can be used to associate 1 or more fishing event records with the corresponding landing event records.

As part of the process to assign values for *trip*, this identified that for 3 vessels where trips started at the end of the calendar year and finished in the next calendar year the wrong year was assigned to a few records so the trip was recorded as starting in December and finishing in January of the same year.
This affected trips for *vessel_no*'s 96121 in 1984, 6177 in 1983 and 5875 in 1987. The corrected records were assigned a memo value of DFN. The event key values still retain the original 2 digit calendar year at the start of the event and dcf keys.

[15] King *et al* 1987

2.8.3 Deep water trawl

Large trawlers that processed their catch at sea completed the **Trawl catch effort logbook**. This included foreign licensed vessels, foreign chartered vessels and New Zealand domestic factory trawlers. These data were assigned a form type of 17, although this form number was never printed on the form **(see Appendix 3)**. These data were sourced from 24 files from the CD. The data in the tables on the MFish database omitted the earliest 4 files in the series so all deepwater trawl data was sourced directly from these files. The filenames for this deepwater trawl dataset all start with 'trawl' followed by 2 years embedded in the filename and have filenames including: trawl7879.dat, trawl7980.dat, … trawl8484_fcd.dat etc. Filenames with 'fcd' in them referred to foreign chartered domestic vessels, 'lic' referred to foreign licensed vessels, 'nzl' referred to New Zealand vessels, and 'fletch' referred to vessels owned by the New Zealand company Fletcher Fishing. Two of the 26 files in this series were discovered to be duplicates for the New Zealand data for 1983 and 1984. The files named trawl8383_nzl.dat and trawl8383_fletch.dat contain essentially the same data, as the only New Zealand vessels at this time were the two Fletcher Fishing vessels. A similar situation exists for the 1984 year except that the file trawl8484_nzl.dat has 88 more tows recorded in December. Hence the files trawl8383_nzl.dat and trawl8484_fletch.dat were excluded from this dataset. This time series of trawl data starts in April 1978 and continues until November 1988, but the 1988 year is incomplete.

The vessel key was applied to this dataset for those vessels that were assigned a vessel key in the MFish database tables. There are 229 distinct vessel call signs in the original dataset, and 109 of these currently do not have a vessel key assigned. One or two of these distinct call signs are probably errors, as they are only one letter different for the same name. Namely call sign UOVK probably should be NOVK as both have the same vessel name. Similarly but less certain UJMY probably should be UIMY. Four other vessels have the same name but different call signs, which are probably correct. No alterations were made to the call signs as this is best done when the null vessel keys are updated and the vessel data groomed at a later stage.

The Perl program that checked and formatted the data generated the attribute dcf_key. The format is similar to those values from other datasets, with the first 2 digits identifying the calendar year, followed by a number that started with 011001 and incremented for each new logbook header. E.g. the first *dcf_key* = 78011001. Note that this *dcf_key* has 1 extra digit compared with the dcf keys for all other datasets. For this dataset a *dcf_key* identifies a logbook, which had a unique logbook number and was originally composed of 50 pages, one page per tow with associated processed catch pages. From part way through the source data files for 1984 from the CD, the way the data was stored changes and there is a new logbook header record after each group of processed catch records. This generates a new *dcf_key* approximately every 4 tows.

Each tow or fishing event is identified by a unique *event_key*. The *event_key* is formed from the *dcf_key* with a 2 digit sequential number concatenated to the right hand end. As a logbook may contain data for more than one month, the value for the month attribute *mth* in the table *t_forms* was standardised as the start date i.e., *date_from* for the logbook. The value of the *event_key* in the landing event and processing event tables is the same as the *event_key* for the previous fishing event.

The logbook number was present in the raw data only up to part way through 1984, and is not present when the raw data changes to the format with a new logbook header after each group of processed catch records. Where it is present in the raw data, the logbook number is stored in the attribute *logbook_no*. While the pages in the most recent version of this logbook had pre-printed

page numbers from 1 to 50, these page numbers were not recorded in the raw data on the CD so no page numbers are provided for these data in this database.

The deepwater trawl form did not have a fishing method code to state if the method was Bottom Trawl or Mid Water trawl. The form did however have a gear code box with 189 distinct gear codes recorded. Various gear codes were recorded including numeric codes, alpha codes such as 'A', and combinations such as 'A1'. None of these combinations above give any indication of the fishing method used at the time. Other gear codes such as 'BT', 'BT1' and other variants of BT are likely to have been bottom trawls and were coded to fishing *method* 'BT' for bottom trawling. Similarly all variants of MW and MT were coded to method 'MW' for mid water trawling. Variants of PT, which was assumed to refer to pelagic trawl, were also coded to method 'MW'. Gear codes starting with B but not BT were assigned a memo code of 'MB%' (for Method B %, where % represents a wild card of 0 to many characters). Gear codes starting with M but neither MW or MT were assigned a memo code of 'MM%' and those starting with P but not PT were assigned a memo code of 'MP%'. It is likely that these records with a memo of 'MB%' were Bottom Trawls but this was not considered definitive enough to assign a method code of 'BT', largely because of the presence of over 4 400 'A' codes, which suggests that some vessels labelled their nets 'A' and 'B' etc. All records not assigned a fishing *method* code of either 'BT' or 'MW' were assigned a code 'ST' for generic single trawl.

One invalid date was detected, that was recorded as 31 NOV 78, which was updated to 30 NOV 78 and the memo attribute set to DAT.

The deepwater trawl form had provision to record only one date being that for the start of the tow. The date for the finish of the tow was set if the tow times were not null. If the start time was less than the finish time then the finish date was set equal to the start date. If the start time was greater than the finish time the finish date was initially set to the following day. However some times are in error so the finish date will be incorrect in some cases. Records were then checked for consecutive dates and times where tow times were greater than approximately 15 hours. This exercise resulted in 31 tows identified. Of these 31, 7 had times that were not consecutive and these records were updated, mostly with the finish date set equal to the start date, and the memo attribute set to 'TSU' or 'TIM'. Some of these errors in date and or time were not fully resolved.

For the years 1983 to 1988 longitude values east of 180 degrees East were stored as values from 180 potentially up to 360 degrees. These values were updated (back to how they would have originally been recorded,) consistent with the convention for recording longitude as values East or West, up to a maximum of 180 degrees.

A simple check was made for invalid positions, defined for this exercise as latitudes less than 20 degrees and longitudes less than 160 degrees. This identified 24 and 15 records respectively that were each examined alongside approximately 10 adjacent records. Most of the latitude errors appeared in the database as 5.0, which would have been recorded as 50. These were all updated to 50 degrees 00.0 minutes, which is consistent with adjacent positions. Similarly most longitude errors were updated to 167 degrees. These updates are identified by the memo values of 'LAT' and 'LON' respectively.

Obsolete and invalid target species were updated, including codes ASQ becoming SQU, DOR becoming OEO, DOG becoming OSD, SBM becoming UNI and SSD becoming SSO. The correct code of SSO for the obsolete and unlikely code of SSD was established by looking at adjacent values for target species and or the estimated catches. For the original target species code of DOR, the catches were confirmed as oreo dory as opposed to other dory species. At the request of MFish

the species code MCH was updated to NOT for 1 record in Pegasus Bay, EPT was updated to CDL, and SHA to OSD. The original species code is assigned to the memo attribute in these cases.

Two invalid bottom temperatures were set to null as they were above the valid maximum of 24.0 degrees. Values of zero for headline height (attribute *effort_height*), speed, surface temperature and bottom temperature were set to null.

In the table *t_estimated_subcatch* 52 records existed where there were two or more estimated catch records for one species for the one fishing event (i.e. tow). These were combined and the memo attribute set to 'SP2'. One record had a species code of 'NIL' but recorded a catch weight for the NIL species as well as for another valid species. For this record the species code NIL was set to 'MIX' and the memo attribute set to 'NIL'.

The deepwater trawl logbook form had at least 3 versions in use between 1978 and 1988. See **Appendix 3**. Each subsequent version added additional columns on the processed catch section and additional boxes to the bottom of this page.

The deepwater trawl logbook had provision to record various processed states for each species. In the latest version of the form there were 8 columns, with 5 columns for pre-printed processed states, a column for other (specify), a column for 'Whole fish used for meal', and finally a 'Calculated weight of each species before processing' column. In these data up to six weights representing a different *state_code* were recorded for each species processed. The bottom of this form had boxes to record meal, oil, species discarded, total weight of whole fish used for meal, and calculated total weight before processing. Each of these states was recorded in the files on the CD by a one character code as listed in the FSU state code column below.

State	FSU state code	**new_fsu** & MFish *state_code*
Whole	0	GRE
H & G	1	HGU
Filleted	2	FIL
Fish Paste or minced block (Surumi)	4	SUR
Dressed	5	DRE
Discards	D	DIS
Weight before processing	8	COM
Converted to meal This refers to whole fish only	C	MWH
Roe	R	ROE
Liver	L	LIV
Squid head and tentacles	T	HET
Fish Heads	H	HDS
Unspecified oddity	X	OTH
Chin & cheek	J	CHK
Present in meal from whole fish	A	MWH
Documentation not found	7	OTH
Documentation not found	?	OTH
The following record types come from the bottom of the page, i.e. for meal record etc.		
Meal	M	MEA
Oil	O	OIL
Whole fish converted to meal	W	MWH
Total weight before processing	8	Record dropped

The earlier data prior to 1981 did not have the calculated weight of each species column nor the calculated total weight box.

The data from the processed catch page or section of the deepwater trawl logbook was loaded to both the *t_processing_event* and the *t_landing_event* tables. This processed catch data naturally belongs in the processing event table. As catches for other form types are to be found in the landing event table, this trawl data was also loaded to this table so the complete dataset is available in one table to simplify data extracts.

The calculated weight of each species before processing, where recorded, provides data on the conversion factors used by the vessel at the time. Most of these data precede legislated conversion factors and in the earlier years in particular, the conversion factors used are more variable suggesting vessel specific or perhaps individual company conversion factors were used. When these data were extracted, each state code for a species became a separate record. For processed catch records where there was only one processed state and the calculated weight before processing for that species was recorded, then this calculated weight before processing has been stored in the *green_weight* attribute in the *t_processing_event_o* and *t_landing_event_o* tables, and has been retained in the *t_processing_event green_weight* attribute. In addition where there was more than one processed state but only one processed state with a conversion factor not equal to 1 or 0, then the Perl script derived the calculated weight before processing for that species and processed state, which has been stored in the *green_weight* attribute in the tables *t_processing_event_o, t_landing_event_o* and *t_processing_event*. For example if a species has three weights recorded: a weight of whole fish; a processed state e.g., a HGU weight; and a calculated total weight for that species then the green weight for the HGU fish was set to the calculated total weight minus the whole fish weight. These records have a green weight type set to 'FBC' for fisher back calculated in the *t_processing_event_o, t_landing_event_o* and *t_processing_event* tables. This data processing methodology used means that from 1981 onwards the green_weight values in the *t_processing_event* table provide a closer record of what the fishers recorded at the time than those in the t_landing_event table. Prior to 1981 the calculated weight of each species before processing was not recorded so it is not possible to apply the above procedures used to derive back calculated green weights as calculated by fishers, to the complete data set.
This process resulted in some green weight values of less than or equal to zero for the state 'present in meal from whole fish' (originally state 'A' and now state MWH) in the *t_processing_event* and *t_landing_event* tables. This state did not originally record a weight and so these green weights were set to null. Approximately 50 records remain with a green weight greater than 1 and a green weight type of FBC for mealed whole fish.

State codes recorded as surumi (SUR) were checked where the species was one other than hoki or southern blue whiting and where the data was from 1982 onwards, i.e., where there was a calculated weight before processing record (with a state code of 'COM'). If the conversion factor used by the vessel was less than 4, indicating that the state code SUR was an error, then the state code was corrected to that most applicable to the conversion factor used, in most cases state headed and gutted. These records had their *memo* attribute set to 'SUR'

In the tables *t_processing_event* and *t_landing_event* the standard FSU conversion factors were inserted. For the table *t_landing_event,* where a processed weight was recorded, the green weight was calculated (i.e., green weight = processed weight * conversion factor,) and the green weight type was assigned a value of 'BAC' for back calculated. This process was also applied to the table *t_processing_event,* but **not** for records that already had a fisher back calculated green weight value as described above.
The discards from the bottom of the page in the logbook were assigned a green weight type of 'EST' to distinguish their origin from other discards recorded above.

The calculated weight of each species before processing when present was recorded as a separate record in the *t_processing_event* table. This allows users to obtain the total weight as recorded by the vessel, but care must be taken not to include this calculated weight before processing identified by the state_code of 'COM' **and** the calculated *green_weight* derived from the *proc_weight * conversion_factor*. These total records with a state code of COM were first recorded on 1 January 1981.

In the final tables namely *t_processing_event* and *t_landing_event*, the record containing the 'Calculated total weight before processing' from the bottom right hand corner of the page was dropped (deleted), as this information is derived from the sum of the individual calculated weights for each species.

There were approximately 34 000 offal records from the bottom left of the page that recorded some meal. Some of these meal records were effectively duplicated as a processed catch record with a species of 'MEA' and an identical weight recorded. Some original logbooks were available to check the raw data, which confirmed this error. There were 7 297 records present as duplicates with a species of 'MEA' which were deleted. Some of the remaining records with species of MEA but with differing weights recorded may be some kind of duplicate, but as their origin is unclear they remain in this dataset. The remaining processed catch records with species code of MEA, in both the processing event and landing event tables, were updated to UNI.

Two records that recorded a processed weight of zero were deleted. Six records of species discarded were duplicates from the bottom of the page and one of each pair was discarded.

The one character state codes were updated to the 3 character MFish codes. No documentation has been located explaining state codes '7' or '?'. Records with a state code of '7' were only present in the first data file up to March 1979. Records with these two state codes were assigned a state code of 'OTH' for oddity and had their *memo* attributes set to 'SC7' and 'SCQ' respectively.
States MEA and OIL had no species code in the source data, and were assigned a species code of 'MIX' in the tables *t_processing_event* and *t_landing_event*.

The archival documentation referring to the state codes used by the FSU referred to state 'W' from the bottom of the page as the code for 'Whole fish converted to meal'. However on looking at a number of these records in conjunction with the associated processed catch records for individual species it appears that the weight recorded is of meal, which presumably originated from whole fish. So although the limited documentation suggests that this state would be coded to 'MWH' it has been coded to 'MEA'. These records can be distinguished from the state code 'M' records by a null species code. Similarly for the 'Estimated total weight whole fish used for meal' value from the bottom of the page, the species is null (and the green weight type is set to 'EST') which distinguishes these records from those records for individual species that record a weight of whole fish to meal, both of which have the state code 'MWH'.

Seven records did not give a processed state so the state code was set to 'GRE', and the weight recorded assigned to the *green_weight* attribute with the *proc_weight* null.

The *destination_type* attribute was set to 'L' for landed for all records in the *t_landing_event* table (at the request of MFish) except for where the state code was discarded ('DIS').
There was no information in the raw data available as to the destination of the processed catch. Generally fish from licensed vessels would have been conveyed outside the NZ EEZ, either via transhipment to a carrier vessel or directly on the catcher vessel. Similarly a portion of the catch from chartered vessels particularly in the earlier years when charter for quota arrangements were common, would have been conveyed outside the NZ EEZ. For simplicity though all catches other than discards have been assigned a destination type of 'L'.

Raw data from the first ten pages from 2 separate trawl logbooks were checked against the final data in this **new_fsu** database. The data in this database was the same as in the trawl logbook except for 1 record in the fishing event table where the bottom depth has a value of 174 when it was recorded in the logbook number 1001494 as 147. Presumably this was a data entry error. Note that the processed weights of fish were truncated to whole kilograms when the values were sometimes originally recorded to 1 decimal place.

In the original data *stat_area* values were not populated for these deepwater trawl data. Under a small upgrade project in September 2011 *stat_area* values were derived from the latitude and longitude values recorded for the deepwater trawl data, including the *stat_area* values '001' to '801' for the entire NZ EEZ. For positions on area boundaries the higher *stat_area* value was assigned. The *stat_area* values were also derived for other records with latitude and longitude values for which no statistical area values were populated previously ie for form types 10, 16, B and S as well as form type 17. A small number of stat_area values for form type 16 that had latitude and longitude values but the stat_area was not assigned were individually assigned in September 2011 also, with the memo code set to ARE. These records had errors in positions and the area assignment was based on other area values for the trip.
Values for the attribute *inside_12mile* were also populated at this time for the deepwater trawl data ie where form_type = 17 and for form types 10, 16, B and S. For the attribute *inside_12mile* the value 'ET' was assigned to positions outside the NZ 200 mile EEZ and 'NZ' assigned to positions on land, along with '12' for inside the 12 mile and 'EZ' for inside the EEZ but outside the 12 mile limit.

	Number of vessels	
Calendar Year	From the **new_fsu** database	FSU published data
1983	65	62
1984	66	60

Table 22. Number of foreign vessels from this new_fsu database compared with FSU published data from the 1983 and 1984 calendar years. The number of vessels from this new_fsu database was derived from the number of distinct radio call signs less 2 New Zealand domestic vessels in the deepwater fleet in these years.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [16]
BAR	13 509	13 510
HOK	32 436	32 435
JMA	10 491	10 491
LIN	4 005	4 004
OEO *	16 680	15 818
ORH	23 960	23 712
RCO	2 094	2 093
SBW	23 188	23 188
SKI	2 861	2 861
STA	827	794
SWA	3 948	3 949
WAR	2 751	2 751

Table 23. Catch totals (tonnes) from the foreign trawl dataset for the year January to December 1983, compared with FSU published data. This includes all data with a form type of 17 except the 2 NZ vessels in the fleet in this year. Data are from back calculated green weights using the standard conversion factors in Appendix 2.
* OEO includes species codes: BOE and SSO.

[16] King 1986

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [17]
BAR	16 983	16 990
HOK	41 089	41 089
JMA	16 610	16 612
LIN	4 488	4 488
OEO *	16 598	16 598
ORH	16 241	16 240
RCO	3 295	3 295
SBW	12 102	12 100
SKI	4 293	4 293
STA	710	769
SWA	3 984	3 984
WAR	2 081	2 080

Table 24. Catch totals (tonnes) from the foreign trawl dataset for the year January to December 1984, compared with FSU published data. This includes all data with a form type of 17 except the 2 NZ vessels in the fleet in this year. Data are from back calculated green weights using the standard conversion factors in Appendix 2.
* OEO includes species codes: BOE and SSO.

Generally there is good agreement between the catch totals derived from this **new_fsu** database and the previously published figures for the major species shown in the two tables above. The largest discrepancy in 1983 is for the combined species, oreo dories, code OEO that has approximately 5% more catch than the published figures. This is likely to be explained by the published figures using conversion factors of 1.90 and 2.10 for state headed and gutted, as opposed to this database using a value of 1.92. These two values, namely 1.9 and 2.1 were documented as being used from January to September and October to December respectively (King 1986). The figures for OEO in 1984 match exactly, confirming the assumptions that differences for OEO in 1983 are due to conversion factors. The 1984 figures generally show good agreement with most differences less than 0.1%. Species stargazer (code STA) records approximately 4% more from this **new_fsu** database in 1983 and 8% less in 1984. An earlier list of conversion factors from 1981 to 1982 records a conversion factor of 1.7 for headed and gutted (HGU) which is the state that most of the catch of STA is processed to. This database uses a conversion factor of 1.8, which at least explains the 1983 discrepancy. Similarly, earlier orange roughy (ORH) used a conversion factor of 1.7 for state HGU as opposed to the more recent value of 1.92 applied to this database.

[17] King *et al* 1987

2.9 Other Pots

Data were collected on the '**Pots Fishing Return** (other than rock lobster)' form, which has a *form_type* of 7 **(see Appendix 3)** from 1983 to 1988. These data have been extracted from tables fsu_pots_header, fsu_pots_catch and fsu_pots_landing held in the Ministry of Fisheries database. This data set corresponds to the data in the six files: pots83.dat, pots84.dat thru pots88.dat on the CD.

As indicated by the pre-printed columns on the other pots form, Blue cod and crab were the species most commonly recorded on this form. Octopus and hagfish are the next most commonly recorded species overall.

The number of records in the MFish database tables for header records and effort records (in tables fsu_pots_header and fsu_pots_catch respectively) were exactly the same as the corresponding number of records in the files on the CD

There were no raw data forms available to us to confirm that the data had been captured correctly. There were 2 records with invalid dates with the day of the month recorded as zero in the files on the CD. The data in the MFish tables had set these to the last day of the month and we have followed this convention.

The attribute *dcf_key* for this other pots dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database. This number uniquely identifies a set of data for one vessel for one month, typically the data from 1 form. Taking the *dcf_key*, and concatenating the MFish 2 digit record sequence number to the right hand end formed the attribute *event_key*.

The *stat_area* attribute was checked and most values were valid statistical areas between 001 and 052, except ten records that recorded area '924' which is a valid rock lobster fishing return area. These data were checked for any forms that had missing area information for some days but had other days with areas recorded for that month. No instances of this situation were found, so the 8 percent of records with no area recorded remain unchanged. Areas were checked where vessels reported fishing 2 or more stat areas in a month that were more than 2 adjacent areas apart, eg areas 032 and 036. No obvious errors were detected and no changes were made to the *stat_area* attribute.

The measure of effort from this form, namely 'No. of pots hauled' was loaded to the attribute *effort_total_num.* The most frequently recorded value for this attribute was 4 pots, which suggest strongly that most fishers recorded the number of pots as opposed to the number of pots lifts. It is known that fishers targeting blue cod typically lift the same few pots repeatedly during a days fishing so this should be taken into account if calculating catch per pot. The maximum recorded number of pots hauled was 300 while catching crab, which seems plausible.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1983	204	5 171	201	5 103
1984	211	6 663	208	6 641

Table 25. Measures of effort from this new_fsu database for form type 7 (other pots), compared with FSU published data for 'crab, fish pots'.
NB that King etal (1987) lists 66 413 vessel days for 1984, but this is clearly an error and the original FSU line flow printout dated 22 August 1985 which appears to be the source for the 1984 data shows 6 641 vessel days.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [18]
BCO	892	736
CRB	90	88
OCT	2	2

Table 26. Catch totals (tonnes) from the other pots dataset (form type 7) for the year January to December 1983, compared with FSU published data for method 'crab, fish pots'.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [19]
BCO	1 039	958
CRB	147	148
TAR	7	7

Table 27. Catch totals (tonnes) from the other pots dataset (form type 7) for the year January to December 1984, compared with FSU published data for method 'crab, fish pots'.

As other pots reported a relatively small catch compared with other methods only the three main species caught were reported in the FSU publications in the 1980s. Tables 26 and 27 show general agreement between the previously published results and those from this **new_fsu** database, particularly for those species other than blue cod (code BCO) which are all landed whole or 'GRE'. The small number of additional vessels accounts for small increases in the reported catches. For the species blue cod, which has the highest reported tonnage caught by potting much of the catch is landed in a filleted state. The published data reported a conversion factor of 1.9 for filleted blue cod, which is lower than the value of 2.3 used in this **new_fsu** database. For the 1983 calendar year if a conversion factor of 1.9 is applied to the filleted blue cod catch then the total green weight of blue cod reported is 776 tonnes, which is 5 percent more than the published figure.

[18] King 1986, Table 19
[19] King *et al* 1987, Table 19

The weight of crab (code CRB) reported in 1984 is in fact the same in both this **new_fsu** database and in the reported figure when the decimal places are taken into account, namely 147.48 t and 147.5 t respectively.

2.10 Squid jig

Squid jig data have been extracted from the tables fsu_prefsu_squid_header, fsu_prefsu_squid_station, fsu_prefsu_squid_tray_tally, fsu_prefsu_squid_catch and fsu_prefsu_squid_comment held in the Ministry of Fisheries database. This data set corresponds to the data in the ten files: squid7879.dat, squid7980.dat thru squid8788.dat on the CD. Each file on the CD has data from November or December through to July, at the latest, in the following year. These data were collected on daily forms in the '**squid jigging catch effort logbook**'. These data were assigned a form type of 'S', although this form type was never printed on the form **(see Appendix 3).**

The number of records in the MFish database tables fsu_prefsu_squid_header and fsu_prefsu_squid_station were exactly the same as the corresponding number of records in the files on the CD.

There were no raw data forms available to us from for this time period to confirm that the data had been captured correctly. There were 3 records with dates beyond a valid date in February, which had been corrected by MFish and confirmed by the author. These records were assigned a *memo* value of 'DAT' or 'DAF' as appropriate.

The attribute *dcf_key* for this squid jig dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database. This number uniquely identifies a set of data for a vessel from one catch effort logbook. Taking the dcf_key, and concatenating the MFish 2 digit record sequence number to the right hand end formed the attribute event_key. Each *event_key* identifies a days activity from a single form for the vessel.

The date from the source data has been stored in the *date_f* attribute in the fishing event table, with the *date_s* attribute all null.

The squid jig form has three boxes for 'number caught' for 'octopus', 'shark' and 'other (specify)'. However no data was present in either the CD files or the MFish database for these fields

Latitude and longitude values of zero were set to null. One record with a latitude value less than 10 00.0 and 19 records with longitudes values less than 100 00.0 were checked and corrected, and the memo attribute set to LAT or LON respectively. Two records with longitudes of 193 degrees, had *long_s* set to null. These values were possibly meant to be 173 degrees but we can not be certain of this. Surface temperature values less than 4 degrees C were investigated, and it appeared that at least some of these records had their column positions corrupted. This in some cases appeared to have affected one or more subsequent fields on the line, namely wind speed, wind direction, day fishing duration and night fishing duration. The most obvious errors were corrected, but as these fields are not critical to catch effort analysis, a thorough check of these fields' data was not completed.

High values for bottom depth greater than or equal to 2 000 m were investigated by plotting their positions on a hydrographic chart, which confirmed that the depths recorded were reasonable.

Values of wind direction of '999' were set to null. The form has a box for 'not fishing' and this was stored in this database in the *effort_total_num* attribute, with 1 = not fishing and 0 = fishing. Time fishing was converted to decimal hours and was stored in the attributes *duration* and *duration2* for day hours and night hours respectively.

Species codes of SQU were updated to SQX, and ASQ updated to SQU consistent with the current meaning of these codes. The original species code was assigned to the *memo* attribute.

The data for tray tallies for this dataset was loaded to the processing event table. Records that had a tray tally of zero were loaded to the *t_processing_event_o* table but not to the *t_processing_event* table. The unit type was assigned a code from T0, T1 through to T15 for the number of squid per tray of 1-10, 11-20 through 151+ respectively. The *action_type* for these records was set to 'TTL' for tray tally. The total number of trays was assigned an action type of 'TTT' and a unit type of 'TRA'. For the number of trays 'without legs' a state code of 'DRE' was assigned with the corresponding codes for action type and state code as above. About 69% of the forms appeared to have used a tray weight of 8.0 kg to calculate the catch in the table *t_landing_event* based on the total number of trays in the table *t_processing_event*. Where this value of 8.0 was used, the unit weight in the processing event table was set to 8.0. Records were checked where the total tray weight did not equal the sum of the number of trays for a state code on one form. Four occurrences were detected and updated with a memo code of 'TTT' with one event unresolved.

The values for the catch i.e. 'TOTAL CATCH (KG)' from the form were loaded to the landing event table. If all tray tallies recorded only whole squid in the processing event table then the state code in *t_landing_event* was set to 'GRE' for squid species. Similarly if only dressed squid were recorded ('without legs') then the state code in the *table* ***t_landing_event*** was set to 'DRE'. Some state codes in the landing event table remain null because both processed states (i.e., GRE and DRE) were recorded and the catch was not split between. Consistent with a state code of DRE for squid species, the conversion factor was then set to 2.0 where the state code was DRE. The attribute *unit_num* still retains the amount as recorded on the form, which is a green weight, so in this case *proc_weight* does not equal *unit_num * unit_weight * conv_factor*.

The date landed in the landing event table has been set to the date as recorded on the form as there was no specific landing data available for this dataset. Similarly the *destination_type* has all been set to 'L' for landed, when it is likely that some of the catch may have been transhipped at sea or retained on board and conveyed outside New Zealand.

Calendar Year	Vessel nationality	From the **new_fsu** database	FSU published data
1983	Domestic	21	21
1983	Foreign charter (JV)	84	62
1983	Japan (foreign licensed)	107	89
1983	Korea (foreign licensed)	9	5

Table 28. Number of vessels from this new_fsu database for squid jigging during 1983 compared with FSU published data.

Calendar Year	Vessel nationality	From the **new_fsu** database	FSU published data
1984	Domestic	17	17
1984	Foreign charter (JV)	85	79
1984	Japan (foreign licensed)	99	92
1984	Korea (foreign licensed)	7	6

Table 29. Number of vessels from this new_fsu database for squid jigging during 1984 compared with FSU published data.

The number of squid jig vessels in this **new_fsu** database is similar to the published data with more vessels in this database than reported in the published data. The Domestic (New Zealand) vessels data comes from line forms with a *form_type* of '5'.If the year from the last date of each logbook cover record is chosen to represent the calendar year the number of vessels in each nationality category are exactly the same as the published figures. There are approximately six vessels that appear to have incorrect call signs due to data entry errors. These call sign errors are presumably reflected in the published figures too, and result in 2 additional vessels in 1983 and 1 additional vessel in 1984. Foreign charter (JV) and licensed vessels may change status from licensed to charter and vice versa, which means that the total number of vessels may not equate to the number of vessels categorized by nationality.

Nationality	Species	Total green weight (t) from the **new_fsu** database	FSU published data (t)
Domestic (New Zealand)	SQU		
	SQX	84	85
Foreign charter & foreign licensed	SQU	46 263	46 258
	SQX	1	

Table 30. Catch totals (tonnes) for squid jigging for the year January to December 1983, compared with FSU published data for squid. The Domestic figures come from the lining form with a form type of '5'.

Nationality	Species	Total green weight (t) from the **new_fsu** database	FSU published data (t)
Domestic (New Zealand)	SQU		
	SQX	135	135
Foreign charter & foreign licensed	SQU	70 012	70 003
	SQX	18	

Table 31. Catch totals (tonnes) for squid jigging for the year January to December 1984, compared with FSU published data for squid. The Domestic figures come from the lining form with a form type of '5'.

Tables 30 and 31 show that the reported catches of squid from this **new_fsu** database are very close to the reported catches with less that 0.1 % difference.

2.11 Other Nets

Data were collected on the **'Other Nets Fishing Return'** form, which has a *form_type* of 12 (see **Appendix 3**) from 1983 to 1988. These data have been extracted from tables fsu_beach_header, fsu_beach_catch and fsu_beach_landing held in the Ministry of Fisheries database. This data set corresponds to the data in the six files: beach83.dat, beach84.dat thru beach88.dat on the CD.

The number of records in the MFish database tables for header records and effort records (in tables fsu_beach_header and fsu_beach_catch respectively) were exactly the same as the corresponding number of records in the files on the CD

The attribute *dcf_key* for this other nets dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database. This number uniquely identifies a set of data for one vessel, typically from 1 monthly form. Taking the dcf_key, and concatenating the MFish 2 digit record sequence number to the right hand end formed the attribute event_key. An *event_key* identifies one line from the fishing return form.

The Other Nets fishing return form had 20 lines to record the day of the month and associated effort and catch data. In those relatively rare (44) cases where a vessel fished more than 20 days in one month, a second form was required which usually had a separate header record in the source data on the CD. This generated a separate record with its unique *dcf_key* in the *t_forms* table. For another 20 forms out of a total of 2 006 in table *t_fishing_event* there were between 21 and 30 records for 1 *dcf_key*. For these vessels this is how the source data was formatted, i.e., with one header line followed by 21 to 30 effort lines, and no attempt has been made to generate an additional record for these 20 monthly records in *t_forms*.

There were no raw data forms available to us to confirm that the data had been captured correctly. There were 3 records with invalid dates with the day of the month recorded as zero in the files on the CD, plus one invalid date of 29 February.

In the table *t_fishing_event_o* the attribute *date_s* was loaded with the date as sourced from the raw data on the CD, and *date_f* holds the corrected date. It is assumed that all fishing events for this other nets dataset started and finished on the same day, so both the start date and finish date (*date_s* and *date_f*) are populated with the corrected date in the table *t_fishing_event*. The data in the MFish tables had set these invalid dates to the last day of the month, and we have followed this convention.

Days of the month were not pre-printed on this form, and some vessels recorded more than 1 line for one day in a month. Most instances of this related to one haul, so presumably these were records of catch per haul. Without access to original data forms it is assumed that these data are correct in this respect.

The *stat_area* attribute was checked and all not null values were valid statistical areas between 001 and 052.

The measure of effort from this form, namely 'No. of hauls' was loaded to the attribute *effort_num.* The most frequently recorded value for this attribute was 1 haul. The maximum number of hauls recorded was 98. All 14 records that recorded more than 40 hauls per fishing event were from 1 vessel fishing in stat_area 038. These values seem high but are left to users to groom as they consider appropriate.

The fishing return form had 3 tick boxes to choose from to record method: '1 Beach seine/Drag net', '2 Lampara nets', and '3 Other specify'. This FSU dataset recorded only 2 method codes 23 and 25 for 'Beach seine, drag net' and 'miscellaneous nets' respectively. Presumably Beach seine/Drag net was coded by FSU to method '23', and lampara nets and any others were coded by FSU to '25' miscellaneous nets. These were recoded to the MFish codes BS and L respectively. It is not strictly correct to code miscellaneous nets to 'L' for lampara nets but as 99 percent of the effort was reported as method 'Beach seine, drag net', then coding FSU method code of 25 to MFish code 'L' seems reasonable.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total effort records	Number of vessels	Total vessel days
1983	108	2 940	106	2 935
1984	78	3 357	77	3 322

Table 32. Measures of effort from this new_fsu database for fishing method beach seine, compared with FSU published data.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [20]
GMU	78	77
SNA	228	229
TRE	164	164
Total	600	600

Table 33. Catch totals (tonnes) for fishing method beach seine for the year January to December 1983, compared with FSU published data.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [21]
GMU	115	111
SNA	247	246
TRE	190	189
Total	729	721

Table 34. Catch totals (tonnes) for fishing method beach seine for the year January to December 1984, compared with FSU published data.

[20] King 1986, Table 19
[21] King *et al* 1987, Table 19

As other nets reported a relatively small catch compared with other methods only the three main species caught were reported in the FSU publications in the 1980s. Tables 33 and 34 show general agreement between the previously published results and those from this **new_fsu** database. The small number of additional vessels and possible conversion factor differences probably account for small differences in the reported catches. The total number of vessels from this **new_fsu** database (which includes shore fishing permit numbers) for the other nets dataset is 110 and 79 for the 1983 and 1984 calendar years respectively. This includes the remaining one percent of methods not included in the beach seine data above.

2.12 Danish Seine

Data were collected on the '**Danish Seine Fishing Return**' form, which has a *form_type* of 3 (see **Appendix 3**) from 1983 to 1988. The associated landing data was recorded on the landed catch form (**see Appendix 3**). This data set corresponds to the data in the six files: danish83.dat**,** danish84.dat thru danish88.dat on the CD. The 1988 dataset finishes in February so is likely to be missing data for this year.

The association between the landed catch records in these files on the CD with the associated effort and estimated catch is based on the sequential order of the records in the file, as the first day fished and last day fished from the landed catch form are not recorded in the source files on the CD. The data in the MFish database tables fsu_danish_catch and fsu_danish_landing did not correctly record the association of the lines on the danish seine form with those from the landed catch form, so this data set has been extracted from the files on the CD. The format and values of the attribute fsu_key from the MFish database table fsu_danish_header has been retained, and these values have been used as the *dcf_key* in this **new_fsu** database. To retain the values of the *vessel_key* assigned by MFish in their database table fsu_danish_header, the data for the table *t_forms* has been extracted directly from the table fsu_danish_header. All vessels have been assigned a vessel key in this dataset.

Data from the landed catch form with a form type of 15 have been loaded to the *t_landing_event* table. These data have been assigned the form type of their associated fishing event, in this case the form type of 3, so each data set can be identified.

The numbers of records in the four MFish database tables were exactly the same as the corresponding number of records in the files on the CD, and those loaded to the original tables in this **new_fsu** database. The last line of the data file for 1985 was identical to the previous line, which suggests it was an error. These 5 records were deleted from the final table *t_landing_event*.

The attribute *dcf_key* for this danish seine dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database and generating a matching value in the Perl program used to extract the data for the fishing event, estimated subcatch and landing event tables. This number uniquely identifies a set of data for one vessel, typically from 1 monthly form. Taking the dcf_key, and concatenating a 2 digit record sequence number to the right hand end formed the attribute event_key. An *event_key* identifies one line from the fishing return form, or an isolated landed catch record with no associated effort data. For these landing records with no associated effort data the record sequence number was set to '00', and the landing date is null.

The Danish seine fishing return form had 20 lines to record the day of and month of the date and associated effort and estimated catch data. For 14 forms out of a total of 880 in table *t_fishing_event* there were between 21 and 31 records for 1 *dcf_key*. For these vessels this is how the source data was formatted, i.e., with one header line followed by 21 to 30 effort lines. These could be considered as 'conceptual' forms and no attempt has been made to generate an additional record for these 20 monthly records in *t_forms*.

There were no raw data forms available to us to confirm that the data had been captured correctly. There were no records with invalid dates in this dataset.

In the table *t_fishing_event_o* the attribute *date_s* was loaded with the date as sourced from the raw data on the CD. It is assumed that all fishing events for this danish seine dataset started and finished on the same day so both the start date and finish date (*date_s* and *date_f*) are populated with the same date in the table *t_fishing_event*.

The *stat_area* attribute was checked and all not null values were valid statistical areas, which for this dataset were between 001 and 010 plus 047.

The measures of effort from this form, namely 'No. of shots' and 'Total rope length in metres' were loaded to the attributes *effort_num* and *effort_total_num* respectively. The most frequently recorded value for the attribute *effort_num* was 1 shot. The maximum number of shots recorded was 8, and the maximum length of rope 8 400 metres.

The danish seine form has 3 options to record the units used for the estimated catch, with tick boxes labelled 'Baskets, cases or bins', 'Kg' and 'Other' with 1, 2 and 3 pre-printed in these boxes respectively. The data only has records with unit codes of 1 and 3. Various sources of documentation, including the form itself indicate that the unit type for unit code 1 is bins etc, which have been assigned a unit weight of 30 kg. From the documentation it is unclear what the unit type is for unit code 3. To determine the unit weight for unit type 3, the estimated weights for each trip were summed alongside the landed catch weights and the ratio compared by unit type. Ninety percent of records with a unit type of code '3' had a ratio of estimated catch/landed catch between 0.8 and 1.2 so a unit weight of 1 was assigned to these records and a unit type of 'KG'.
As part of this process 11 trips from 5 vessels were noted that recorded a unit type of 1 for BIN but had estimated catch equal or close to the landed catch weights. All other records for these vessels in the calendar year that this discrepancy was noted recorded a unit type of code '3'.These records were updated with the unit type set to KG, unit weight set to 1 and the *memo* attribute set to 'BIN'.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total effort records	Number of vessels	Total vessel days
1983	23	1 674	23	1 644
1984	26	1 944	26	2 223

Table 35. Measures of effort from this new_fsu database for fishing method Danish seine, compared with FSU published data.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [22]
GUR	91	91
JDO	58	58
SNA	785	785
Total	997	997

Table 36. Catch totals (tonnes) for fishing method Danish seine for the year January to December 1983, compared with FSU published data.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [23]
GUR	82	81
JDO	109	107
SNA	1 086	1 071
Total	1 340	1 321

Table 37. Catch totals (tonnes) for fishing method Danish seine for the year January to December 1984, compared with FSU published data.

As danish seine reported a relatively small catch compared with other methods only the three main species caught were reported in the FSU publications in the 1980s. Tables 35 to 37 show good agreement between the previously published results and those from this **new_fsu** database, especially for 1983 where the results are exactly the same.

[22] King 1986, Table 19
[23] King *et al* 1987, Table 19

2.13 Troll and pole

Data were collected on the '**Troll and Pole Fishing Return'** form, which has a *form_type* of 6 (see **Appendix 3**) from 1983 to 1988. This data set corresponds to the data in the six files: troll83.dat, troll84.dat thru troll88.dat on the CD.

For troll and pole data the landed catch information is recorded on the form alongside the estimated catch data. The date landed is not recorded as part of the landed catch records in the source files on the CD. The association between the landed catch records in these files on the CD with the associated effort and estimated catch is based on the sequential order of the records in the file. The data in the MFish database tables fsu_troll_catch and fsu_troll_landing did not correctly record the association of the lines from the troll and pole form, so this data set has been extracted from the files on the CD. The format and values of the attribute fsu_key from the MFish database table fsu_troll_header has been retained, and these values have been used as the *dcf_key* in this **new_fsu** database. To retain the values of the vessel_key assigned by MFish in their database table fsu_troll_header, the data for the table *t_forms* has been extracted directly from the table fsu_troll_header. All vessels have been assigned a vessel key by MFish in this dataset.

The numbers of records in the four MFish database tables were exactly the same as the corresponding number of records in the files on the CD, and those loaded to the final tables in this **new_fsu** database. There were 17 landed catch records with no data present in table *t_landing_event_o*. These 17 records were deleted from the final table *t_landing_event*.

The attribute *dcf_key* for this troll and pole dataset was generated in the standard manner by extracting the attribute 'fsu_key' from the MFish database and generating a matching value in the Perl program used to extract the data for the fishing event, estimated subcatch and landing event tables. This number uniquely identifies a set of data for one vessel, for 1 monthly form. Taking the dcf_key, and concatenating a 2 digit record sequence number to the right hand end formed the attribute event_key. An *event_key* identifies one line from the fishing return form.

There were no raw data forms available to us to confirm that the data had been captured correctly. There were no records with invalid dates in this dataset. Over the 6 annual files there were a total of 70 errors where the header record was appended to the end of the previous daily record. The data files were corrected prior to extracting the data and so these errors are not documented in the memo attribute.

In the table t_fishing_event_o the attribute *date_s* was loaded with the date as sourced from the raw data on the CD. It is assumed that all fishing events for this troll and pole dataset started and finished on the same day so both the start date and finish date (*date_s* and *date_f*) are populated with the same date in the table *t_fishing_event*. The value for the landing date was assigned from the previous daily record, and a *trip* number was assigned to a group of records ending with a landed catch record.

The *stat_area* attribute was checked and all not null values were valid statistical areas.

The measures of effort from this form, namely 'No. of jigs' and 'No. of hours fished' were loaded to the attributes *hook_no* and *duration* respectively. The maximum number of jigs recorded was 17.

The troll and pole form has boxes to record the number of fish caught for the estimated catch. The values of number of fish were loaded to the *unit_num* attribute in the table *t_estimated_subcatch* and the unit type was set to 'FIS'. The FSU documentation has a conversion factor for number of fish to kg for albacore (species code ALB), and southern bluefin tuna (code STN). Average fish weights were derived for other species based on modal weights and mean weights by summing the number of fish and the landed weight by species and by trip. These average fish weights were loaded to the *unit_weight* attribute allowing the estimated *weight* to be calculated.

Values of the number of fish caught per day, i.e. *unit_num* in the estimated subcatch table that were greater than 999 were checked and compared with the landed weight. Twenty-two records had values for unit_num greater than 999, and the 3 values over 2 000 were corrected to smaller values. An additional adjacent record with a value of 905 fish was updated. These records had the *memo* attribute set to 'UNM'. The remaining high values appear to be cumulative tallies from several days or monthly tallies.

There were 17 null landing event records in *t_landing_event_o* that were deleted from *t_landing_event*. These records consisted of a 'W' in the raw data file with no further data. These records caused the *trip* number attribute to increment so a comparison of estimated numbers of fish caught with the landed catch weight may give spurious results in these cases. As some fishers omitted to record daily numbers of fish in some cases, a check of the average weight of fish per trip was not performed.

Calendar Year	From the **new_fsu** database		FSU published data	
	Number of vessels	Total effort records	Number of vessels	Total vessel days
1983	115	2 001	113	2 001
1984	214	4 306	214	4 294

Table 38. Measures of effort from this new_fsu database for the troll and pole dataset, compared with FSU published data.

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [24]
ALB	710	710
KIN	15	15
STN	21	21
Total	764	764

Table 39. Catch totals (tonnes) for the troll and pole dataset for the year January to December 1983, compared with FSU published data.

[24] King 1986, Table 19

Species	Total green weight (t) from the **new_fsu** database	FSU published data (t) [25]
ALB	2 530	2 527
KAH	21	21
KIN	38	38
Total	2 624	2 621

Table 40. Catch totals (tonnes) for the troll and pole dataset for the year January to December 1984, compared with FSU published data.

As troll and pole reported a relatively small catch compared with other methods only the three main species caught were reported in the FSU publications in the 1980s. Tables 38 to 40 show good agreement between the previously published results and those from this **new_fsu** database, especially for 1983 where the tonnages reported are exactly the same. It is likely that the additional 3 tonnes of albacore in this **new_fsu** database was reported after the published report was finalised.

[25] King 1986, Table 19

2.14 Dredge data

This section describes various dredge datasets archived separately, under the headings Foveaux Strait Oyster Fishery data, Tasman Bay Oyster data, Scallop data and dredging data. The Foveaux Strait Oyster data was collected on the **Oyster Return** form type 14 and the other data sets on the **Dredge Return** form type 2 (see **Appendix 3**). It would appear from the data, that earlier versions of the dredge form (2), must have existed in some fisheries at different times (pre-FSU) due to the attributes given in the data sets, specifically the number of tows is not on the form that was used in the FSU era, for which we have a copy.

2.14.1 Foveaux Strait Oyster data

Foveaux Strait oyster data was collected on form 14 (**see Appendix 3**) from 1972 to 1986 ('pre-fsu') and 1987 to 1988. These data were extracted from the MFish database tables, prefsu_fsoyster_header, fsu_fsoyster_header, fsu_fsoyster_catch and fsu_fsoyster_est_catch. This oyster dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event* and *t_landing_event*.

The attribute *dcf_key* for this oyster dataset was extracted from the MFish database tables as the attribute 'fsu_key'. This number contained the year as its first 2 digits followed by a 4 digit number that uniquely identified a set of data for one vessel for one week, contained on one form. Taking the dcf_key, then concatenating the MFish 2 digit record sequence number, to the right hand end, formed the attribute event_key. The *event_key* uniquely identifies each day of fishing on an oyster form.

No invalid dates were found in this dataset. The conversion factor applied was the standard 79 kg per sack figure, published for this single species in this fishery. See **Appendix 2** for the conversion factors used and their source. Area codes used for this fishery are the Foveaux Strait dredge oyster statistical areas, stored in the *stat_area* attribute. The Ministry of Fisheries stored the area code used for this fishery in a *sub_area_code* field and '025' in the *stat_area*, however this has not been retained, only the areas as recorded on the fishing returns, (all are within area '025'). There were no missing *stat_area* codes in this dataset.

There were some records containing errors for the 1979 year, which investigation revealed were due to a corrupted archive file for the 1979 year, with the end of lines appearing to be lost in places. The memo field has been set to 'VAR', for the following effected records, where the dcf_key is one of the following 7907733, 7907836, 7907837, 7908666, 7908691, 7908348, 7907157, 7907158, 7908760, 7908818, 7908819, 7908820, 7908661. The interpretation of some of these records differs from the MFish data set.

The *fishyear* attribute in the tables *t_fishing_event* and *t_landing_event* was set to the 1 October to 30th September fishing year for all these oyster data. The calendar year is stored in the *cal_year* attribute and is used to summarize the data set.

The Foveaux strait oyster fishery was restricted to 23 vessels during the period this data set covers. All years show 23 distinct vessels, except for 1979, 1982, 1983 and 1986 where summaries show 24 distinct vessels, presumably there were the odd replacement vessels in some years.

A copy of a table summarizing the Foveaux Strait Oyster production from 1975 to 1988 supplied by Dr John Cranfield, from NIWA at Greta Point has been very useful for cross checking the data held in the **new_fsu** tables. For instance in 1983, Dr John Cranfield's data show the number of days fished as 1780, an exact match with the **new_fsu** database, where as the 1983 FSU publication shows a slight difference with 1783, which is 3 days more.

A comparison of the number of days fished in the **new_fsu** database with the figures obtained from Dr Cranfield's notes, as displayed in table 25 below, show a very good level of agreement, with exact matches in most years. For the two years where published FSU figures are available in 1983 and 1984, the days fished are 1783 and 1647, respectively 3 and 1 day more. However, both these years match the figures used, sourced from NIWA.

Calendar year	Number of boat days, **new_fsu** database.	Number of boat days, NIWA source.
1972	2214	Not available
1973	2206	Not available
1974	1876	Not available
1975	1755	1776
1976	1716	1709
1977	1706	1701
1978	1866	1865
1979	1789	1790
1980	1616	1616
1981	1834	1834
1982	1859	1859
1983	1780	1780
1984	1646	1646
1985	1515	1515
1986	1456	1456
1987	1242	1278
1988	1776	Not available

Table 41. Total number of vessel days, by year from the new_fsu database compared to the NIWA data from Dr John Cranfield.

A comparison of the catch data in the **new_fsu** database with previously published FSU figures for oyster is displayed in table 42 below. OYS is the only species landed in this fishery.

Calendar year	Total sacks of oysters **new_fsu** database	Total sacks of oysters NIWA source.
1972	99 330	Not available
1973	125 980	Not available
1974	119 106	119 106
1975	114 533	114 706
1976	116 089	115 067
1977	119 127	119 040
1978	124 547	124 547
1979	119 939	121 430
1980	114 230	114 230
1981	115 034	115 034
1982	113 663	113 663
1983	115 064	115 064
1984	114 980	114 999
1985	105 646	105 688
1986	77 874	77 880
1987	54 158	61 544
1988	88 594	Not available

Table 42. Total numbers of sacks of Foveaux Strait oysters landed by calendar year, from the new_fsu database compared to summary notes held by NIWA staff (Except 1974 from published FSU data [26]).

Fishing effort in the Foveaux Strait Oyster fishery was recorded as the total hours dredging in each bed fished, each day. The number of hours is stored in the *duration* attribute, in the *t_fishing_event* table. The number of hours fished for the years between 1984 and 1986 retrieved from the MFish database, understated the total hours for those years. An investigation of the archived data files, revealed five digits had been stored in the hours fished field, not four digits as in the earlier years and documentation. Further more, on a small number of records the implied decimal shifted from 2 to 4 places. A correction to the MFish interpretation of 3 decimal places was applied to the incorrect years. Very clearly most records needed to be multiplied by 10, and the remainder decreased by a tenth. For example, in 1984 the hours dredged were stored as either between 0.01 and 1.0 or between 50.05 and 70.05, where as the adjusted figures resulted in 166 records at 4.00 hrs, 257 records at 5.00 hrs, 223 records at 6.00 hrs and 150 records at 7.0 hrs, realistic times for effort in this fishery. The totals of the adjusted hours were very close to the expected figures, for the 1984 year 8 325 hours in the **new_fsu** database compared with 8 321 in the NIWA sourced figures, instead of only 2 704 hours from the MFish database.

[26] King 1985

The only published area summary available is the statistical area summaries, for domestic fishing, (1983 and 1984), which include Foveaux Strait oyster effort figures for area '025' where it ranked in the top 3 fishing methods. However catches by the Foveaux Strait oyster bed areas, as used on the fishing returns and stored in the **new_fsu** database are not available in the FSU publications.

Calendar year	Total hours fished **new_fsu**	Total hours fished NIWA notes
1972	14 879	Not available
1973	12 625	Not available
1974	11 018	Not available
1975	9 611	9 636
1976	8 706	8 584
1977	7 721	7 723
1978	7 995	8 006
1979	8 260	8 023
1980	7 516	7 525
1981	8 569	8 577
1982	8 627	8 637
1983	9 374	9 382
1984	8 325	8 321
1985	8 709	8 723
1986	7 406	7 405
1987	5 933	5 623
1988	8 765	Not available

Table 43. Total fishing effort of Foveaux Strait oyster fishery, measured by hours dredging, from the new_fsu database compared to summary notes held by NIWA staff.

2.14.2 Tasman Bay Oyster data

Tasman Bay oyster data was collected on form 2 (**see Appendix 3**) from 1980 to 1982 ('pre-fsu'). These data were extracted from the MFish database tables, prefsu_tboyster_header, and prefsu_tboyster_catch. This oyster dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event* and *t_landing_event.* The measures of effort recorded on the oyster form, were the hours dredged and number of tows per day. Hours dredged was loaded into the attribute *duration* and the number of tows into the *effort_num* attribute in the *t_fishing_event* table. There were 7 records where the number of hours exceeded 24, at least 4 of these (for one vessel, dcf_key 807121 to 807125), appear to be monthly totals entered onto the return. The number of tows are correspondingly high, where the number of hours exceed those expected on a single day. No invalid dates were found in this dataset. The weight per unit used was 22 kg per sack for OYS and 25 kg per sack for MUS.

Calendar year	Species	Total sacks **new_fsu** database	Total published sacks [27]	Total catch (t) **new_fsu** database.	Total published catch (t) [32]
1980	OYS	6 525	7 783	144	171
1981	OYS	17 583	17 681	387	389
1982	OYS	19 597	19 642	431	432

Table 44. Total catch of Tasman Bay oysters as number of sacks and the green weight amount in tonnes, from the new_fsu database, compared to the FSU published figures.

The MUS bycatch is not published separately, for this fishery in the FSU publications, therefore no conclusions can the reached regarding the MUS figures recorded with the Tasman Bay oyster data set loaded into the **new_fsu** database. The amounts in this dataset represent only a very small fraction, (less than 0.1 %) of the published MUS totals that combine dredge and hand gathering.

A summary of the effort data is shown below, although no published data has been located to help verify these figures, the total hours and the number of tows are reasonable.

Calendar year	Total hours dredging **new_fsu** database.	Total number of tows **new_fsu** database.
1980	4 542	6 891
1981	8 409	11 318
1982	9 475	8 438

Table 45. Fishing effort for the Tasman Bay dredge fishery, with the effort measured as the number of hours fishing and the number of tows (not always given).

2.14.3 Scallop data

The scallop fishing return data was collected on form 2 (**see Appendix 3**) from 1980 to 1982 ('pre-fsu'). This dataset covered the three different scallop fisheries of: Northland, Coromandel and Nelson/Marlborough. These data were extracted from the MFish database tables, prefsu_scallop_header, prefsu_scallop_catch and prefsu_scallop_catch_80. This scallop dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event* and *t_landing_event*. The measures of effort recorded on the oyster form, were the hours dredged and number of tows. Hours dredged was loaded into the attribute *duration* and the number of tows into the *effort_num* attribute in the *t_fishing_event* table. No invalid dates were found in this dataset. All weights were in the green state, therefore the conversion factor was set to 1.0 for this dataset. The *unit_weight* depended upon fishery and the *unit_type*, ranging from 22 to 45 kg per unit for sacks and bins.

The three different datasets for the scallop fisheries were archived as distinct fisheries by way of separate files. Each was assigned a 'fishery_code', in the MFish table prefsu_scallop_header.

[27] King 1985

These same codes have been stored in the *fishstock* attribute in the **new_fsu** database table *t_landing_event_o*, in order to retain the separation of the fisheries. These codes have been updated in the table *t_landing_event* as follows:

Scallop fishery	**new_fsu** t_landing_event_o	**new_fsu** t_landing_event
Northland	SCN	SCA1
Coromandel	SCC	SCACS
Nelson/Marlborough	SCS	SCA7

Table 46. Fishstock codes used for scallop fisheries in the new_fsu database, showing the original and updated codes.

Landing data for the scallop fisheries were summarized. The data for the earlier years are understated in the FSU dataset compared with the published FSU data. It has not been possible to resolve the discrepancy, which is probably a factor of altered conversion factors at some point.

Scallop fishstock	Species	Calendar year	Total greenweight (t) **new_fsu** database	FSU published catch (t) data [28]
SCC	SCA	1978	908	1 364
SCC	SCA	1979	814	858
SCC	SCA	1980	957	1 016
SCC	SCA	1981	1 094	1 081
SCC	SCA	1982	1 070	1 070
SCC	SCA	1983	215	132
SCN	SCA	1978	95	113
SCN	SCA	1979	150	150
SCN	SCA	1980	219	220
SCN	SCA	1981	519	540
SCN	SCA	1982	722	721
SCN	SCA	1983	157	167
SCS	MUS	1980	2	Not available
SCS	OYS	1980	27	Not available
SCS	SCA	1977	4 312	4 686
SCS	SCA	1978	1 602	1 612
SCS	SCA	1979	855	855
SCS	SCA	1980	334	333
SCS	SCA	1981	-	0
SCS	SCA	1982	-	0
SCS	SCA	1983	-	0

Table 47. Catch totals (tonnes) from the archived scallop fisheries in the new_fsu database, compared with FSU published data from calendar years 1977 to 1982. The 1983 figures are up to 14th February only. The scallop season normally covered 15 July to 14 February.

[28] King 1985

Species	Calendar year	Total greenweight (t) **new_fsu** database	Published FSU weight (t) [29]
SCA	1977	4 312	5 565
SCA	1978	2 605	3 090
SCA	1979	1 819	1 863
SCA	1980	1 510	1 570
SCA	1981	1 613	1 620
SCA	1982	1 792	1 780

Table 48. Total scallop landings for all fisheries compared with the total published FSU landings.

fishstock	Calendar year	Vessel numbers in **new_fsu** database.
SCA1	1978	16
SCA1	1979	15
SCA1	1980	18
SCA1	1981	39
SCA1	1982	37
SCA1	1983	24
SCA7	1977	187
SCA7	1978	131
SCA7	1979	100
SCA7	1980	61
SCACS	1978	59
SCACS	1979	35
SCACS	1980	27
SCACS	1981	28
SCACS	1982	24
SCACS	1983	19

Table 49. Shows the number of distinct registered vessels fishing in each of the scallop fisheries. The numbers are not included in table form in the FSU publications, but the numbers look consistent with the footnotes. (Note 25 on page 115 of the Fish and shellfish landings by domestic fishermen, 1974-82 by M.R. King).

2.14.4 Dredge data

Dredge data, incorporating the oyster and scallop datasets held separately as described in two previous sections, was also collected on form 02 (**see Appendix 3**), covering the period from 1983 to 1988. These data were extracted from the MFish database tables, fsu_dredge_header, fsu_dredge_catch, fsu_dredge_est_catch and fsu_dredge_landing. This oyster dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event, t_landing_event* and *t_processing_event*.

[29] King 1985

The Dredge return covered a set week, with one line per day and the days of the week going from Sunday down to Saturday, preprinted in the first column. Going across each line, after the day followed area and hours dredging columns, then four columns captured catch, with the first 3 pre-printed for scallops, oysters, mussels and the fourth open for other species. These daily catches were loaded to the *t_landing_event* table.

The total landings for the week were also recorded on the bottom of the form, in pre-printed boxes that specified the state for the species SCA and OYS i.e., "Kg of scallop meat" or "Dozens for oysters". Despite only the meat option, both green (GRE) and meat (SHU) states were archived for SCA, and both states have been retained in this database. For mussels the preprinted box read "sacks/kg of whole mussels", which was entered as 'S' or 'K' units at the data entry stage. In fact all the MUS catch is stored as state GRE in this dataset. In the 'other species' column, the state box was open and entered as a single char field. Other species reported in this data set consisted of SUR, COC, OCT, PPI, TUA, FLA, FLO, SOL. Except for SUR (kina), for which a small proportion was recorded as state meat, all the catch for the other species was recorded as state green.

The only two conversion factors applicable for this data set are 8.0 for SCA and SUR, where the state was SHU (meat), and 1.0 for GRE (green) weights. The week totals that were generally given as an exact figure, normally to one or two decimal places for kg of scallop meat on the forms, are believed to have been the processed weights, provided back to fishers from the factory. These total landings for the week were loaded to the *t_processing_event* table. The weekly totals are not always present in the data (or recorded on form).

The week ending (Saturday) date recorded on the dredge return is not retained, however it is likely this was only ever used to assign the day of the month to each 'day' during loading of the data, into the FSU system. This is not of any consequence, as the actual date is assigned to each day fished. No invalid dates were found in this dataset. A large number of date errors that were reported by MFish in their fsu_dredge_catch table, were a result of using the month (alpha) from the header record, when the month (numeric) should have been taken from the catch table. When the month changed during the course of a week fished, an incorrect date was formed. For example a vessel (dcf_key 8302039) that fished from 31st Jan 1983 to 01st Feb 1983, had both days assigned to February, then the 31st altered to the 28th to fit the number of days of the month in February.

The measure of effort recorded on the dredge form, was the hours dredging. An examination of the data stored in the MFish tables, confirmed that the data stored in the field labeled 'No of hours dredging' contained some other value (equating to the month fishing finished in) and the hours dredged was actually stored in the *catch_quantity_number* attribute. A summary of the appropriate data did resemble the published hours fished, within 3 to 6 percent for areas where published data are available. E.g. for area '038', the stat_area with the highest effort, in 1983 there are 17 276 hours in the **new_fsu** database (compared with the published 17 213 hours) and 20 800 hours (compared with the published 20 700 hours) for 1984. The hours dredging data, is stored in the attribute *duration* for this data set.

The unit type as ticked on the dredge return form, which applies to the daily catch, was stored in the *unit_type* attribute. This was typically sacks (6 658 returns) or cases (4 772 returns). The only other type recorded is kg (323 returns). Out of 39 894 catch records only 497 were for a second species and 2 for a third species, reported as being caught on the same day of fishing by one vessel.

The number of daily catch units recorded by the Fisher on the dredge return, was not archived, therefore the *unit_num* has been left blank in the t_landing_event tables. The estimated weight of each unit in kg was recorded in a box on each weekly dredge return form. This figure is also not retained in the archived data, and may not have been retained in the FSU data files, as the daily catches have been archived as actual weights (kg). It appears that the number of units has been multiplied by the 'Estimated weight of each unit (kg)', and this figure stored. It appears in the earlier data (1983), that there has been some adjustment carried out while doing this, so that the daily totals sum exactly to the weeks total figure for each return. Documentation on the Fisheries Statistical System, initial report dated April 1982, describes for dredge, 'the estimated catch for each day is converted from cases or bags using the given unit weight (or a default value of __ kg) to green weight'. (Default taken from the standard FSU values). An examination of late FSU period dredge return forms, show that the daily catches entered onto the dredge returns were actually sometimes recorded in kg, summing exactly with the weeks meat total, despite the units being ticked as sacks. On the forms where this has happened, the 'units' have been altered to 'other' and 'meat weight' written (in red) in the specify space. This would also indicate there was a mechanism for assigning the 'Total landings for week', proportionally to each day fished, using the reported daily catch units. The *unit_weight* attribute is also left blank for this data set.

In the later data, the daily figures do not always match the 'total landings for week' exactly. Not all returns in the **new_fsu** database have the total landings for week provided. An examination of some dredge return forms (post FSU era), provide examples of returns missing the 'total landings for week' figure and others with the daily catch figures missing.

Comparing the daily figures with the total landings for week when both were recorded on the same form often produces a discrepancy with a factor of 3 to 5 and sometimes approximately 30. Difficulties in reconciling the recorded landings for this data set loaded into the **new_fsu** database with published FSU data were unable to be resolved completely. However, the days fished by statistical area from the **new_fsu** database, provided a good match with the published FSU data for 1983 and 1984, often showing exactly the same number of days, giving confidence the dataset loaded is at least the same data set. Summarizing catch using a combination of processed data where available, (accepted as being the definitive weight) and the daily figures where no processed data were available, gave the closest match to published figures.

The dredge dataset covered in this section stored both the statistical fishing area and the scallop or oyster areas used in each fishery. Although only the appropriate oyster or scallop fishery area codes were recorded on the dredge return, due to some changes in area boundaries and labeling of areas, a decision was reached to retain both area codes in the **new_fsu** database, on the basis the FSU were in a better position at the time to assign statistical area codes to the data. The area codes are respectively stored in the attributes *stat_area* and *sub_area* in the *t_fishing_event* table.

Calendar year	Statistical area	Days fished from the **new_fsu** database	Days fished from FSU published data [30]
1983	002	896	878
1983	007	838	838
1983	008	746	746
1983	017	488	488
1983	038	3 020	3 020
1984	005	200	200
1984	007	766	766
1984	008	1 066	1 066
1984	017	864	864
1984	038	3 020	3 020
1984	044	268	268

Table 50. Total days fished by statistical area from the new_fsu database, compared to published FSU data. Only areas where FSU published data is available are presented, i.e., only where dredge was one of the three main methods in the statistical area.

Calendar year	Species	Total green weight (t) **new_fsu** database	FSU Published data (t)
1983	SCA	5 328	4 011
1984	SCA	4 668	4 660

Table 51. Scallop total landings from the new_fsu database, derived by summing 'processed weights' for returns where given and adding the daily weight where the processed weight was not given on the dredge return, compared to published FSU data.

[30] King 1985

2.15 Bottom long line data

The only bottom long lining data available prior to 1990 was from Japanese or Korean (either foreign licensed or foreign chartered,) vessels fishing between April 1978 and November 1980. These vessels are understood to have filled out a logbook, but we have been unable to obtain copies of the forms used. This bottom long lining data was sourced from the file blmaster7880.dat from the CD, and has been assigned a form_type of 'B' in this **new_fsu** database.

The Perl program that checked and formatted the data generated the attribute dcf_key. The format is similar to those values from other datasets, with the first 2 digits identifying the calendar year, followed by a number that started with 80001 and incremented for each new logbook header. E.g. the first *dcf_key* = 7880001. For this dataset a *dcf_key* identifies the data associated with a logbook header i.e., a logbook cover record.

Each set or fishing event is identified by a unique *event_key*. The *event_key* is formed from the *dcf_key* with a 2 digit sequential number concatenated to the right hand end. As a logbook may contain data for more than one month, the value for the month attribute *mth* in the table *t_forms* was standardised as the start date i.e., *date_from* for the logbook. The value of the *event_key* in the landing event and processing event tables is the same as the *event_key* for the previous fishing event.

Seventeen of the 27 distinct vessels (based on *call_sign*) in this dataset had vessel registration numbers starting with alpha characters, e.g., 'BSA450'. These numbers were loaded directly into the *t_forms_o* and other original tables, but simply had any alpha characters 'stripped off' before loading to *t_forms* and the other final tables. It is unknown if these resulting vessel numbers are correct MAF registration numbers, and 8 vessels have no registration number recorded. The call_signs should provide vessel identification.

The fishing method has been set to 'BLL' for all this dataset.

This dataset is unusual in that up to 4 dates were recorded for one fishing event. Namely date at start of lay or set, date at end of set, date at start of haul and date at end of haul. Associated times were recorded for these dates too. These dates were updated where a date in the series above was recorded as before the previous date within a fishing event. The memo attributes was set to DSE, DHS or DFN according to which date was updated.

This included 45 records where *haul_start_date* > *date_f,* which were corrected by decrementing *haul_start_date* by 1 month with the memo attribute set to DHS. These records had *haul_start_date* as the last day of the month and *date_f* was 1st day of the (next) month.

The values for the attributes *land_date* and *proc_date* respectively were set to the date at the end of the haul, which is also stored in the **date_f** attribute in the *t_fishing_event* table. If the date at the end of the haul was null the *land_date* and *proc_date* were set to the previous not null date for that fishing event with 13 records assigned to the date at the start of the set, namely *date_s*.

The bait used for each line set is recorded in the *t_bait* table. Original bait code '3' for alaska Pollack (also "meong tae") has been coded to the species code of 'BAI'. All other species are coded to the current 3 letter species code, except for 'artificial' and 'unspecified' which have the species code set to null.

The measures of fishing effort namely, length of line, number of baskets and number of hooks were loaded to the attributes *effort_num, effort_total_num* and *no_hooks* respectively.

The recorded catch has been loaded into both the processing event and the landing event tables. Total records with a species code of 'TOT' were loaded into the *t_processing_event_o* table but not the *t_processing_event* table, nor either of the landing event tables.

Documentation for state code '7' and '9' was not obtained and these were set to state code 'OTH', with a corresponding memo codes of SC7 and SC9 respectively.

Original records with a species code of 'DIS' (for discards) and a state code of 8 (for calculated weight before processing) were set to species MIX and state code DIS. All other calculated weight before processing records were set to a state code of COM. These 'COM' records are not included in either of the landing event tables, to avoid spurious calculations of total catch.

All records in the *t_landing_event* table have the *destination_type* attribute set to 'L' for landed except for discards, at the request of MFish. We have no record as to the true destination of these fish, and it is likely that some at least left the NZ EEZ without being landed here.

Species code 'OLS' for other large sharks, was updated to 'OSD' (for other sharks and dogs). There are 28 catch records with a species code of DOR for unspecified dories. It is unclear what species these were so they have been left as code DOR.

Duplicate catch records were checked and compared with the total (TOT) record where this was present. There were 5 distinct catch records that were duplicated for 1 vessel. Four of these had 1 out of the 2 corresponding records deleted and the memo attribute set to S1D. The remaining duplicate series had 2 or the 3 records deleted and the memo attribute set to S2D. The records for these processing and landing events now correctly summed to agree with the recorded totals.

Conversion factors were set to the standard conversion factors as listed in **Appendix 2**. Some of these conversion factors were probably not those used by this early BLL dataset but these conversion factors have been used for consistency in this database.

No published figures from this dataset have been obtained to compare with those in this database.

2.16 Purse seine data

This section describes several purse seine datasets archived separately, under the headings **purse seine** and **skipjack tuna purse seine**. The purse seine dataset covers the 1983 to 1988 FSU period, and the skipjack tuna purse seine the pre-FSU period, with data from November 1975 to May 1982. Data was collected on a daily purse seine log, form 10 (**see Appendix 3**) from 1983 to 1988. The pre-fsu data includes data fields not present on the form used in the FSU era, shown in **Appendix 3**, indicating an earlier version of the skipjack tuna form existed. We were unable to locate a copy of this earlier skipjack tuna form.

Two sets of files, the "pre-FSU purse seine" and "pre-FSU skipjack", archived on the CD and also loaded onto the MFish database, both contained data for exactly the same period, from 17 November 1975 to 14 May 1982. Examination of the data determined these were two versions of the same dataset. Archived notes on the CD confirmed the purse seine version was created by the FSU from the skipjack format, for the pre-FSU period data to be compatible with the later FSU purse seine layout. The pre-FSU purse seine version that was created excluded the data fields that were not collected in the later 1983 - 1988 period, therefore, to retain all the data fields the original skipjack dataset has been used as the source of data loaded to the **new_fsu** database.

2.16.1 Skipjack tuna Purse Seine data

Skipjack data was collected on form 10 (see **Appendix 3**) from 1975 to 1982 ('pre-fsu'). The 'pre-fsu' data were extracted from the MFish database tables, prefsu_skipjack_header, prefsu_skipjack_sub_header, prefsu_skipjack_station, prefsu_skipjack_catch and prefsu_skipjack_est_catch. This skipjack dataset was loaded to the **new_fsu** tables *t_forms, t_fishing_event, t_landing_event* and *t_estimated_subcatch.*

The attribute *dcf_key* for this skipjack dataset was extracted from the MFish database tables as the attribute 'fsu_key'. This number contained the year as its first 2 digits followed by a 4 digit number that uniquely identified a set of data for one vessel for one week, contained on one form. Taking the dcf_key, then concatenating the MFish 2 digit record sequence number, to the right hand end, formed the attribute event_key. The *event_key* uniquely identifies each day of fishing on a skipjack form.

As all purse seine fish were landed GRE, a conversion factor of 1.0 was applied to the complete dataset. This dataset has been archived as a single species fishery, and is referred to as the '**Purse-seine Skipjack Fishery**', by the relevant publications. No by-catch species have been archived, although small incidental amounts of other species were caught with skipjack schools, including albacore and yellow fin tuna. (Personal experience of author as an observer onboard vessels in this fishery). An archived attribute 'Number of species caught', contained a constant value of '01' for all records, therefore has not been retained in the **new_fsu** database, and as stated the number of species caught would have always been only one. (The species recorded in this dataset is always 01 for skipjack).

Area codes recorded for this dataset were devised especially for the skipjack tuna skipjack fishery. The standard *stat_area* codes stored in the *t_fishing_event* table have been derived from the latitude and longitude positions, and the skipjack areas are stored in the *sub_area* attribute.

Note the skipjack area codes are archived as 01 to 12, which correspond to A to M on published areas maps. There were no missing area codes in this dataset and all set positions have latitude and longitude values present in this dataset.

There were some discrepancies apparent when assigning the *stat_area*, as a small number of sets fell outside (off-shore) of the domestic fishing areas, which have been assigned to the adjacent area. Amendments were made to the positions of the following three records, which did not fit into the statistical areas. Two were on land and the third obviously too far north.

event_key	vessel_no	date_s	lat_s	long_s	stat_area	sub_area
785548303	6186	19780209	3742.0	17518.0 E		04
785556302	2012	19780206	3440.0	17731.0 E		04
805560001	10409	19800310	3759.0	17453.0 E		10

Given the skipjack fishery '*sub_area*', date & fishing pattern at that time, the following adjustments were made:
"update t_fishing_event set stat_area = '010', long_s = 17718.0, memo='LON'
where form_type = '10' and event_key = 785548303 and long_s = 17518.0;"

"update t_fishing_event set stat_area = '010', lat_s=3740.0, memo='LAT'
where form_type = '10' and event_key = 785556302 and lat_s = 3440.0;"

"update t_fishing_event set stat_area = '042', long_s = 17353.0, memo='LON'
where form_type = '10' and event_key = 805560001 and long_s = 17453.0;"

Catch per unit effort typically published[31] as catch per season day, catch per day searching and fishing, catch per set and catch per successful set. The effort recorded on the top section of the daily purse seine form included the activity being undertaken, 'searching/fishing' or various other activities such as 'discharging' or 'bad weather', recorded in half days, i.e., for AM and PM. This information and weather details is stored in the *comments* attribute in the *t_forms* table. Similarly the overnight areas codes are stored in the comments field where applicable, these were stored in the prefsu_skipjack_sub_header table in the MFish database.

The *fishyear* attribute in the tables *t_fishing_event* and *t_landing_event* was set to the 1st October to 30th September fishing year for all these Purse Seine data. The skipjack season generally started from November or December and finished either in March or April. No invalid dates were found in this dataset.

This dataset included the collection of various parameters not collected elsewhere on the FSU forms namely the attributes *sea_condition, salinity, moon_phase, set_result, extra_data* and *inside_12mile*. The *extra_data*, 1=yes, 2=no, indicates extra data was collected (by an observer) e.g., the collection of length frequency data. The attribute *set_result* indicates the success of the set i.e. 1=successful (caught school), 2 partly, 3 unsuccessful. The other new fields are self explanatory. The set number has been stored in the *effort_num* attribute. Wind condition has been stored in the *wind_speed* attribute, as the average wind speed in metres per second for the wind condition code recorded e.g. code 2 (1 – 10 knots), set to 2.572 m/s, code 3 (11 – 20 knots) set to 7.717 m/s in the **new_fsu** database.

A comparison of the number of vessels and the number of days fished with previously published results for Purse Seine fishing is displayed in table 52 below.

[31] Habib G,Clement I.T., Fisher K.A. (1981)

Fishing year	From the **new_fsu** database		Published data from 1980-81 season summary[32]	
	Number of vessels	Total vessel days	Number of vessels	Total vessel days
1975/76	5	461	5	486
1976/77	11	797	11	797
1977/78	10	807	10	806
1978/79	12	1 042	12	1 042
1979/80	15	1 192	15	1 192
1980/81	19	2 084	19	2 084
1981/82	10	918	Not available	Not available

Table 52. Measures of effort from this new_fsu database compared with Fisheries Research Division published data covering the period from the 1975 and 1982.

A comparison of the total catch data in this **new_fsu** database with previously published results for purse seine is displayed in table 53 below.

Fishing year	Total landed skipjack weight from the **new_fsu** database (t)	Published data from 1980-81 season summary[33]
1975/76	4 692	4 715
1976/77	7 541	7 541
1977/78	9 527	9 526
1978/79	8 975	8 975
1979/80	8 931	8 931
1980/81	8 555	8 555
1981/82	4 998	NA

Table 53. Catch totals from the Purse Seine dataset for the years 1975 to 1982, compared with FSU published data.

Tables 52 and 53 show that overall the reported catches agree very closely with the data in this **new_fsu** database.

[32] Habib G., Clement I.T., Fisher K.A. (1981)
[33] Habib G,Clement I.T., Fisher K.A. (1981)

Fishing year	**new_fsu** database			Published [34]		
	Area	Total skipjack landed (t)	No. of sets	Area	Total skipjack landed (t)	No. of sets
1976/77	1	124	10	A	125	10
1976/77	2	1 483	131	B	1 483	131
1976/77	3	4 369	283	C	4 369	283
1976/77	4	437	97	D	437	97
1976/77	10	1 127	88	J	1 127	88
1977/78	2	0	2	B	0	2
1977/78	3	4 776	262	C	4 721	260
1977/78	4	1 595	120	D	1 650	122
1977/78	5	275	52	E	275	52
1977/78	8	65	13	H	65	13
1977/78	9	195	25	I	195	25
1977/78	10	2 613	229	J	2 613	229
1977/78	11	7	1	K	7	1
1978/79	2	3 117	125	B	2 947	123
1978/79	3	4 202	321	C	4 372	323
1978/79	4	680	114	D	680	114
1978/79	5	120	36	E	120	36
1978/79	10	557	40	J	557	40
1978/79	12	298	31	L	299	31
1979/80	1	207	10	A	207	10
1979/80	2	398	26	B	398	26
1979/80	3	4 169	270	C	4 168	270
1979/80	4	831	122	D	831	122
1979/80	5	189	20	E	189	20
1979/80	10	1 670	108	J	1 670	108
1979/80	11	1 468	69	K	1 468	69
1980/81	1	0	1	A	0	1
1980/81	2	3 017	290	B	3 017	290
1980/81	3	4 736	509	C	4 737	509
1980/81	4	487	104	D	487	104
1980/81	5	175	26	E	175	26
1980/81	10	37	15	J	37	15
1980/81	11	102	15	K	102	15

Table 54. Effort totals from the Purse Seine dataset, measured by total number of sets and catch quantity, for the period 1975 to 1983, compared with FRD published data, for the areas as used for the skipjack fishery, where published figures available.

Salinity data was recorded in the dataset from the 1978/79 fishing season, however there are no published results for that year. For the sets that monitored salinity catch in tonnes was compared for the 1979/80 and 1980/81 fishing years with published results where these were available. The results from this database matched the published figures exactly.

[34] Habib G,Clement I.T., Fisher K.A. (1980, 1981)

Comparisons of the new_fsu data was made with a further three tables contained in the skipjack publications[35], namely the catch in tonnes summarised by: 1) sea surface temperature in whole degree units, 2) moon phase (quarters), and 3) bottom depth (in 100 m ranges). These comparisons were made for the four fishing seasons, 1977/78. 1978/79, 1979/80 and 1980/81 and found that all agreed exactly.

2.16.2 Purse Seine data

This dataset for the FSU purse seine period, 1983 to 1988, was extracted from the files archived onto the CD, namely the files purseseine83.dat, purseseine84.dat, purseseine85.dat, purseseine86.dat, purseseine87.dat and purseseine88.dat. The daily purse seine log (form type 10) for this time period was accompanied with a landed catch form (form type 15), so that a group of daily purse seine forms followed by one landing form make up a trip.

MFish database tables, for the pre FSU period. There are 10 distinct vessel registration numbers in the FSU purse seine dataset, and 4 of these did not have a vessel key assigned. All vessels had vessel names, except vessel number 4265, which had the vessel name set for this vessel based on the pre-FSU dataset and an archive file listing vessels in the New Zealand skipjack tuna fishery. Updates were made to vessel_key values in table t_forms in October 2009 so only vessel_no 4265 does not have a vessel_key assigned in this FSU purse seine dataset for 1983 to 1988.

The archived data file pureseine85.dat contained a G (Group) record, followed immediately by a W (weight) record, (then another G record), at lines 316 & 317. Checking the two lines against dates and catches of the surrounding records revealed that the two lines were slightly out of place and were moved to the appropriate line positions at 325 & 326.

The Perl program that checked and formatted the data generated the attribute *dcf_key*. The format is similar to those values from other datasets, with the first 2 digits identifying the calendar year, followed by a number that started with 91001 and incremented for each new daily purse seine log and for each landed catch form. E.g. the first *dcf_key* = 8391001. For this dataset a *dcf_key* identifies a daily purse seine log form or a landed catch form. The landed catch records in the landing event table were assigned the *dcf_key* of the previous daily record.

Each purse seine set is recorded as a fishing event and is identified by a unique *event_key*. The *event_key* is formed from the *dcf_key* with a 2 digit sequential number concatenated to the right hand end. For example the first set on the form *dcf_key* = 8391003, the event_key is 839100301. The landing data, cannot be linked directly to fishing event data, nor would it be correct to do so (unless there was only one set for the entire purse seine trip). Landing data can only be linked on a trip basis, via the '*trip*' attribute. Estimated catch can be linked directly with the set data using the event_key, as the estimated catch is recorded by set.

Data from the landed catch form with a form type of 15 have been loaded to the *t_landing_event* table. These data have been assigned the form type of their associated fishing event, in this case the form type of 10, so each data set can be identified.

The landing date in the landing event table was assigned to the date of the previous daily record in the file. In some cases this was several days after the last catch record, but this approach standardized the allocation of the *land_date* attribute.

[35] Habib G,Clement I.T., Fisher K.A. (1980, 1981)

A comparison of total landed weights by fishing year and species, are made for purse seine in the following table.

Calendar year	Species	Total green weight (t) from the **new_fsu** database	Published total landed weights from FSU data. (t)
1983	BAR	169	169
1983	EMA	1 870	1 870
1983	JMA	2 115	2 115
1983	KAH	3 609	3 609
1983	SKJ	3 908	3 908
1983	TRE	545	545
1984	EMA	670	670
1984	JMA	4 133	4 133
1984	KAH	3 609	3 609
1984	SKJ	3 857	3 856
1984	TRE	619	619

Table 56. Catch totals (tonnes) from the new_fsu database, compared to published figures, for 1983 and 1984 domestic catch for species where figures are available.

A comparison of the number of vessels and the number of days fished with previously published FSU results for Purse Seine fishing is displayed in table 57 below.

Calendar Year	From the **new_fsu** database			FSU published data		
	Number of vessels	Total vessel days	Total all species landed (t)	Number of vessels	Total vessel days	Total all species landed (t)
1983	9	670	12 237	7	732	12 237
1984	6	461	12 967	6	461	12 967

Table 57. Measures of effort from this new_fsu database for the Purse seine dataset, compared with FSU published data.

The 1984 data on the number of vessels fishing and the number of vessel days gives an exact match between the **new_fsu** database and published data, counting all records where the activity includes “fishing” in the database. This includes days “searching/fishing”, where no sets were made. The 1983 data in the **new_fsu** database has several more distinct vessels. This may be explained by a reference to SFPs (Separate Fishing Permits?) on old FSU printouts. While the published summaries list 7 vessels in 1983 we are confident that the 9 vessels in the **new_fsu** database are correct. The lower number of days fished in 1983 may be accounted for by the criteria used to select days where fishing occurred out of the total 1 185 days, counting all activities. The total tonnes landed, match for both 1983 and 1984. Combined with other comparisons we are confident the figures given in the **new_fsu** database for this dataset are correct and the discrepancy is only due to the method used to summarize vessels and days.

A comparison of the number of sets made and the days effort given are made in the following two tables. Days effort not given for purse seine were always zero, hence are not included in the comparison tables below.

Stat area	**new_fsu** database total sets	Published number of sets	**new_fsu** days effort given.	Published days effort given.
003	107	74	62	41
004	98	67	59	39
008	69	67	40	37
009	190	191	116	117
010	32	33	21	21
011	4	4	2	2
013	57	57	33	32
014	32	32	18	18
017	30	30	19	18
018	40	40	20	18
036	12	12	6	6
037	88	87	34	32
040	14	10	8	5

Table 58. Effort totals from the purse seine dataset for the year January to December 1983 compared with FSU published data, for statistical areas where published figures are available. The published effort figures are only available, where purse seine ranked in the top 3 methods for domestic fishing.

Stat area	**new_fsu** database total sets	Published number of sets	**new_fsu** days effort given.	Published days effort given.
008	69	69	37	36
009	357	356	192	186
010	72	73	43	43
011	5	5	2	2
013	26	26	11	11
014	18	18	5	5
015	40	40	13	13
018	89	89	29	29
039	11	11	3	3

Table 59. Effort totals from the purse seine dataset for the year January to December 1984 compared with FSU published data, for statistical areas where published figures are available. The published effort figures are only available, where purse seine ranked in the top 3 methods for domestic fishing.

In December 2010 enquires were made regarding target species values recorded for the purse Seine (PS) dataset. The purse seine forms do not have a box or place on the form to record target

species and the method of assignment of target species values was not recorded in April 2004 when these data were loaded. The following has been confirmed as the process used to assign target species values for the fsu PS dataset, ie 1983 – 1988 data.
Based on the request from MFish to populate as many fields as possible when this database was being populated, target species was assigned to this Purse Seine dataset based on the estimated catch on the data record (form) as follows.
Where only 1 species of estimated catch was recorded that species was assigned as the target species. Where 2 or more species of estimated catch were recorded, the species with the maximum estimated weight was assigned as the target species, but when the same maximum estimated catch weight was recorded for 2 or more different species then target species is not assigned.

3 Data Structures

3.1 Table relationships

This database contains several tables. The ERD for **new_fsu (Figure 1)** shows the logical structure[36] of the database and it's entities, (each entity is implemented as a database *table,)* and relationships between these tables and tables in other databases. This schema is valid regardless of the database system chosen and it can remain correct even if the Database Management System (DBMS) is changed. Each table represents an object, event, or concept in the real world that is selected to be represented in the database. Each *attribute* of a table is a defining property or quality of the table. All of the table's attributes are shown in the ERD. The underlined attributes represent the table's primary key[37]. The ERD's in this document show attributes within the tables with generic data-types.

This **new_fsu** database has a duplicate set of tables that contain the original data as sourced by the authors. The ERD for these original tables is shown in **Figure 2**. These original tables which all have table names with an '_o' suffix are identical in structure except that they do not have the memo attribute which is the last attribute of the main tables. In addition the tables *t_landing_event* and *t_processing_event* have the attribute *key* added as the primary key.

Note that **Figure 1** shows the main tables only. All the tables in this **new_fsu** database have attributes, called foreign keys[38], which contain standard NIWA/MFish fisheries codes such as *species* and *stat_area*. These foreign keys not only define the relationships between the tables in **new_fsu** but also provide links to the **rdb** (research database) database, which contains the definitive list of these standard codes.

This **new_fsu** database is implemented as a relational database; i.e., each table is a special case of the mathematical construct known as a *relation* and hence elementary relation theory is used to deal with the data within tables and the relationships between them. There are three types of relationships possible between tables, but only one exists in **new_fsu**: one-to-many[39]. These relationships can be seen in ERDs by connecting a single line (indicating 'many') from the child table; e.g., *t_fishing_event*, to the parent table; e.g., ***t_forms,*** with an arrowhead (indicating 'one') pointing to the parent.

[36] Also known as a database *schema.*
[37] A primary key is an attribute or a combination of attributes that contains an unique value to identify that record.
[38] A foreign key is any attribute, or a combination of attributes, in a table that is a primary key of another table. Tables are linked together through foreign keys.
[39] A one-to-many relationship is where one record (the *parent*) in a table relates to one or many records (the *child*) in another table; e.g., one landing in *t_landing* can have many catches in *t_catch* but one catch can only come from one landing.

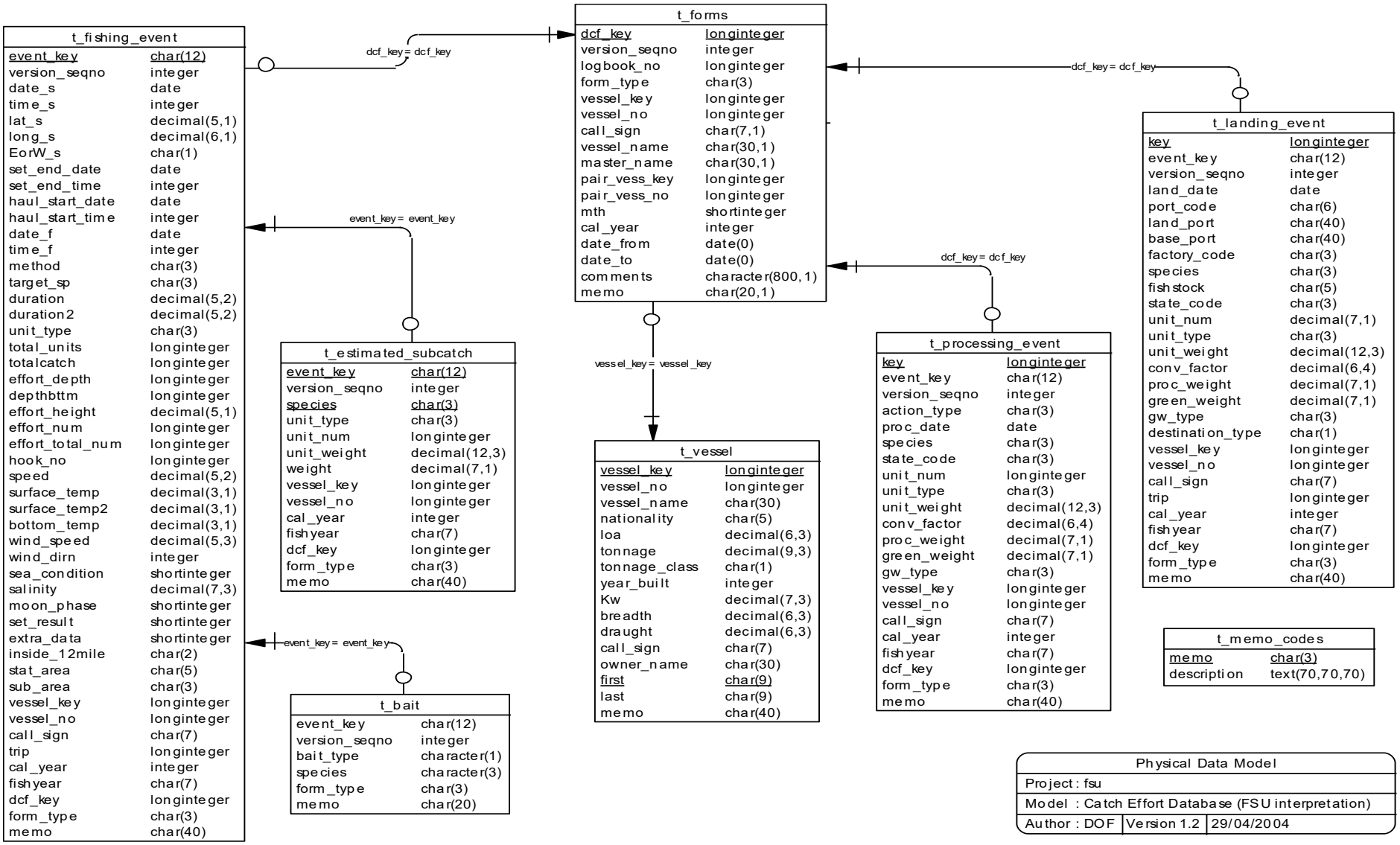

Figure 1: Entity Relationship Diagram (ERD) for this **new_fsu** database

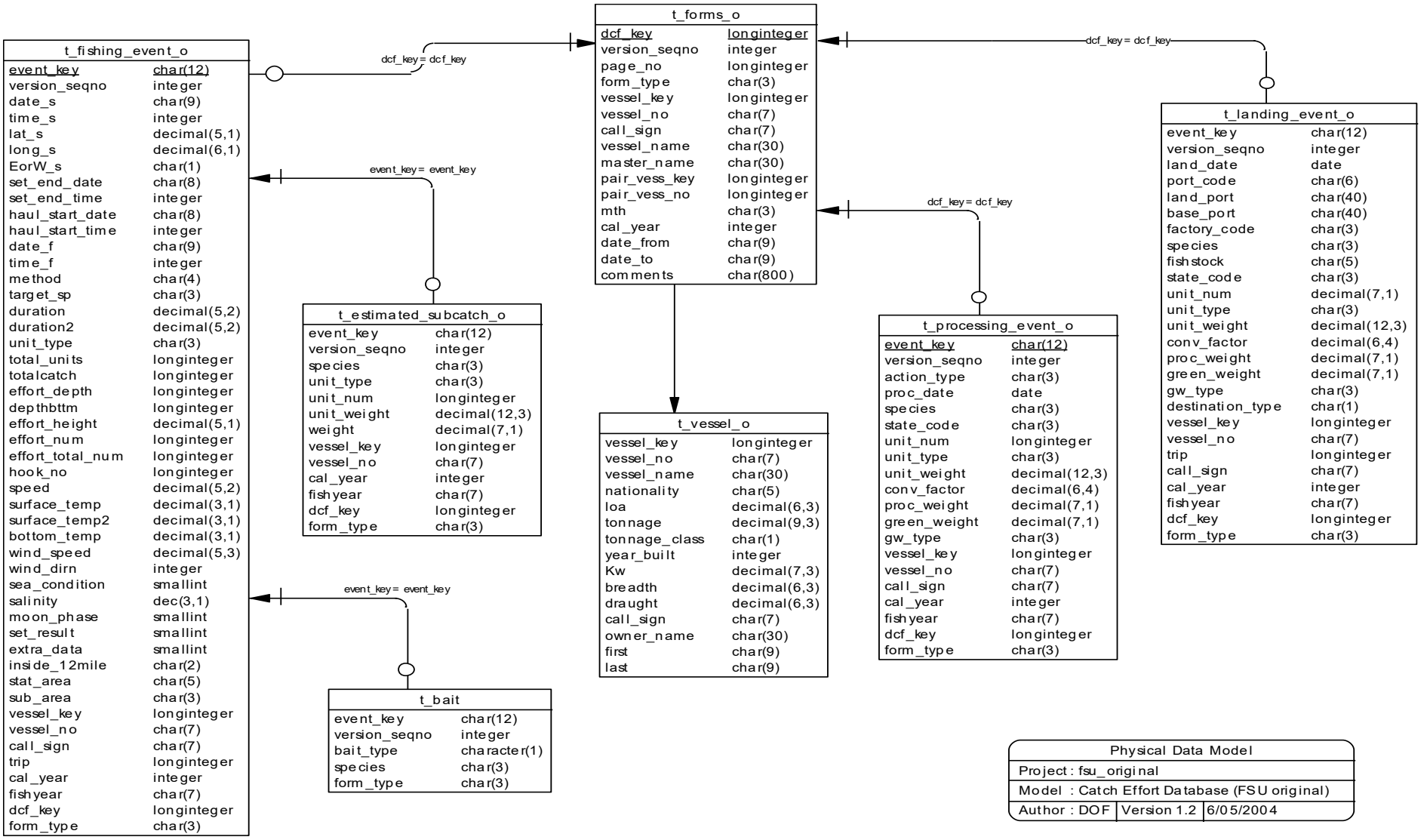

Figure 2: Entity Relationship Diagram (ERD) for the original tables in this **new_fsu** database

Every relationship has a mandatory or optional aspect to it. If a relationship is mandatory, then it has to occur at least once, while an optional relationship might not occur at all. For example, in **Figure 1**, consider that relationship between the table *t_forms* and it's child table *t_landing_event.* The symbol 'o' by the child *t_landing_event* means that a form can have zero or many landing records, while the bar by the parent *t_forms* means that for every landing record there must be a matching form.

These links are enforced by foreign key constraints[40]. These constraints do not allow *orphans* to exist in any table; i.e., where a child record exists without a related parent record. This may happen when: a parent record is deleted; the parent record is altered so the relationship is lost; or a child record is entered without a parent record

Foreign-key constraints are shown in the table listings by the following format:

Foreign-key constraints:
"foreign key name" FOREIGN KEY (attribute[,attribute]) REFERENCES
parent table (attribute[, attribute])

Note that the typographical convention for the above format is that square brackets [] may contain more than one item or none at all. Items stacked between vertical lines | | are options of which one must be chosen.

For example, consider the following constraint found in the table *t_fishing_event*:

Foreign-key constraints:
"fk_t_fishing_event_t_forms" FOREIGN KEY (dcf_key) REFERENCES t_forms(dcf_key)
ON UPDATE CASCADE ON DELETE CASCADE

This means that the value of the attribute *dcf_key* in the current record must already exist in the parent table *t_forms* of this **new_fsu** database or the record will be rejected and the following message will be displayed:

ERROR: insert or update on table "t_fishing_event" violates foreign key constraint "fk_t_fishing_event_t_forms"

For tables residing in other schemas, the parent table name will be prefixed by the name of the schema.

Section 5 lists all the **new_fsu** tables as implemented by the Postgres DBMS. As can be seen in the listing of the tables each table has a primary key on it. Primary keys are generally listed using the following format:

Indices: index_name PRIMARY KEY, btree (*attribute* [, *attributes*])

where attribute(s) make up the primary key. These prevent records with duplicate keys from being inserted into the tables; e.g., a record with an existing *event_key* in the table *t_fishing_event*.

[40] Also known as integrity checks.

The database listing (Tables 1-6) shows that the tables also have indices on many attributes. That is, attributes that are most likely to be used as a searching key have like values linked together to speed up searches. These indices are listed using the following format:

`Indices:` index_name btree (*attribute*)

Note that indices may be simple, pointing to one attribute or composite, pointing to more than one attribute.

3.2 Database design

This **new_fsu** database model is based on the MFish Catch Effort database model, which is built around the premise that all fishing trips are based on a series of events. An event is a specific occurrence at a particular position on earth and at a certain time to a vessel or fisher. The MFish Catch Effort system recognizes four types of events: a fishing event (when a trawl, pot set, long line set, jig, etc. is made); a processing event (when an amount of fish is processed over a certain time period); an environmental event (a weather or sea condition measurement); and a trip event. These four event types are specialisations of the generalised entity "events". Each event, regardless of event type, is identified by an *event_key* attribute.

Full documentation of the MFish Catch Effort **warehou** database is given in Duckworth (1997).

Each record in all **new_fsu** tables originally comes from a paper form, and the top-level table in **new_fsu** is *t_forms* **(Table 1).** The attribute *dcf_key* is used to store a system generated number to uniquely identify each form. The vessel identification attributes including *vessel_key* and *vessel_no* are also stored in this table.

The second table is *t_fishing_event* **(Table 2).** Details stored include: dates, times, and location of the fishing event, the fishing method used; the vessel key; and other measures of effort. Because *t_fishing_event* has to handle all possible fishing types, the meaning of the various effort related attributes changes depending on the form type and fishing method used. Definitions for the effort related attributes are given in **Appendix 2** for each form type and fishing method. To improve the performance of the database, the vessel identification attributes *vessel_key* and *vessel_no* are also stored in this table, as well as table *t_landing_event.*

Details of the catch by species, as estimated by the fisher, are stored in the *t_estimated_subcatch* table **(Table 3)**. Details include species code and estimated weight.

Fish processing at-sea details are stored in the table *t_processing_event* **(Table 4)**. This is generally the daily processing summary from the deepwater trawl logbooks, but may also include tuna counts and squid catches. Details include species code, processed state, number of units of processed fish, and the weight of each unit of processed fish.

Landing details are stored in the table *t_landing_event* **(Table 5)**. Details include species code, landed state, and green weight. The amount of catch as recorded by the fisher is stored in the attribute *unit_num.* This is typically a number of kilograms of fish, which has a *unit_type* of 'KG' and *unit_weight* = 1. In some circumstances, e.g., for some hand gathering catches, the catch may be recorded as a number of sacks of fish or shellfish. In this case, the value in *unit_num* is the number of sacks, which have a *unit_type* 'SAC', and the *unit_weight* records the average sack weight. The processed weight is given by *unit_num * unit_weight = proc_weight* and the green weight is given by *conv_factor * proc_weight = green_weight.*

Vessel details are to be stored in the table *t_vessel* **(Table 6).** This table is not populated at present. Vessel details are in the t_vessel_o table as not all vessel records have a vessel key assigned because vessels that were not in the fishery when vessel key values were assigned in about 1989 do not have a documented vessel key.

To join the t_vessel_o table to the t_forms table, for form_type = 17 for example, one joins on call_sign and date_from = first (cast to date) and date_to = last (cast to date).
A similar join can be made for the form type = 'B'.

4 Table Summaries

This **new_fsu** database has 2 sets of six tables containing FSU catch and effort data. In addition to the tables listed below there is a complete duplicate set of 6 tables referred to as original tables. These tables have corresponding names to the tables listed below differing only by the suffix '_o' on each table name. E.g. the table *t_forms* also has the corresponding original table *t_forms_o***.** The structure of these original tables is identical to the main tables listed below except that the original tables do not have the *memo* attribute. One additional difference is that the tables *t_landing_event_o* and *t_processing_event_o* do not have the attribute *key*.

The following is a listing and brief outline of the main tables contained in this **new_fsu** database:

1. **t_forms** : contains the dcf_key, which identifies each record and vessel and date information for each form or logbook cover.

2. **t_fishing_event** : contains the fishing effort and location data for each fishing trip

3. **t_estimated_subcatch:** contains estimated green weights for each species caught.
   Only populated for form types with 'Estimated catch' on the form and form type 6.
   Ie only for form types 1, 3, 6, 10, 16 and 17.

4. **t_processing_event :** contains daily processing details of each species. Contains processing data and calculated green weight

5. **t_landing_event** : contains the details on each species landed including the weight.

6. **t_bait** : contains details of the type of bait and species used for BLL forms.

7. **t_vessel:** contains details of each vessel. This table is not populated at present.

8. **t_memo_codes:** documents the codes used in the memo attribute, which document any changes made to the data.

9. **t_port_codes:** contains the base and landing point codes by region.

Four views were created in Octoer 2014, to provide access for users without disclosing vessel identifiers including vessel registration number, call sign or name.
These views are listed below.

1. **v_forms:** View containing details for a single fsu form or logbook cover, omitting sensitive vessel columns.
2. **v_fishing_event:** View of fishing effort and location data for each fishing event, omitting sensitive vessel id columns and truncating position accuracy.
3. **v_processing_event:** View of fish processing event details, omitting sensitive vessel id columns.
4. **v_landing_event:** View of fish landing event details, omitting sensitive vessel id columns.

5 new_fsu Tables

The following are listings of the tables in this **new_fsu** database, including attribute names, data types (and any range restrictions), and comments.

5.1 Table 1: t_forms

Comment: Details for a single fsu form or logbook cover.

Column	Type	Null?	Description
dcf_key	integer	No	System generated number identifying a single fsu form, or logbook for form_type = 17, B or S.
version_seqno	integer	No	Version number for this record.
logbook_no	integer		The logbook number where available ie only for form_type 17, B & S.
form_type	character varying(3)	No	FSU form type code.
vessel_key	integer		MFish generated number identifying the vessel fishing.
vessel_no	integer		Vessel registration number.
call_sign	character varying(7)		Radio call sign of the vessel.
vessel_name	character varying(30)		Vessel name.
master_name	character varying(30)		Name of the master of the vessel.
pair_vess_key	integer		MFish generated number identifying the pair fishing vessel.
pair_vess_no	integer		Pair vessel registration number.
mth	smallint		Month.
cal_year	integer		Calendar year.
date_from	date		Start date for form or logbook, not populated for monthly forms.
date_to	date		End date for form or logbook, not populated for monthly forms.
comments	character varying(800)		Comments, from FSU staff re the data.

```
memo            character varying(20)      3 char codes that document any
                                           changes made to this record,
                                           refer t_memo_codes.


Indexes:
   "pk_t_forms" PRIMARY KEY, btree (dcf_key)
```

5.2 Table 2: t_fishing_event

Comment: Details of fishing effort and location data for each fishing event.

Column	Type	Null?	Description
event_key	character varying(12)	No	System generated number identifying a single fishing event.
version_seqno	integer	No	Version number for this record.
date_s	date		Start fishing date, equivalent to start_date in MFish CE database.
time_s	integer		Start fishing 24-hour time, equivalent to start_time in MFish CE database.
lat_s	numeric(5,1)		Latitude of start of fishing in ddmm.m format, equivalent to display_start_latitude in MFish CE database.
long_s	numeric(6,1)		Longitude of start of fishing in dddmm.m format, equivalent to display_start_longitude in MFish CE database.
eorw_s	character varying(1)		East or West meridian of start longitude.
set_end_date	date		Date at end of set for fishing method BLL.
set_end_time	integer		Time at end of set for fishing method BLL.
haul_start_date	date		Date at start of haul for fishing method BLL.
haul_start_time	integer		Time at start of haul for fishing method BLL.
date_f	date		Finish fishing date, equivalent to end_date in MFish CE database.
time_f	integer		Finish fishing 24-hour time, equivalent to end_time in MFish CE database.
method	character varying(3)		Fishing method code, equivalent to primary_method in MFish CE database.

target_sp	character(3)	Target species code, equivalent to target_species in MFish CE database.
duration	numeric(5,2)	Duration of fishing event (usage varies with form type), equivalent to fishing_duration in MFish CE database.
duration2	numeric(5,2)	Duration of a 2nd aspect of the fishing event (decimal hours night fishing for squid jig) equivalent to fishing_night_duration in MFish CE database.
unit_type	character varying(3)	Type of packaging; e.g., container, box, sack, single fish, kg, etc.
total_units	integer	Total number of units or kg, of unit_type as landed.
totalcatch	integer	Total weight (kg) of catch for this fishing event as estimated at the time, equivalent to catch_weight in MFish CE database.
effort_depth	integer	Depth (m) of effort (e.g., ground rope in some forms only).
depthbttm	integer	Depth (m) of sea bottom, equivalent to bottom_depth in MFish CE database.
effort_height	numeric(5,1)	Effort_height (usage varies with fishing type).
effort_num	integer	Effort number (usage varies with fishing type), eg max no pots hauled for month for RL.
effort_total_num	integer	Effort total number (usage varies with fishing type), eg number pot lifts for the day for RL.
hook_no	integer	Hook number (may be total hooks hauled per day OR max. number of hooks used at any one time).
speed	numeric(5,2)	Vessel speed (knots) during effort, equivalent to effort_speed in MFish CE database.
surface_temp	numeric(3,1)	Sea surface temperature in degrees C.

surface_temp2	numeric(3,1)	Sea surface temperature in degrees C, at end of set for BLL.
bottom_temp	numeric(3,1)	Bottom temperature in degrees C.
wind_speed	numeric(5,3)	Wind speed in m/s.
wind_dirn	integer	Wind direction in degrees true (0-360).
sea_condition	smallint	Sea state. 1-calm, 2=slight, 3=moderate, 4=rough.
salinity	numeric(7,3)	Salinity in parts per thousand.
moon_phase	smallint	Moon phase. 1=new, 2=first quarter, 3=full, 4=last quarter.
set_result	smallint	Fishing operation code. 1=successful, 2=partly successful, 3=unsuccessful.
extra_data	smallint	If extra data eg LF data was collected. 1=Yes, 2=No.
inside_12mile	character varying(2)	Initially fishing position in relation to the 12 mile limit for form_type = 10. Upgraded in 2011 for records with lat and long to: 12=inside 12 mile limit, EZ=outside 12 mile and in EEZ, NZ=on land, ET=outside 200 mile EEZ boundary.
stat_area	character varying(5)	Statistical area fishing in, equivalent to start_stats_area_code in MFish CE database. Includes general statistical area values and rock lobster statistical areas, plus some species or form specific area codes. Upgraded in 2011 for records with lat and long values and stat_area null to values 001-801 and NZ=on land.
sub_area	character varying(3)	Sub area code, usage varies with form_type.
vessel_key	integer	MFish generated number identifying the vessel fishing.
vessel_no	integer	Vessel registration number.
call_sign	character varying(7)	Radio call sign of the vessel.

trip	integer		A system generated number allocated to each of the events that took place for one vessel between its trip start and end dates. Populated for form_type 1, 3, 6 & 10 only. Plus form_type 16 populated in 2011.
cal_year	integer		Calendar year from 1 January to 31 December.
fishyear	character varying(7)		Formatted fishing year (e.g., 1 Oct 1986 to 30 Sep 1987 = 1986/87).
dcf_key	integer		System generated number identifying a single fsu form.
form_type	character varying(3)	No	FSU form type code.
memo	character varying(40)		3 char codes that document any changes made to this record, refer t_memo_codes.
dlat	numeric(7,5)		Latitude of start of fishing in decimal degrees.
dlon	numeric(8,5)		Longitude of start of fishing in decimal degrees.
position	geometry		Position of start of fishing as gis point type.

```
Indexes:
   "pk_t_fishing_event" PRIMARY KEY, btree (event_key)
   "nx_t_fishing_event_position" gist ("position")
Check constraints:
   "enforce_dims_position" CHECK (ndims("position") = 2)
   "enforce_geotype_position" CHECK (geometrytype("position") =
    'POINT'::text OR "position" IS NULL)
   "enforce_srid_position" CHECK (srid("position") = 4326)

Foreign-key constraints:
   "fk_t_fishing_event_t_forms" FOREIGN KEY (dcf_key)
    REFERENCES new_fsu.t_forms(dcf_key) ON UPDATE CASCADE ON DELETE CASCADE
```

5.3 Table 3: t_estimated_subcatch

Comment: Estimated catch data by species. Only populated for form types with 'Estimated catch' on the form and form_type = 6.

Column	Type	Null?	Description
event_key	character varying(12)	No	Unique fishing event number.
version_seqno	integer	No	Version number for this record.
species	character(3)	No	Three letter code identifying the species caught.
unit_type	character varying(3)		Type of packaging; e.g., container, box, sack, single fish, kg etc.
unit_num	integer		Number of units, eg containers, kg of fish, or litres for oil.
unit_weight	numeric(12,3)		Average weight (kg) of each container or unit.
weight	numeric(7,1)		Estimated weight (kg) caught of the species.
cal_year	integer		Calendar year from 1 January to 31 December.
fishyear	character varying(7)		Formatted fishing year (e.g., 1 Oct 1986 to 30 Sep 1987 = 1986/87).
dcf_key	integer	No	System generated number identifying a single fsu form.
form_type	character varying(3)	No	FSU form type code.
memo	character varying(40)		3 char codes that document any changes made to this record, refer t_memo_codes.

Indexes:
"pk_estimated_subcatch" PRIMARY KEY, btree (event_key, species)

Foreign-key constraints:
"fk_subcatch_fishing_event" FOREIGN KEY (event_key)
REFERENCES new_fsu.t_fishing_event(event_key)
ON UPDATE CASCADE ON DELETE CASCADE

5.4 Table 4: t_processing_event

Comment: Fish processing event details, including calculated green weight.

Column	Type	Null?	Description
key	integer	No	Primary key generated from a counter.
event_key	character varying(12)		Unique fish processing event number.
version_seqno	integer		Version number for this record.
action_type	character varying(3)		General nature of processing event: PRO=processing, OFF=offal production.
proc_date	date		The start date for processing.
species	character(3)		Three letter code identifying the species caught.
state_code	character varying(3)		Processed fish state code.
unit_num	numeric(7,1)		Number of units, eg containers, kg of fish, or litres for oil.
unit_type	character varying(3)		Type of packaging, e.g., container, box, sack, single fish, kg etc.
unit_weight	numeric(12,3)		Average weight (kg) of each container or unit.
conv_factor	numeric(6,4)		Conversion factor.
proc_weight	numeric(7,1)		Processed weight (kg) (processed weight X conversion factor = green weight).
green_weight	numeric(7,1)		Calculated green weight (kg) of the fish.
gw_type	character varying(3)		How green_weight was calculated: ACTual, Fisher Back Calculated, BACk calculated, ESTimated.
vessel_key	integer		MFish generated number identifying the vessel fishing.
vessel_no	integer		Vessel registration number.
call_sign	character varying(7)		Radio call sign of the vessel.
cal_year	integer		Calendar year from 1 January to 31 December.

fishyear	character varying(7)	Formatted fishing year (e.g., 1 Oct 1986 to 30 Sep 1987 = 1986/87).
dcf_key	integer	System generated number identifying a single fsu form.
form_type	character varying(3)	FSU form type code.
memo	character varying(40)	3 char codes that document any changes made to this record, refer t_memo_codes.

Indexes:
"pk_t_processing_event" PRIMARY KEY, btree ("key")

Foreign-key constraints:
"fk_t_processing_event_t_forms" FOREIGN KEY (dcf_key)
REFERENCES new_fsu.t_forms(dcf_key) ON UPDATE CASCADE ON DELETE CASCADE

5.5 Table 5: t_landing_event

Comment: Fish landing event details.

Column	Type	Null?	Description
key	integer	No	Primary key generated from a counter.
event_key	character varying(12)		System generated number identifying a single fishing event.
version_seqno	integer		Version number for this record.
land_date	date		The start date for the landing.
port_code	character varying(6)		Numeric code for the port of landing. Refer t_port_codes or see Appendix 2 of the database documentation for the descriptions.
land_port	character varying(40)		Port of landing. Equivalent to landing_name in MFish CE database.
base_port	character varying(40)		Base port.
factory_code	character varying(3)		Code for factory name.
species	character(3)		Three letter code identifying the species caught, equivalent to species_code in MFish CE database.
fishstock	character varying(5)		Fishstock code. Only populated for form_type 2 and 14.
state_code	character varying(3)		Processed fish state code.
unit_num	numeric(7,1)		Number of units, eg containers, kg of fish, or litres for oil.
unit_type	character varying(3)		Type of packaging; e.g., container, box, sack, single fish, kg etc.
unit_weight	numeric(12,3)		Average weight (kg) of each container or unit.
conv_factor	numeric(6,4)		Conversion factor.
proc_weight	numeric(7,1)		Green or processed weight (kg) or number of units, as landed.
green_weight	numeric(7,1)		Green weight (kg) of the fish.

gw_type	character varying(3)	How green_weight was calculated, ACTual, Fisher Back Calculated, BACk calculated, ESTimated.
destination_type	character varying(1)	Type of destination for fish eg Landed, Discarded.
vessel_key	integer	MFish generated number identifying the vessel fishing.
vessel_no	integer	Vessel registration number.
call_sign	character varying(7)	Radio call sign of the vessel.
trip	integer	A system generated number allocated to each of the events that took place for one vessel between its trip start and end dates. Populated for form_type 1, 3, 6 & 10 only. Plus form_type 16 populated in 2011.
cal_year	integer	Calendar year from 1 January to 31 December.
fishyear	character varying(7)	Formatted fishing year (e.g., 1 Oct 1986 to 30 Sep 1987 = 1986/87) equivalent to display_fishyear in MFish CE database.
dcf_key	integer	System generated number identifying a single fsu form.
form_type	character varying(3)	FSU form type code.
memo	character varying(40)	3 char codes that document any changes made to this record, refer t_memo_codes.

Indexes:
"pk_t_landing_event" PRIMARY KEY, btree ("key")
"nx_t_landing_event_event_key" btree (event_key)

Foreign-key constraints:
"fk_t_landing_event_t_forms" FOREIGN KEY (dcf_key)
REFERENCES new_fsu.t_forms(dcf_key) ON UPDATE CASCADE ON DELETE CASCADE

5.6 Table 6: t_bait

Comment: Details of the type of bait and species used for BLL forms.

Column	Type	Null?	Description
event_key	character varying(12)		Unique fishing event number.
version_seqno	integer	No	Version number for this record.
bait_type	character varying(1)		A one letter code indicating the type of bait used. S=Species, A=Artificial, U=Unspecified.
species	character(3)		Three letter code identifying the species.
form_type	character varying(2)		FSU form type code.
memo	character varying(20)		3 char codes that document any changes made to this record, refer t_memo_codes.

Foreign-key constraints:

```
"fk_t_bait_t_fishing_event" FOREIGN KEY (event_key)
 REFERENCES new_fsu.t_fishing_event(event_key)
 ON UPDATE CASCADE ON DELETE CASCADE
```

5.7 Table 7: t_vessel

Comment: Vessel data table.

Column	Type	Null?	Description
vessel_key	integer	No	MFish generated number identifying the vessel fishing.
vessel_no	integer	No	Vessel registration number.
vessel_name	character varying(30)		Vessel name.
nationality	character varying(5)		Vessel flag nationality, equivalent to vessel_nationality in MFish CE database.
loa	numeric(6,3)		Vessel length (m) overall.
tonnage	numeric(9,3)		Vessel tonnage.
tonnage_class	character varying(1)		Tonnage class of the vessel.
year_built	integer		Year vessel built.
kw	numeric(7,3)		Vessel engine power (Kw).
breadth	numeric(6,3)		Vessel breadth (m).
draught	numeric(6,3)		Vessel draught (m).
call_sign	character varying(7)		Radio call sign of the vessel.
owner_name	character varying(30)		Name of the company that owns or charters the vessel.
master_name	character varying(30)		Name of the master of the vessel
first	character varying(9)		First date recorded with vessel details as in this record.
last	character varying(9)		Last date recorded with vessel details as in this record.
memo	character varying(40)		3 char codes, comma separated that document any changes made to this record.

Indexes:
"pk_vessel" PRIMARY KEY, btree (vessel_key)

5.8 Table 8: t_memo_codes

Comment: Lookup table for memo codes, which document changes made to the data.

Column	Type	Null?	Description
memo	character varying(3)	No	3 character code.
description	text		Description of the code which documents the changes made to the record.

Indexes:
"pk_t_memo_codes" PRIMARY KEY, btree (memo)

5.9 Table 9: t_port_codes

Comment: Table of the base and landing point codes by region.

Column	Type	Null?	Description
port_code	character varying(6)	No	6 digit port code.
region	character varying(3)		Region code, which equals first 3 digits of port_code.
region_desc	character varying(20)		Region description.
point_desc	character varying(30)		Point description, ie location description of the base or landing point.

Indexes:
"pk_t_port_codes" PRIMARY KEY, btree (port_code)

new_fsu Views

For column descriptions refer to the respective table above

5.10 View 1: v_forms

```
Comment: View containing details for a single fsu form or logbook cover,
         omitting sensitive vessel columns.

Column            Type

dcf_key           integer

version_seqno     integer

logbook_no        integer

form_type         character varying(3)

vessel_key        integer

pair_vess_key     integer

mth               smallint

cal_year          integer

date_from         date

date_to           date

comments          character varying(800)

memo              character varying(20)

View definition:
SELECT t_forms.dcf_key, t_forms.version_seqno, t_forms.logbook_no,
t_forms.form_type, t_forms.vessel_key, t_forms.pair_vess_key, t_forms.mth,
t_forms.cal_year, t_forms.date_from, t_forms.date_to, t_forms.comments,
t_forms.memo
  FROM new_fsu.t_forms;
```

5.11 View 2: v_fishing_event

Comment: View of fishing effort and location data for each fishing event, omitting sensitive vessel id columns and truncating position accuracy.

Column	Type
event_key	character varying(12)
version_seqno	integer
date_s	date
time_s	integer
dlat	numeric(4,1)
dlon	numeric(4,1)
set_end_date	date
set_end_time	integer
haul_start_date	date
haul_start_time	integer
date_f	date
time_f	integer
method	character varying(3)
target_sp	character(3)
duration	numeric(5,2)
duration2	numeric(5,2)
unit_type	character varying(3)
total_units	integer
totalcatch	integer
effort_depth	integer
depthbttm	integer
effort_height	numeric(5,1)
effort_num	integer
effort_total_num	integer
hook_no	integer
speed	numeric(5,2)

```
surface_temp      numeric(3,1)

surface_temp2     numeric(3,1)

bottom_temp       numeric(3,1)

wind_speed        numeric(5,3)

wind_dirn         integer

sea_condition     smallint

salinity          numeric(7,3)

moon_phase        smallint

set_result        smallint

extra_data        smallint

inside_12mile     character varying(2)

stat_area         character varying(5)

sub_area          character varying(3)

vessel_key        integer

trip              integer

cal_year          integer

fishyear          character varying(7)

dcf_key           integer

form_type         character varying(3)

memo              character varying(40)

View definition:
SELECT t_fishing_event.event_key, t_fishing_event.version_seqno,
t_fishing_event.date_s, t_fishing_event.time_s,
t_fishing_event.dlat::numeric(4,1) AS dlat,
t_fishing_event.dlon::numeric(4,1) AS dlon, t_fishing_event.set_end_date,
t_fishing_event.set_end_time, t_fishing_event.haul_start_date,
t_fishing_event.haul_start_time, t_fishing_event.date_f,
t_fishing_event.time_f, t_fishing_event.method, t_fishing_event.target_sp,
t_fishing_event.duration, t_fishing_event.duration2,
t_fishing_event.unit_type, t_fishing_event.total_units,
t_fishing_event.totalcatch, t_fishing_event.effort_depth,
t_fishing_event.depthbttm, t_fishing_event.effort_height,
t_fishing_event.effort_num, t_fishing_event.effort_total_num,
t_fishing_event.hook_no, t_fishing_event.speed,
t_fishing_event.surface_temp, t_fishing_event.surface_temp2,
t_fishing_event.bottom_temp, t_fishing_event.wind_speed,
t_fishing_event.wind_dirn, t_fishing_event.sea_condition,
t_fishing_event.salinity, t_fishing_event.moon_phase,
```

```
t_fishing_event.set_result, t_fishing_event.extra_data,
t_fishing_event.inside_12mile, t_fishing_event.stat_area,
t_fishing_event.sub_area, t_fishing_event.vessel_key, t_fishing_event.trip,
t_fishing_event.cal_year, t_fishing_event.fishyear,
t_fishing_event.dcf_key, t_fishing_event.form_type, t_fishing_event.memo
  FROM new_fsu.t_fishing_event;
```

5.12 View 3: v_processing_event

```
Comment: View of fish processing event details, omitting sensitive vessel
         id columns.

Column            Type

key               integer

event_key         character varying(12)

version_seqno     integer

action_type       character varying(3)

proc_date         date

species           character(3)

state_code        character varying(3)

unit_num          numeric(7,1)

unit_type         character varying(3)

unit_weight       numeric(12,3)

conv_factor       numeric(6,4)

proc_weight       numeric(7,1)

green_weight      numeric(7,1)

gw_type           character varying(3)

vessel_key        integer

cal_year          integer

fishyear          character varying(7)

dcf_key           integer

form_type         character varying(3)

memo              character varying(40)

View definition:
SELECT t_processing_event."key", t_processing_event.event_key,
t_processing_event.version_seqno, t_processing_event.action_type,
t_processing_event.proc_date, t_processing_event.species,
t_processing_event.state_code, t_processing_event.unit_num,
t_processing_event.unit_type, t_processing_event.unit_weight,
t_processing_event.conv_factor, t_processing_event.proc_weight,
t_processing_event.green_weight, t_processing_event.gw_type,
t_processing_event.vessel_key, t_processing_event.cal_year,
t_processing_event.fishyear, t_processing_event.dcf_key,
t_processing_event.form_type, t_processing_event.memo
  FROM new_fsu.t_processing_event;
```

5.13 View 4: v_landing_event

Comment: View of fish landing event details, omitting sensitive vessel id columns.

Column	Type
key	integer
event_key	character varying(12)
version_seqno	integer
land_date	date
port_code	character varying(6)
land_port	character varying(40)
base_port	character varying(40)
factory_code	character varying(3)
species	character(3)
fishstock	character varying(5)
state_code	character varying(3)
unit_num	numeric(7,1)
unit_type	character varying(3)
unit_weight	numeric(12,3)
conv_factor	numeric(6,4)
proc_weight	numeric(7,1)
green_weight	numeric(7,1)
gw_type	character varying(3)
destination_type	character varying(1)
vessel_key	integer
trip	integer
cal_year	integer
fishyear	character varying(7)
dcf_key	integer
form_type	character varying(3)
memo	character varying(40)

```
View definition:
SELECT t_landing_event."key", t_landing_event.event_key,
t_landing_event.version_seqno, t_landing_event.land_date,
t_landing_event.port_code, t_landing_event.land_port,
t_landing_event.base_port, t_landing_event.factory_code,
t_landing_event.species, t_landing_event.fishstock,
t_landing_event.state_code, t_landing_event.unit_num,
t_landing_event.unit_type, t_landing_event.unit_weight,
t_landing_event.conv_factor, t_landing_event.proc_weight,
t_landing_event.green_weight, t_landing_event.gw_type,
t_landing_event.destination_type, t_landing_event.vessel_key,
t_landing_event.trip, t_landing_event.cal_year, t_landing_event.fishyear,
t_landing_event.dcf_key, t_landing_event.form_type, t_landing_event.memo
  FROM new_fsu.t_landing_event;
```

6 new_fsu business rules

6.1 Introduction to business rules

The following are a list of business rules applying to the **new_fsu** database. A business rule is a written statement specifying what the information system (i.e., any system that is designed to handle **new_fsu** sampling data) must do or how it must be structured.

There are three recognised types of business rules:

Fact	Certainty or an existence in the information system.
Formula	Calculation employed in the information system.
Validation	Constraint on a value in the information system.

Fact rules are shown on the ERD by the cardinality (e.g., one-to-many) of table relationships. Formula and Validation rules are implemented by referential constraints, range checks, and algorithms both in the database and during validation.

Validation rules may be part of the preloading checks on the data as opposed to constraints or checks imposed by the database. These rules sometimes state that a value should be within a certain range. All such rules containing the word 'should' are conducted by preloading software. The use of the word 'should' in relation to these validation checks means that a warning message is generated when a value falls outside this range and the data are then checked further in relation to this value.

6.2 Summary of rules

Fishing effort details (t_fishing_event)

event_key	Must be unique, and should be an integer.
version_seqno	Must have an integer value entered and should be greater than zero.
date_s	The date start must be a valid date.
set_end_date	The date at the end of the set must be a valid date.
haul_start_date	The date at the start of the haul must be a valid date.
date_f	The finish date must be a valid date.
dcf_key	The dcf_key must be equal to a dcf_key in the t_forms table.
form_type	The form_type code must have a value entered.

Estimated catch (t_estimated_subcatch)

event_key	Must be equal to an event_key in the t_fishing_event table.
version_seqno	Must have an integer value entered and should be greater than zero.
species	Must have a value entered, and should be a valid species code in rdb:species_master.
form_type	The form_type code must have a value entered.
	Multiple column check on event_key and species: The combination of event_key and species must be unique.

Processed catch (t_processing_event)

key	Must be a unique integer.
event_key	Must have a value.
version_seqno	Must have an integer value entered and should be greater than zero.
proc_date	The processed date must be a valid date.
dcf_key	The dcf_key must be equal to a dcf_key in the t_forms table.
form_type	The form_type code must have a value entered.

Landed catch (t_landing_event)

key	Must be a unique integer.
event_key	Must have a value.
version_seqno	Must have an integer value entered and should be greater than zero.
land_date	The landing date must be a valid date.
dcf_key	The dcf_key must be equal to a dcf_key in the t_forms table.
form_type	The form_type code must have a value entered.

7 References

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Appendix 1 – Data Integrity

Data collection and data processing

1. Data error checking, validation, and grooming:
Data files are put through a number of computer error checking (validation) routines that look for inaccuracies and inconsistencies. Any errors detected are corrected. Data are then passed through these error-checking routines until the data reach a satisfactory standard that will allow them to be inserted in the appropriate database.

In some instances, data may be inserted into “working tables” in a database. This is often done to check the integrity of the data by taking advantage of relational databases ability to manipulate, match, and compare related sets of data.

2. "Groomed", validated data loaded to database. Available for analysis:
The clean, groomed, and validated data are inserted into the appropriate database and now become available for analysis.

The clean digitised data files and raw paper data are then archived for safekeeping.

Appendix 2 – Reference code tables

Memo codes documenting changes made to records in this database.

memo	description
A40	Fisher recorded "averaged 40 pots per day" but the number of days fished was not recorded, so catch effort is erroneously high
AEC	Average Effort where Catch exists - effort given for more than one day and given effort varies. The average effort was only assigned to records where a catch existed. i.e., if neither effort nor catch present, effort was not assigned.
AEF	Average EFfort - where some effort_total_num values for the month were not recorded and other days have values for effort_total_num. Then the average effort was applied to these null values.
ARE	stat_area assigned - where null area and distinct area given on form.
ARI	Stat area invalid, ie > 052, updated based on adjacent values.
ARU	stat_area updated where it was too far from base port and landing port and inconsistent with adjacent month(s).
ASE	Average Subtotal Effort - where assessed effort_total_num given as sub-totals and the value recorded a reasonable daily figure, the effort given was assigned to null effort days.
ASQ	species originally coded as ASQ, now SQU
BAG	Original data had unit type landed as BAG but catch rate impossibly high, previous 2 months and only other handgathering for this year recorded catch in KG so changed this catch to kg too
BEL	species originally coded as BEL, now BBE
BIN	Original data had estimated catch units as BIN @ 30kg but ratio to landed catch for trip is 30*, so changed unit weight to 1.
BLC	species originally coded as BLC, now BCO
BMO	species originally coded as BMO, now MOK
BRM	species originally coded as BRM for small snapper, now SNA
BRT	species originally coded as BRT, now FLO
COD	species or target_sp originally coded as COD, now RCO
CRA	species 'CRAB' originally coded as CRA, now CRB
CSN	call_sign updated, assumed to be data entry error
D10	Duration ie hours fished low and catch rate impossibly high so duration = original duration * 10
DAD	Date duplicated for vessel daily record. Updated as appropriate.
DAF	Date moved forward to beginning of next month, as initial month full. Reassignment of values with memo of TDA.
DAI	Date invalid, set to last day of the month
DAT	Date invalid - beyond end of the month, 'shuffled up' to fix.
DFN	Date finish, or proc_date, or land_date updated based on chronology of adjacent dates and time
DHS	haul_start_date updated based on chronology of adjacent dates and times
DOG	species originally coded as DOG, now OSD
DOR	species (or target_sp in t_fishing_event) originally coded as DOR, now OEO or JDO
DSE	set_end_date updated based on chronology of other dates and times for that record
DST	Date start updated based on chronology of adjacent dates and time

EPT	species or target_sp originally coded as EPT, now CDL
EVK	EVent Key updated
FT0	form_type was '0' (zero) but in error
GIZ	species originally coded as GIZ, now STA
GRO	species originally coded as GRO, now HAP
HGU	species originally coded as HGU, now species = BCO and state code = HGU
I12	inside12_mile value interpolated from adjacent stations
LAT	lat_s updated, as below reasonable minimum or position on land
LON	long_s updated, as below a reasonable minimum or position on land
LIV	species originally coded as LIV, now species = MIX and state code = LIV
LLI	species originally coded as LLI, now UNI
MB%	Gear code as indicator of Method recorded as - in SQL - "like 'B%' and not = 'BT' "
MCH	species originally coded as MCH, now NOT
MEA	species originally recorded as MEA, now UNI (and state_code = MEA where applicable)
MEF	species originally coded as MEA & state_code as FIL, now species UNI & state_code = MEA
MEG	species originally coded as MEA & state_code as GRE, now species UNI & state_code = MEA
MEH	species originally coded as MEA & state_code as HGU, now species UNI & state_code = MEA
MET	State code recorded as 'M' for Meat, but non standard state for finfish species, set state_code to HGU for headed and gutted.
MM%	Gear code as indicator of Method recorded as - in SQL - "like 'M%' and not = 'MW' "
MP%	Gear code as indicator of Method recorded as - in SQL - "like 'P%' and not = 'MW' "
NIL	NIL catch recorded on form, but total catch recorded as >= 1
OCY	species originally coded as OCY, now OCT
OIL	species originally coded as OIL, now MIX
OLS	species originally coded as OLS, now OSD
RDO	species originally coded as RDO, now ROC
RIG	species originally coded as RIG, now SPO
RLP	Fishing method changed from RLP to CP based on catch species and quantity
RLT	State code originally 'RLT', but not in tailing at sea area ie stat areas 922 thru 929, so conversion factor set to 1 and green weight set to landed weight.
ROE	species originally coded as ROE, now species = UNI and state code = ROE
S1D	species, state_code and proc_weight combination duplicated for this event_key, and 1 record deleted.
S2D	species, state_code and proc_weight combination duplicated twice, ie 3 identical records, 2 records deleted
SAL	species originally coded as SAL, now SAM
SBM	species (or target_sp in t_fishing_event) originally coded as SBM, now UNI
SC7	state code originally coded to 7 but documentation for code 7 not found, becomes state_code = OTH
SC8	state code originally coded to 8 with no processed (or green) weight recorded, becomes state_code = GRE
SC9	state code originally coded to 9 but documentation for code 9 not found, becomes state_code = OTH
SCQ	state code originally coded to '?' but documentation for code '?' not found, becomes state_code = OTH
SDA	Date was OK, but shuffled up the month to accommodate subsequent invalid date
SEF	Spread EFfort - ie apportion effort over days fished where effort value in effort_total_num was recorded as the sum of effort from more than 1 day.

SHA species or target_sp originally coded as 'SHA', now OSD

SHF species originally coded as SHF, now state_code = SHF and species = SCH or SPO based on which other shark species in catch.

SMX Species 'MIX' state 'G' omitted from raw data line so species matched '00?' , species set to MIX , state_code set to 'G' and landed_wt set to correct value.
For vessel_no 8912 Aug 1985.

SNP species originally coded as SNP for Premium Snapper, now SNA

SP2 2 records for this species combined into this record. No logical reason for 2nd record which may have been a miscoded species.

SPG species originally coded as SPG, now JGU

SQT species originally coded as SQT state HGU, now SQX state HET

SQU species originally coded as SQU, now SQX

SSD species (or target_sp in t_fishing_event) originally coded as SSD, now SSO

SSE Spread Subtotal Effort - where assessed effort_total_num given as sub-totals and the value recorded higher than likely daily average, total effort averaged over total days.

SUR State code of SUR updated to another state based on unlikely state for species and conv_factor is less than 5.0

TDA Date error, no unfished days in month (or next month) to fit, assigned to last day of month (as duplicate date)

TIM Fishing times, either time_s or time_f are in error, resulting in negative fishing time, date_f has been set = date_s, as fishing times are not consecutive and or are too long

TMB Bottom temperature updated, as outside reasonable range

TMS Surface temperature updated, as outside reasonable range

TOT totalcatch originally had value of 32767 and additional TOT records in t_estimated_subcatch_o, these TOT records summed into totalcatch attribute.

TSU Time start (time_s) or time finish (time_f) updated, because fishing times were not consecutive, or too long

TTT Total tray tally != sum of action_type TTL tray tallies, unit_num updated

UNM unit_num updated based on values outside reasonable range or relationship between estimated and landed weights

VAR Original data line corrupted ie extra or missing character(s) so several attributes affected.

VKA Vessel key populated in 2009 based on vessel name (but vessel number is inconsistent).

VKC Vessel key populated in 2009 from NIWA vessel database, where call sign equals call sign from vessel database and the vessel names are the same or similar.

VKE Vessel key updated in 2009 based on match on vessel name and either vessel number or call sign, with MFish sourced data.

VKF Vessel key and vessel_no populated in 2009 based on values from t_fishing_event for same dcf_key, and also vessel_no in t_fishing_event corresponds to vessel_name in t_forms.

VKN Vessel key populated in 2009, based on vessel_no but vessel name is not equal.

VKY Vessel key populated later from vessel database.

VNM Vessel name updated based on other records for same vessel identifier ie vessel_no or call_sign and similar spelling.

XEF eXtra EFfort records added based on data or comments on the original form, e.g. number of pots hauled = "average 50 every 3rd day".

Codes used for the fishing *method* attribute in the t_fishing_event table.

FSU historic method code	new_fsu database method code	Fishing method
11	BT	Bottom Trawl – Single
12	MW	Midwater Trawl – Single
13	BPT	Bottom Trawl – Pair
14	MPT	Midwater Trawl – Pair
	ST	Single Trawl (Bottom or Mid Water not specified)
17	D	Dredging
21	DS	Danish Seine
23	BS	Beach Seine/Dragnets
24	PS	Purse Seine
25	L	Lampara net (for FSU miscellaneous nets)
31	SN	Set Nets
40	POT	Pots (fish, crab etc)
41	RLP	Rock Lobster Potting
	CP	Cod Potting
45	EP	Eel Potting
46	FN	Fyke Netting
50	LL	Long Lining (unspecified)
51	HL	Handlining
52	BLL	Bottom Longlining
53	DL	Drop/Dahn Lines
54	TL	Trot Lines
55	SLL	Surface Longline
56	SJ	Squid Jigging
61	PL	Pole and line
62	T	Trolling
70	H	Handgathering
72	DI	Diving

The contents of the various effort related fields in the t_fishing_event table, by form type.

Form type	Method codes	duration	duration2	effort_num	effort_total_num	hook_no
1	BT, BPT, MW, MPT	Hours trawling		Number of tows		
2	D	Hours dredging		Number of tows		
3	DS			Number of shots	Total rope length (m)	
4	RLP			Max. no. of pots in the water at any one time during the month	Number of pot lifts in the day	
5	LL, HL, BLL, DL, TL					No. of hooks set or No. of handlines
6	T, PL	Hours fished				Number of jigs
7	POT				Number of pots hauled	
8	SN				Total length of net set (m)	
9	H, DI	Hours each spent gathering		Number of people		
10	PS			Set number		
11	EP, FN				Number of pot/trap lifts in the day	
12	BS, L			Number of hauls		
14	D	Hours dredging				
S	SJ	Hours fishing day	Hours fishing night		Not fishing flag, 1= not fishing, 0 = fishing	
B	BLL			Length of line	Number of baskets	Number of hooks

Form types 16 and 17 have none of the above effort related fields populated, as they record start and end times for each tow.

Codes used for the *unit_type* attribute

unit_type code	Description
KG	Kilograms
FIS	Numbers of fish,
BAG	Bag
SAC	Sack
TRA	Tray for action type TTT (Tray tally total)
T0	Tray tally of trays with 1 -10 squid per tray
T1	Tray tally of trays with 11-20 squid per tray
T2	Tray tally of trays with 21-30 squid per tray
T3	Tray tally of trays with 31-40 squid per tray
T4	Tray tally of trays with 41-50 squid per tray
T5	Tray tally of trays with 51-60 squid per tray
T6	Tray tally of trays with 61-70 squid per tray
T7	Tray tally of trays with 71-80 squid per tray
T8	Tray tally of trays with 81-90 squid per tray
T9	Tray tally of trays with 91-100 squid per tray
T10	Tray tally of trays with 101-150 squid per tray
T15	Tray tally of trays with 150+ squid per tray

File FISHSTATS>CODES>CONVERSION_FACTORS

Factors in use as from 12 March 1985
Conversion factors used to convert master file catch information consisting of species code state code and amount to an equivalent green weight.
The first part of this file contains the default conversion factors for deepwater trawl states. These are the factors to be used when the species/state pair does not appear elsewhere in the file.
The format of the first part of the file is in the form:
<state code> <conversion factor> <state description>
The first part is terminated by an invalid state code of ?.
The second part of the file consists of a list of lines each containing a species code, a state code and a conversion factor followed by an optional comment. The end of the file terminates this second part.

Default Conversion Factors
For reference purposes only, states for which no default value is to be used are included in the following list with a factor of -1
NOTE: Conversion factors of 0.0 are specified for some states. The intention being that when calculating a total green weight figure, the catch not be duplicated. For example, a catch record might give both a weight of headed fish and a weight of heads.
To get the original green weight we need only multiply each reported figure by the factor and sum.
Additionally, figures that may be the result of calculations from other figures have a 0.0 factor. E.g. calculated green weight. This is done to preserve the summing as described above. Such calculated figures can be used as a cross check against other calculations.

State	Factor	Comment/Description
B	-1	Bags - no default
C	0.0	Calculated Green Weight
D	1.8	Dressed
E	0.0	Tentacles
F	2.3	Filleted, Skin On
G	1.0	Whole Green Weight
H	0.0	Heads
J	0.0	Chin and cheeks
L	1.1	Gilled and Gutted
M	-1	Meat - no default
N	0.0	Number of Whole Fish
O	1.1	Oddity/Error
P	5.0	Paste/Minced Block
R	0.0	Roe
T	1.7	Trunked/Headed and Gutted
U	1.1	Gutted
V	0.0	Liver
W	0.0	Meal Whole Weight
Z	0.0	Discarded
?		End of Defaults.

Specific conversion Factors
Note that a state code of ? indicates that the conversion factor applies for all states not otherwise given for the given species. The state ? should be the last one given for a species.

Note: any line starting with an * is treated as a comment line.

* **Albacore**
ALB L 1.19 Gilled & gutted
ALB T 1.40 Trunked
ALB U 1.10 Gutted
* **Bait**
BAI U 1.00 Gutted
* **Barracouta**
* Filleted factor changed from 1.8 on 22 July 1985
BAR D 1.50 Dressed
BAR F 2.30 Filleted
BAR L 1.10 Gilled & gutted
BAR T 1.50 Trunked
BAR U 1.10 Gutted
* **Bass Groper**
BAS F 2.40 Filleted
BAS L 1.10 Gilled & gutted
BAS T 1.50 Trunked
BAS U 1.10 Gutted
* **Blue Cod**
* Filleted factor changed from 1.9 on 22 July 1985
BCO D 1.80 Dressed
BCO F 2.30 Filleted
BCO L 1.20 Gilled & gutted
BCO T 1.50 Trunked
BCO U 1.10 Gutted
* **Black Flounder**
BFL F 1.80 Filleted
BFL L 1.10 Gilled & gutted
BFL T 1.40 Trunked
BFL U 1.10 Gutted
* **Blue Maomao**
BMA L 1.10 Gilled & gutted
* **Bluenose**
BNS F 3.00 Filleted
BNS L 1.10 Gilled & gutted
BNS T 1.40 Trunked
BNS U 1.10 Gutted
* **Black Oreo**
BOE D 2.40 Dressed
BOE F 5.30 Filleted
BOE T 2.15 Trunked
* **Bastard Red Cod**
BRC F 1.70 Filleted
BRC T 1.30 Trunked
* **Brill**
BRI L 1.10 Gilled & gutted
BRI T 1.40 Trunked
BRI U 1.10 Gutted
* **Seal Shark**
BSH T 2.00 Trunked
BSH U 1.10 Gutted
* **Butterfish**
BUT F 3.00 Filleted
BUT L 1.20 Gilled & gutted
BUT T 1.40 Trunked
BUT U 1.10 Gutted
* **Bronze Whaler Shark**
BWH T 2.00 Trunked
* **Blue Shark**
BWS T 2.20 Trunked
BWS U 1.10 Gutted

* **Alfonsino**
BYX T 1.40 Trunked
BYX U 1.10 Gutted
* **Capro Dory**
CDO D 1.80 Dressed
CDO F 2.30 Filleted
CDO T 1.70 Trunked
* **Centroscymnus species. (deepsea sharks)**
CEN T 2.00 Trunked
* **Cockles**
COC B 25.0 Bags
* **Cod (unspecified)**
* Filleted factor changed from 1.7 on 22 July 1985
* Trunked (HGU) factor changed from 1.3 on 22 July 1985
COD D 1.80 Dressed
COD F 2.30 Filleted
COD L 1.20 Gilled & gutted
COD T 1.70 Trunked
COD U 1.10 Gutted
* **Conger eels**
CON F 1.40 Filleted
CON L 1.19 Gilled & gutted
CON T 1.30 Trunked
CON U 1.10 Gutted
* **Crays/Rock Lobsters**
CRA B 25.0 Bags
CRA T 3.00 Tailed
* **Dogfish**
DOG F 2.70 Filleted
DOG L 1.10 Gilled & gutted
DOG T 2.00 Trunked
DOG U 1.10 Gutted
* **Dory**
DOR F 2.60 Filleted
DOR T 1.50 Trunked
DOR U 1.10 Gutted
* **Deepwater Dogfish**
DWD T 2.00 Trunked
* **Eels Marine**
EEL F 1.30 Filleted
EEL L 1.19 Gilled & gutted
EEL T 1.40 Trunked
EEL U 1.10 Gutted
* **Elephant Fish**
ELE F 2.85 Filleted
ELE T 2.30 Trunked
ELE U 1.10 Gutted
* **Blue Mackerel**
EMA T 1.40 Trunked
EMA U 1.10 Gutted
* **N.Z. Sole**
ESO L 1.10 Gilled & gutted
ESO T 1.40 Trunked
ESO U 1.10 Gutted
* **Deepsea Flathead**
FHD T 1.50 Trunked
FHD U 1.10 Gutted
* **Flats (mixed)**
FLA L 1.10 Gilled & gutted
FLA T 1.40 Trunked
FLA U 1.10 Gutted

* **Flounder (mixed)**
FLO F 1.80 Filleted
FLO L 1.10 Gilled & gutted
FLO T 1.40 Trunked
FLO U 1.10 Gutted
* **Frostfish**
FRO T 1.50 Trunked
* **Garfish**
GAR U 1.10 Gutted
* **Greenback Flounder**
GFL U 1.10 Gutted
* **Grey Mullett**
GMU L 1.19 Gilled & gutted
GMU T 1.40 Trunked
GMU U 1.10 Gutted
* **Ghost Shark**
GSH D 1.80 Dressed
GSH F 2.85 Filleted
GSH L 1.10 Gilled & gutted
GSH T 2.30 Trunked
GSH U 1.10 Gutted
* **Gurnard**
GUR F 2.60 Filleted
GUR L 1.10 Gilled & gutted
GUR T 1.50 Trunked
GUR U 1.10 Gutted
* **Hake**
HAK D 1.70 Dressed
HAK F 2.30 Filleted
HAK L 1.19 Gilled & gutted
HAK T 1.50 Trunked
HAK U 1.10 Gutted
* **Hapuku**
HAP F 2.40 Filleted
HAP L 1.10 Gilled & gutted
HAP T 1.40 Trunked
HAP U 1.10 Gutted
* **Hammerhead Shark**
HHS T 2.50 Trunked
***Hoki**
HOK D 1.80 Dressed
HOK F 2.10 Filleted
HOK L 1.10 Gilled & gutted
HOK T 1.50 Trunked
HOK U 1.10 Gutted
* **Horse mussels**
* Included on 22 July 1985 meat added 13 jan 87 only est.
HOR B 25.00 Bags
HOR M 8.00 Meat
* **John Dory**
JDO F 2.60 Filleted
JDO L 1.10 Gilled & gutted
JDO T 1.50 Trunked
JDO U 1.10 Gutted
* **Jack Mackerel**
JMA D 1.80 Dressed
JMA F 2.30 Filleted
JMA T 1.40 Trunked
JMA U 1.10 Gutted

* **Kahawai**
KAH F 2.00 Filleted
KAH L 1.10 Gilled & gutted
KAH T 1.40 Trunked
KAH U 1.10 Gutted
* **Kinfish**
KIN F 2.50 Filleted
KIN L 1.10 Gilled & gutted
KIN T 1.40 Trunked
KIN U 1.10 Gutted
* **Lookdown Dory**
LDO T 1.50 Trunked
LDO U 1.10 Gutted
* **Leatherjacket**
LEA T 2.30 Trunked
LEA U 1.10 Gutted
* **Ling**
* Filleted factor changed from 2.2 on 22 July 1985
LIN D 1.70 Dressed
LIN F 2.10 Filleted
LIN L 1.10 Gilled & gutted
LIN T 1.50 Trunked
LIN U 1.10 Gutted
* **Lemon Sole**
LSO F 1.80 Filleted
LSO L 1.10 Gilled & gutted
LSO T 1.40 Trunked
LSO U 1.10 Gutted
* **Mackerel (unspecified)**
MAC T 1.40 Trunked
MAC U 1.10 Gutted
***Mako Shark**
MAK T 2.00 Trunked
MAK U 1.10 Gutted
* **Maomao (unspecified)**
MAO T 1.50 Trunked
MAO U 1.10 Gutted
* **Marlin (unspecified)**
MAR T 1.50 Trunked
* **Mirror Dory**
MDO D 1.80 Dressed
MDO F 2.30 Filleted
MDO T 1.70 Trunked
* **Fish meal**
MEA ? 0.00 ALL STATES
* Mixed fish
MIX L 1.10 Gilled & gutted
MIX T 1.50 Trunked
MIX U 1.10 Gutted
* **Moki**
MOK F 2.50 Filleted
MOK L 1.10 Gilled & gutted
MOK T 1.40 Trunked
MOK U 1.10 Gutted
* **Blue Mussels**
MSB B 25.0 Bags
MSB M 8.00 Meat
* **Green Lipped Mussels**
MSG B 25.0 Bags
MSG M 8.00 Meat
* **Mussels (unspeciified)**
MUS B 25.0 Bags

* **Mullet (unspeciified)**
MUU L 1.10 Gilled & gutted
MUU T 1.40 Trunked
MUU U 1.10 Gutted
* **Northern Spiny Dogfish**
NSD T 1.40 Trunked
* **Octopus**
OCT T 3.00 Trunked
OCT U 1.50 Gutted
* **Oreo Dory**
OEO D 2.40 Dressed
OEO F 5.30 Filleted
OEO T 2.15 Trunked
* **Oilfish**
OFH T 1.30 Trunked
* **Fish oil**
OIL ? 0.00 ALL STATES
* **Orange Roughy**
ORH D 2.20 Dressed
ORH F 4.00 Filleted
ORH T 1.92 Trunked
ORH U 1.10 Gutted
* **Parore**
PAR L 1.19 Gilled & gutted
PAR T 1.50 Trunked
PAR U 1.10 Gutted
* **Paua**
PAU B 30.0 Bags
PAU M 2.50 Meat
* **Packhorse Rock Lobster**
PHC T 3.00 Tailed
* **Porae**
POR T 1.50 Trunked
POR U 1.10 Gutted
* **Pipi** Meat added 13 jan 87 est. only
PPI B 25.0 Bags
PPI M 5.0 Meat
* **Queen Scallops** added 17.2.87 weights to be confirmed.
QSC B 25.00 Bags
QSC M 8.00 Meat
* **Rattails**
RAT D 1.80 Dressed
RAT F 2.30 Filleted
RAT T 1.70 Trunked
* **Rays (Unspecified)**
RAY F 2.13 Filleted
RAY T 2.00 Trunked
* **Red Cod**
* Filleted factor changed from 1.7 on 22 July 1985
* Trunked (HGU) factor changed from 1.3 on 22 July 1985
RCO D 1.80 Dressed
RCO F 2.30 Filleted
RCO L 1.20 Gilled & gutted
RCO T 1.70 Trunked
RCO U 1.10 Gutted
* **Ribaldo**
RIB D 1.80 Dressed
RIB F 2.30 Filleted
RIB T 1.40 Trunked
RIB U 1.10 Gutted

* **Red Moki**
RMO F 2.50 Filleted
RMO L 1.10 Gilled & gutted
RMO T 1.40 Trunked
RMO U 1.10 Gutted
* **Rock Cod**
ROC T 1.30 Trunked
ROC U 1.10 Gutted
* **Red Scorpion Fish**
RRC T 1.50 Trunked
* **Red Snapper**
RSN F 2.80 Filleted
RSN L 1.10 Gilled & gutted
RSN T 1.50 Trunked
RSN U 1.10 Gutted
* **Southern Blue Whiting**
SBW D 1.80 Dressed
SBW F 2.30 Filleted
SBW T 1.70 Trunked
* **Scallops**
SCA B 25.0 Bags
SCA M 8.00 Meat
* **School Shark**
SCH F 2.70 Filleted
SCH L 1.10 Gilled & gutted
SCH T 2.20 Trunked
SCH U 1.10 Gutted
* **Silver Dory**
SDO D 1.80 Dressed
SDO F 2.30 Filleted
SDO T 1.70 Trunked
SDO U 1.10 Gutted
* **Seaweed (unspecified)**
SEO B 25.0 Bags
* **Broardsnouted Sevengill Shark**
SEV T 2.20 Trunked
* **Sand Flounder**
** GGU state set as 1.10 consistent for FLO for this new_fsu database
SFL L 1.19 Gilled & gutted
SFL T 1.40 Trunked
SFL U 1.10 Gutted
* **Shark (unspecified)**
SHA F 2.70 Filleted
SHA L 1.10 Gilled & gutted
SHA T 2.20 Trunked
SHA U 1.10 Gutted
* **Skate**
SKA F 2.13 Filleted
SKA L 2.13 Gilled & gutted
SKA T 2.13 Trunked
SKA U 2.13 Gutted
* **Gemfish**
SKI D 1.60 Dressed
SKI F 2.30 Filleted
SKI L 1.20 Gilled & gutted
SKI T 1.50 Trunked
SKI U 1.10 Gutted
* **Skipjack**
SKJ T 1.40 Trunked

* **Snapper**
SNA D 1.80 Dressed
SNA F 2.30 Filleted
SNA L 1.10 Gilled & gutted
SNA T 1.60 Trunked
SNA U 1.10 Gutted
* **Shovelnose Spiny Dogfish**
SND T 2.00 Trunked
* Snapper, Premium Grade
SNP F 2.30 Filleted
SNP T 1.60 Trunked
SNP U 1.10 Gutted
* **Sole (mixed)**
SOL F 2.20 Filleted
SOL L 1.10 Gilled & gutted
SOL T 1.40 Trunked
SOL U 1.10 Gutted
* **Spiky Oreo**
SOR D 1.80 Dressed
SOR F 2.30 Filleted
SOR T 1.70 Trunked
* **Spiny Dogfish**
* Trunked (HGU) factor changed from 3.0 on 22 July 1985
SPD L 1.50 Gilled & gutted
SPD T 1.70 Trunked
SPD U 1.40 Gutted
* **Sea Perch**
SPE D 1.80 Dressed
SPE F 2.50 Filleted
SPE T 1.50 Trunked
SPE U 1.10 Gutted
* **Rig**
SPO F 2.70 Filleted
SPO L 1.10 Gilled & gutted
SPO T 2.00 Trunked
SPO U 1.10 Gutted
* **Squid (unspecified)**
SQU D 2.00 Dressed
SQU F 2.00 Filleted
SQU T 2.00 Trunked
SQU U 1.10 Gutted
* **Smooth Oreo**
SSO D 2.40 Dressed
SSO F 5.30 Filleted
SSO T 2.15 Trunked
* **Stargazer**
STA D 2.00 Dressed
STA F 2.30 Filleted
STA L 1.10 Gilled & gutted
STA T 1.80 Trunked
STA U 1.10 Gutted
* **Striped Marlin**
STM T 2.20 Trunked
STM U 1.10 Gutted
* **Southern Bluefin Tuna**
STN L 1.20 Gilled & gutted
STN T 1.50 Trunked
STN U 1.10 Gutted
* **Stingray**
STR T 2.00 Trunked

* **Sea Urchin/Kina**
SUR B 25.0 Bags
SUR M 8.00 Meat
* **Silver Warehou**
SWA D 1.70 Dressed
SWA F 3.90 Filleted
SWA T 1.50 Trunked
SWA U 1.10 Gutted
* **Broardbilled Swordfish**
SWO T 1.50 Trunked
* **Tarakihi**
TAR D 1.80 Dressed
TAR F 2.30 Filleted
TAR L 1.10 Gilled & gutted
TAR T 1.50 Trunked
TAR U 1.10 Gutted
* **Thresher Shark**
THR T 2.20 Trunked
* Total Catch
TOT G 1.00 Green
TOT ? 0.00 ALL STATES other than Green
* **Trevally**
TRE F 2.50 Filleted
TRE L 1.19 Gilled & gutted
TRE T 1.50 Trunked
TRE U 1.10 Gutted
* **Trumpeter**
TRU F 2.50 Filleted
TRU L 1.10 Gilled & gutted
TRU T 1.40 Trunked
TRU U 1.10 Gutted
* **Tuatua**
TUA B 25.0 Bags
TUA M 5.00 Meat
* **Tuna (unspecified)**
TUN U 1.10 Gutted
* **Turbot**
TUR L 1.19 Gilled & gutted
TUR T 1.40 Trunked
TUR U 1.10 Gutted
* **Unidentified**
UNI B 25.0 Bags
UNI T 1.50 Trunked
UNI U 1.10 Gutted
* **Common Warehou**
WAR D 1.50 Dressed
WAR F 2.00 Filleted
WAR L 1.19 Gilled & gutted
WAR T 1.40 Trunked
WAR U 1.10 Gutted
* **White Warehou**
WWA D 1.80 Dressed
WWA F 3.90 Filleted
WWA T 1.50 Trunked
WWA U 1.10 Gutted
* Yellow Boarfish
YBO L 1.19 Gilled & gutted
YBO T 1.40 Trunked
YBO U 1.10 Gutted
* **Yellow Eyed Mullet**
YEM T 1.50 Trunked
YEM U 1.10 Gutted

Units Conversion Factors.

The following is a list of the conversion factors used in converting from the given units to kilograms whole weight, and to calculate acceptance factors.

Units	Factor
Cases (outside Wellington)	30
Cases (Wellington)	45
Sacks (default)	25
Strings	40
Foveaux Strait oyster sacks	79
Number of fish (albacore)	5
Number of fish (southern bluefin tuna)	57

The *factory_code* and factory name for data from the landed catch form, associated with form types 1 (Trawl), 3 (Danish Seine),10 (Purse Seine) and 16 (Specified trawl).
Refer to table *t_landing_event* .

Factory Code	Factory Name
ADD	ADDINGTON FISH SUPPLY CO LTD
AKE	AKAROA EXPORTS
ALB	ALBERT ST. FISH SUPPLY
ANT	ANTON'S SEAFOODS
AUS	AUSTRO SEAFOODS LTD
BAP	BAPOBS
BAR	BARBADOES FISHERIES
BCB	BECROFT BROTHERS
BLF	BLUFF SEAFOODS
BLU	BLUE PACIFIC FISHERIES
BOA	BOALERS
BRA	BROADWAY FISHERIES AKL
BRO	BROADWAY FISHERIES PSN
BRU	BROUGH
BTC	BLUFF TRAWLING CO LTD
BUL	BULK SEAFOODS
CFS	CORAL FISH SHOP
CIP	CHATHAM ISLAND PACKING CO
COL	COLUMBIA FISHERIES
CON	CONSOLIDATED FISHERIES
COR	COROMANDEL FISH EXPORTERS
CRA	CRAY ENTERPRISES & DEALERS
CSB	COASTAL SEAFOOD BAZAAR
DAL	DALLINGTON FISH SUPPLY
DCO	DEEP COVE FISHERIES
DEL	DELI'S
DES	DEEP SEA FISHERIES
DFS	DIRECT FISH SUPPLY
EAS	EAST COAST SEAFOODS
FAR	FAR NORTH FISHERIES
FEC	FERONS SEAFOODS
FEG	FERONS
FET	FERON SEAFOODS (SANFORDS)

FLA	FLETCHER FISHING AKL
FLD	FLETCHER FISHING DUN
FLG	FLETCHER FISHING GIS
FLN	FLETCHER FISHING NAP
FRE	FRESHA FISHERIES
FRP	FRESHPACK
GEB	G.E. BRAND & CO
GIS	GISBORNE FISHERIES LTD
GLO	GLOBE FISHERIES
GSF	GULF STRIKE FISHERIES
GUN	GUYTONS
HAR	HARTSTONE (RAGLAN) LTD
HGS	HEINZ GREENSEAS
HIK	HIKURANGI FISHERIES
HIS	HARBOUR INN SEAFOODS
IND	INDEPENDENT FISHERIES
INV	INVERCARGILL FISH & OYSTERS
JAD	JADE SEAFOODS
JAT	JOHN TURNERS
JAY	JAYBEL NICHIMO LTD
JDR	JOHNSON & DE RYK PACKING CO
KAI	KAITI FISHERIES
KOP	KOPE FISHERIES
KTC	KENTON TRAWLING CO
KUT	KUTERE FISHERIES
LEF	LEIGH FISHERIES
MAN	MANGERE
MAU	MAUI FISHERIES
MIL	MILBY SEAFOODS
MOU	MOUNT SEAFOODS
NCO	NORTHCOTE SEAFOODS
NEL	NELSON FISHERIES
NOR	NORFISH
OCE	OCEAN PRODUCTS
ONE	ONEHUNGA FISHERIES
OPO	OPOTIKI SEAFOODS
OTA	OTAKOU FISHERIES
PAF	PACIFIC FISHING CO (PAFCO)
PAK	PAKURANGA FISH SUPPLIES
PAL	PALLINGTON FISHERIES
PAN	PANDORA FISHERIES
PAV	PARK AVENUE FISH SUPPLY
PEA	PEARL FISHERIES
POL	POLYNESIAN FOODS
PON	PORT NICHOLSON
POT	POTTS INTERNATIONAL
PPR	POLAR PRODUCTS
PUK	PUKEKOHE FISHERIES
RIV	RIVERTON (FISHERMANS COOP)
SAN	SANFORDS AKL
SAT	SANFORDS TGA
SAU	SANFORDS TIM
SCO	SCOTT FISHING
SDS	STH DUNEDIN SEAFOOD PROCESSOR
SEA	SEALORDS
SEF	SEAFRESH
SHE	SHELWICK FISHERIES
SIM	SIMUNOVICH FISHERIES
SJF	SAINT JOHNS FISHERIES
SKB	SKEGGS BLF
SKN	SKEGGS NSN

SKP	SKEGGS PCH
SKW	SKEGGS WTN
SOC	SOUTHERN CROSS FISHERIES
SOL	SOLANDER
STR	STRATFORD FISHERIES
TAG	TALLEYS FISHERIES GRM
TAM	TALLEYS FISHERIES MOT
TAP	TOWNSEND & PAUL LTD
TAR	TARANAKI FISH DIST.
TAS	TASMAN SEAFOODS
TAW	TALLEYS FISHERIES WPT
TAY	TAYLOR FISHERIES
TEM	TEMUKA FISHERIES
TFS	TRAWLER FISH SHOP
THO	THORESEN FISHERIES
TOK	TOKOROA FISH SUPPLY
TUR	TURNERS SEAFOOD
UNI	UNITED FISHERIES
UNK	UNKNOWN
URW	URWINS
VAC	VANCOUVER FISHERIES
VAN	VAN CAMP
VAR	VARIOUS
VAU	VAUXHALL FISH SUPPLY
VEL	VELA SEAFOODS
VIR	VIRGO FISHERIES
WAI	WAIKANAE FISHERIES
WAN	WANGANUI TRAWLERS
WAR	WAIRAU FISHERIES
WAT	WATTIE CANNERIES
WEF	WEST FLEET COOP
WEL	WELLINGTON TRAWLING CO
WES	WESTLAND PROCESSORS
WHO	WHOLESALE FISH LTD
WMF	WESTMERE FISHERIES
WST	WESTERN FISHERIES

Base and Landing Region and Point Codes.

The following is a list of all base (and landing) point codes by region, in numeric order within region.
These 6 digit numeric codes are those used in the *port_code* attribute in the **t_landing_event** table.

Note that the first three digits of each code is the region code.

Region 001 - Mangonui

001001 Ahipara Bay
001002 Awanui - Mangonui
001003 Doubtless Bay
001005 Houhora
001006 Kaitaia
001007 Mangonui
001008 Ninety Mile Beach
001009 Parengarenga Harbour
001010 Pukenui
001011 Rangaunu
001012 Reef Point
001013 Te Hapua
001014 Te Kao
001016 Whatuwhiwhi
001017 Taipa
001018 Karikari
001019 Kaimaumau
001020 Merita Bay
001021 Unahi
001022 Taupoutapouta
001023 Spirits Bay
001024 Aurere
001026 Tokerau
001028 Hukatere

Region 002 - Whangaroa

002001 Kaeo
002002 Mahinepua
002003 Matangirau
002004 Matauri
002005 Pupuke
002006 Saies
002007 Totara North
002008 Wainui - Whangaroa
002009 Whangaroa
002010 Flat Island
002011 Tauranga Bay
002012 Te Ngaere
002014 Waimahana Bay

Region 003 - Bay of Islands

003002 Kerikeri
003003 Matauwhi Bay
003004 Opua
003005 Paihia
003006 Purerua
003007 Rawhiti
003008 Russell

003009 Taumarere
003011 Te Ti
003012 Waipapa
003013 Waitangi - Russell
003014 Crowles Bay
003015 Waikare - Russell
003016 Doves Bay
003017 Paengaroa
003018 Tapuaetahi
003019 Waimate North
003020 Opito Bay-Northland
003021 Karetu
003022 Moerewa
003023 Kawakawa

Region 004 - Hokianga

004002 Horeke
004003 Kohukohu
004004 Koutu
004005 Mitimiti
004006 Motukaraka
004007 Motukiore
004008 Motuti
004009 Omapere
004010 Opononi
004011 Oue
004012 Pawarenga
004013 Rawene
004014 Tutekehua
004015 Waimamaku
004016 Whangape - Hokianga
004017 Rangi Point
004018 Taheke
004020 Mangamuka Bridge
004021 Orira
004022 Okaihau
004023 Te karaka Point
004024 Kaikohe
004025 Herekino
004026 Manukau - Northland

Region 041 - Whangarei

041001 Hikurangi
041003 Langs Beach
041004 Mangawhai
041005 Marsden Point
041006 Mckenzies Bay
041007 Ngunguru
041009 Onerahi
041010 One Tree Point
041011 Parua Bay
041012 Pataua
041013 Sherwood
041014 Taiharuru
041015 Takahiwai
041016 Tutakaka
041017 Waipu
041018 Whananaki
041020 Whangaruru
041021 Teal Bay

041022 Portland
041023 Taipuha
041024 Helena Bay
041025 Opahi
041027 Wellingtons Bay
041027 Whangaumu Bay
041028 Ruakaka - Whangarei
041029 Bland Bay
041032 Towai
041034 Titoki
041036 Oakleigh
041038 Matapouri
041040 Oakura - Whangarei
041041 Tamaterau
041043 Rockells Bay
041044 Maungakaramea
041045 Taurikura
041046 Whangarei
041048 Wairua River
041049 Taupiri-Whangarei

Region 042 - Auckland

042001 Albany
042002 Arid Island
042003 Auckland
042004 Avondale
042005 Awana
042006 Awaroa - Waiheke
042007 Birkdale
042008 Browns Bay
042009 Great Barrier Island
042010 Greenhithe
042011 Herald Island
042012 Hobson Bay
042013 Howick
042015 Kumeu
042021 Mechanics Bay
042022 Milford - Auckland
042023 Mission Bay
042024 Motuora Island
042026 Northcote
042027 Okupu Bay
042028 Orewa
042029 Ostend
042030 Kawaka Bay
042031 Panmure
042034 Port Fitzroy
042036 Rakino Island
042037 Riverhead
042038 Riverlea
042040 St Heliers
042041 Surfdale
042043 Te Atatu
042045 Torbay
042046 Tryphena
042047 Wade River
042048 Waiheke Island
042051 Waterview
042054 Otahuhu
042056 Whenuapai
042057 Whangaparapara - Auckland

042058 Hellyers Creek
042059 Henderson
042060 Silverdale
042063 Mairangi Bay
042065 Wesley Bay
042066 Stanmore Bay
042067 Devonport
042069 Birkenhead
042070 Waikumete
042071 Glen Eden
042072 Kelston
042073 Takapuna
042074 Onetangi
042075 Whangaparaoa - Auckland
042078 Swanson
042079 Herne Bay
042080 Ponsonby
042081 Point Chevalier
042083 Matiatia Bay
042085 Rangitoto Island
042086 Arkles Bay
042087 Manly
042088 Owairaka
042091 Okiwi
042092 Massey
042093 Mawhitiwhiti Rd
042094 Mt Albert
042096 Hobsonville
042097 Oneroa
042098 Katherine Bay
042099 Kohimarama
042100 Pakatoa Island
042101 Huapai
042102 Rocky Bay
042103 Beachlands
042105 Nimaru Bay
042106 Clevedon
042107 Duders Beach
042108 Kawakawa Bay
042109 Maraetai
042110 Orere
042111 East Tamaki
042111 Tamaki
042112 Pakuranga
042113 Turanga Creek
042114 Woodside Bay
042115 Little Bay - Auckland
042116 Little Mahuki
042117 Ranui
042118 Whitford
042119 Otara - Auckland
042120 Whau Creek
042121 Westhaven - Auckland
042122 Stillwater
042123 Claris
042124 Karaka Bay - Auckland
042125 Okura River
042126 Castor Bay
042127 Cockle Bay
042128 Bayswater
042129 Bucklands Beach

Region 043 - Thames

043001 Kaiaua - Thames
043002 Kopu
043003 Miranda
043004 Ngatea
043005 Pipiroa
043006 Tapu
043007 Te Mata
043008 Te Puru
043009 Thames
043010 Thornton Bay
043011 Turua
043012 Waiomu Bay
043013 Waitakaruru
043014 Whakatiwai
043016 Hikutaia
043018 Waikawau - Thames
043019 Paeroa
043020 Ngarimu Bay
043021 Te Aroha
043022 Kereta
043023 Kerepeh i
043024 Puru
043025 Little Bay
043026 Whakatete Bay
043028 Piako River
043029 Morrinsville
043031 Mangatangi
043033 Waitoa

Region 044 - Coromandel

044001 Big Bay - Coromandel
044002 Colville
044003 Coromandel
044004 Long Bay - Coromandel
044005 Manaia
044006 Port Jackson
044007 Waitete Bay
044010 Colville Bay

Region 045 - Kawhia

045001 Aotea
045002 Kawhia
045003 Te Awamutu
045004 Te Waitete
045005 Raoraokauere
045006 McLeods Bay
045007 Te Pahu
045008 Pironga
045009 Otorohanga
045010 Te Kuiti
045011 Te Kawa

Region 046 - Raglan

046001 Aka Aka
046002 Huntly
046003 Meremere
046004 Port Waikato

046004 Waikato
046004 Waikato Heads
046004 Waikato River
046005 Pukekohe
046006 Raglan
046007 Taupiri - Raglan
046008 Tuakau
046009 Waingaro Landing
046010 Waipa
046011 Ruawaro
046012 Otaua
046013 Kopua Point
046015 Hamilton
046017 Ohinewai
046019 Lake Whangape
046021 Te Kauwhata
046022 Puniu
046023 Bombay
046024 Frankton - Hamilton
046025 Ngaruawahia
046026 Cambridge
046027 Waitetuna River
046028 Matira
046029 Rangiriri
046030 Waerenga
046031 Pokeno
046064 Hoods Landing
046066 Karapiro
046067 Mercer

Region 047 - Manukau

047001 Big Bay-Manukau
047002 Blockhouse Bay
047003 Bottle Bay
047004 Bottletop Bay
047006 Clarkes Beach
047009 French Bay
047010 Glenbrook Beach
047011 Grahams Beach
047012 Huia
047013 Karaka
047015 Laingholm
047016 Mangere
047018 Manurewa
047020 Mataitai
047021 Onehunga
047023 Papatoetoe
047025 Te Toro
047026 Titirangi Beach
047027 Waiuku
047028 Wattle Bay
047029 Weymouth
047031 Waiau Pa
047032 Hingaia Bridge
047033 Elbow Landing
047035 Papakura
047037 Pukaki Creek
047038 Cornwallis
047039 Jenkins Bay
047040 Muriwai Beach
047041 Mawahawi

047042 Awhitu
047043 Waikowhai
047044 Drury
047047 Matakawau
047048 Green Bay - Manukau
047050 Taurangaruru
047052 Kariotahi Beach
047055 Parau
047059 Waipipi
047060 Whatipu
047061 Piha
047062 Paerata

Region 048 - Leigh

048001 Kawau Island
048002 Leigh
048003 Mahurangi
048003 Mahurangi Heads
048003 Mahurangi River
048003 Scotts Landing
048004 Martins Bay - Leigh
048005 Matakana
048006 Mullet Point
048007 Puhoi
048008 Sandspit
048009 Takatu
048010 Ti Point
048011 Waiwera
048012 Warkworth
048013 Wenderholm
048014 Whangateau
048015 Snells Beach
048016 Point Wells
048017 North Cove
048018 Algies Bay

Region 081 - Mercury Bay

081001 Kennedys Bay
081002 Mercury Bay
081003 Kuaotunu
081004 Opoutere
081005 Port Charles
081006 Potiki Bay
081007 Slipper Island
081008 Tairua
081009 Tererenga
081010 Waihi Beach
081011 Waikawau Bay
081012 Whangamata
081013 Whangapoua
081014 Whitianga
081015 Hahei
081016 Opito Bay - Mercury Bay
081017 Tuateawa
081018 Great Mercury Island
081019 Wharekawa

Region 082 - Tauranga

082001 Athenree
082002 Bowentown
082003 Katikati
082004 Maketu
082005 Matata
082006 Motiti Island
082007 Mount Maunganui
082008 Ohinepanea
082009 Omokoroa
082010 Otumoetai
082011 Pahoia
082012 Pilot Bay
082013 Pukehina
082014 Tanners Point
082015 Tauranga
082016 Waipapa Block
082017 Waiatarua
082018 Pios Beach
082018 Pios Point
082019 Kaituna Cut - Tauranga
082020 Paripari
082021 Papamoa
082022 West End
082023 Kawerau
082024 Little Waihi
082025 Rotorua
082026 Tokoroa
082027 Matamata
082028 Te Puke
082029 Waharoa

Region 083 - Whakatane(Opotiki)

083001 Cape Runaway
083002 Horoera
083003 Hicks Bay
083004 Kutarere
083005 Lottin Point
083006 Maraehako
083007 Ohiwa
083008 Omaio
083009 Opape
083010 Opotiki
083013 Raukokore
083014 Tainui
083015 Te Araroa
083016 Te Kaha
083017 Thornton
083018 Torere
083019 Waihau Bay
083020 Whakatane
083021 Whanarua Bay
083022 Whangaparaoa - Whakatane
083023 Ohope
083023 Port Ohope
083024 Waikawa Point
083025 Okura Creek
083027 Edgecumbe
083028 East Cape - Whakatane
083030 Otara - Whakatane

083031 Waikirikiri
083032 Little Awanui
083033 Te Teko
083034 Ohiwa Harbour
083035 Ruatoki
083036 Taneatua
083037 Pahaoa - Whakatane

Region 100 - Freezer Vessels *

100001 Daniel Solander

Region 121 - Gisborne

121001 Anaura
121002 Gisborne
121003 Kaiaua - Gisborne
121004 Makorori
121006 Tatapouri
121007 Tokomaru
121007 Tokomaru Bay
121008 Tolaga Bay
121009 Waimata River
121011 Whangara
121012 Whareongaonga
121013 Whareponga
121014 Tuparoa
121015 Waipiro
121016 Kaiti
121018 Turihaua
121019 Pouawa
121020 Awanui - Gisborne
121020 Port Awanui
121021 Tikitiki
121024 Mahanga
121025 Mahia

Region 161 - Napier

161001 Ahuriri
161001 Port Ahuriri
161002 Clive
161003 Haumoana
161004 Mahia Beach
161005 Napier
161006 Opoutama
161007 Porangahau
161010 Pourere
161010 Pourerere
161011 Te Awanga
161012 Waikokopu
161013 Wairoa
161014 Whangawehi
161016 Karamu Stream
161017 Waipukurau
161018 Black Head - Napier
161019 Tukituki River
161020 Whirinaki - Napier
161021 Puketapu
161022 Clifton - Napier
161023 Waikoau
161024 Awatoto

161025 Havelock North
161026 Hastings
161029 Kairakau
161030 Aramoana - Napier
161031 Dannevirke
161032 Ocean Beach - Napier

Region 201 - Castlepoint

201001 Cape Palliser
201002 Castlepoint
201003 Featherston
201004 Flat Point
201005 Hamanga
201006 Lake Ferry
201007 Lake Reserve
201008 Mataikona
201009 Ning Nong Bay
201010 Orui
201011 Te Awaiti - Castlepoint
201012 Te Kopi
201013 Tora
201014 Uruti Point
201015 Whareama River
201016 Wharekaukau
201017 Windy Point
201018 Ngawi
201019 Western Lake
201021 Akitio
201022 Whangaehu - Castlepoint
201023 Pahaoa - Castlepoint
201024 Lake Onoke
201025 Palliser Bay
201026 Whatarangi
201027 Glenburn
201028 Greytown
201029 Martinborough
201030 Aohanga
201032 Masterton
201033 White Rock
201035 Carterton
201037 Riversdale Beach
201038 Glendhu
201039 Ngapotiki
201040 Eketahuna
201041 Waiorongomai

Region 202 - Wellington

202001 Breaker Bay
202002 Eastbourne
202003 Fishermans Rock
202004 Island Bay
202005 Moa Point
202006 Oteranga Bay
202007 Petone
202008 Point Howard
202009 Rona Bay
202010 Seatoun
202011 Port Nicholson
202011 Wellington
202012 Evans Bay

202014 Lowry Bay
202015 Lower Hutt
202016 Lyall Bay
202017 Hutt River
202018 Taraki Bay
202019 Taita
202020 Linden
202021 Wainuiomata
202022 Epuni
202023 Kelson
202024 Naenae
202025 Seaview - Wellington

Region 203 - Makara

203001 Makara

Region 204 - Paremata

204001 Karehana Bay
204002 Paremata
204003 Plimmerton
204004 Pukerua Bay
204005 Titahi Bay
204006 Porirua
204007 Pauatahanui

Region 205 - Paraparaumu

205001 Hokio Beach
205003 Levin
205004 Otaki
205005 Paraparaumu
205006 Raumati
205007 Te Horo
205008 Waikanae - Paraparaumu
205009 Waitarere Beach
205012 Paekakariki

Region 206 - Manawatu

206001 Bulls
206002 Foxton
206002 Manawatu Heads
206002 Manawatu River
206004 Moanaroa Beach
206005 Tangimoana
206007 Palmerston North
206008 Woodville
206009 Kimbolton
206010 Feilding
206011 Opiki
206012 Himatangi
206013 Marton
206014 Shannon

Region 241 - Wanganui

241001 Castlecliff
241002 Patea
241003 Wanganui
241004 Waitotara

241005 Whangaehu - Wanganui
241006 Waverley
241007 Turakina

Region 281 - New Plymouth

281001 Mokau
281002 New Plymouth
281002 Port Taranaki
281003 Oakura - New Plymouth
281004 Ohawe
281005 Opunake
281006 Timaru Stream
281007 Urenui
281008 Waitara
281009 Tongaporutu
281010 Whangamomona
281012 Stratford
281013 Wai
281015 Pungarehu
281016 Onaero
281017 Warea
281018 Pukearuhe
281020 Cape Egmont
281021 Purangi
281022 Bell Block
281023 Pariokarewa
281024 Awakino
281025 Hawera

Region 321 - Kaipara

321001 Awaroa Creek
321002 Aratapu
321003 Batley
321004 Dargaville
321005 Helensville
321006 Hoteo
321008 Makarau
321009 Matakohe
321010 Maungaturoto
321011 Mititai
321012 Naumai
321013 Oruawharo - Kaipara
321014 Pahi
321015 Port Albert
321016 Raupo
321017 Ruawai
321018 Shelly Beach
321019 Tauhoa
321020 Te Kopuru
321021 Tinopai
321022 Tokatoka
321023 Whakapirau
321025 Rangiora - Kaipara
321026 Tikinui
321027 Wharehine
321028 Point Curtis
321029 Glinkes Gully
321030 Pouto
321031 Tapora
321032 Te Kowhai

321033 Arapaoa River
321034 Kaukapakapa
321035 Stables Landing
321036 Wellsford
321037 Whakahara
321038 Tangowahine
321039 Te Kopua Point
321040 Mangakura
321041 Ranganui
321042 Maunganui Bluff
321043 Waikiri Creek
321044 Kaiwaka
321045 Parakai
321046 Waimauku

Region 400 - Overseas

400001 Pago Pago
400002 Levuka (Fiji)
400003 Outside NZ

Region 501 - Golden Bay

501002 Motupipi
501003 Onekaka
501004 Rangihaeata
501005 Takaka
501006 Wainui - Golden Bay
501007 Waitapu
501008 Westhaven Inlet
501009 Puponga
501010 Collingwood
501011 Pohara
501012 Parapara - Golden Bay
501013 Kaihoka
501014 Pakawau
501015 Ligar Bay
501016 Mangarakau
501018 Tata Bay
501018 Tata Beach
501019 Tarakohe

Region 502 - Motueka

502001 Motueka
502002 Riwaka
502003 Kaiteriteri
502004 Sandy Bay - Motueka

Region 503 - Nelson

503001 Mapua
503002 Monaco
503003 Nelson
503004 Tasman
503006 Ruby Bay
503008 Rai Valley

Region 504 - Pelorus

504001 Elaine Bay
504002 French Pass

504003 Havelock
504005 Port Ligar
504006 Tuna Bay
504007 Clova Bay
504008 Mahakipawa
504009 Bulwer
504010 Croisilles
504011 Durville Island
504012 Wakatahuri
504013 Pukatea Bay
504014 Allman Bay
504015 Mahau
504017 Nikau Bay
504018 Kenepuru Sound
504019 Double Bay
504020 Manaroa
504021 Port Hardy
504022 Nopera
504023 Portage Bay
504024 Penzance Bay
504025 Waitai Bay
504026 Okiwi Bay
504027 Duncans Bay

Region 541 - Picton

541001 Big Bay - Picton
541003 Onahau Bay
541004 Picton
541006 Tory Channel
541007 Te Iro Bay
541008 Grove
541009 Deep Bay - Picton
541010 Port Gore
541011 Cape Jackson
541013 Blackwood Bay
541014 Te Weuweu Bay
541015 Titirangi Bay
541016 Waikawa Bay - Picton
541017 Linkwater
541019 Resolution Bay
541020 East Bay
541021 Bellview Bay
541022 Anakoha Bay
541023 Mint Bay
541024 Te Awaiti - Picton
541025 Anakiwa

Region 542 - Blenheim

542001 Awatere
542002 Blenheim
542003 Cape Campbell
542005 Marfells Beach
542007 Ocean Bay
542008 Oyster Bay
542009 Port Underwood
542010 Rarangi
542011 Robin Hood Bay
542012 Seaview - Blenheim
542013 Seddon
542015 Wairau Bar

542017 Whites Bay
542018 Opawa River
542019 Lake Rotoiti - Blenheim
542020 Spring Creek
542024 Blind River
542026 Renwick
542027 Hakahaka Bay

Region 621 - Kaikoura

621001 Goose Bay
621002 Kaikoura
621003 Motunau
621003 Motunau Beach
621004 Oaro
621005 Port Robinson
621006 Rakautara
621007 South Bay - Kaikoura
621008 Waipapa Bay
621009 Paparoa Point
621010 Mangamaunu
621012 Claverley
621013 Black Miller
621014 Kekerengu
621015 Ward Beach
621016 Clarence River

Region 622 - Lyttleton

622001 Governors Bay
622002 Kaiapoi
622003 Le Bons Bay
622004 Little Akaloa
622005 Lyttleton
622006 Pigeon Bay
622007 Purau
622008 Red Cliffs
622009 Sumner
622010 Scarborough
622011 Port Levy
622012 Kairaki Beach
622014 Rangiora - Lyttleton
622015 Cass Bay
622016 Waikuku Beach
622017 Okains Bay
622019 Pines Beach
622021 Christchurch
622022 Amberley
622023 Styx River
622024 Lake Sumner
622025 Leithfield

Region 623 - Akaroa

623001 Akaroa
623003 Duvauchelle
623004 Long Bay - Akaroa
623005 Okawa
623006 Peraki
623007 Te Oka Bay
623008 Wainui - Akaroa
623009 Takamatua

623010 French Farm
623011 Robinsons Bay
623012 Lake Forsyth

Region 624 - Lake Ellesmere

624001 Greenpark
624002 Lake Ellesmere
624003 Lakeside
624004 Selwyn River
624005 Taumutu
624006 Southbridge

Region 661 - Timaru

661001 Timaru
661002 Geraldine
661003 Waihao River

Region 701 - Oamaru

701001 Oamaru

Region 741 - Moeraki

741001 Moeraki
741002 Shag Point

Region 742 - Karitane

742001 Blueskin Bay
742002 Goodwood
742003 Karitane
742004 Merton
742005 Omimi
742006 Palmerston
742007 Pleasant River
742008 Puketeraki
742009 Seacliff
742010 Tumai
742011 Waikouaiti
742013 Warrington
742014 Purakanui

Region 743 - Port Chalmers

743002 Dunedin
743003 Harrington Point
743004 Port Chalmers
743005 Outram
743006 Otakou
743007 Toko River
743010 Albert Town
743011 Sawyers Bay
743013 Broad Bay
743014 Portobello
743016 Careys Bay

Region 744 - Taieri Mouth

744001 Brighton
744002 Lake Waihola

744003 Taieri Mouth
744004 Waipori Lake
744005 Henley
744006 Toko River

Region 745 - Nuggets

745001 Kaka Point
745002 Nugget Point
745003 Pounawea
745004 Willsher Bay
745005 Balclutha
745006 Owaka
745007 Stirling
745008 Hinahina
745009 Kaitangata
745010 Clydevale
745011 Nugget Bay
745011 Nuggets
745012 Wangaloa
745013 Clutha River
745014 Papatowai
745015 Tautuku Peninsula

Region 781 - Waikawa

781004 Waipapa Point
781006 Waikawa - Southland
781007 Tahakopa
781007 Tahakopa Bay
781008 Haldane
781009 Fortrose
781010 Wyndham

Region 782 - Riverton

782001 Bluecliffs - Riverton
782002 Colac Bay
782003 Invercargill
782004 Lorneville
782005 Pahia
782006 Riverton
782007 Sandy Point
782008 Te Waewae Bay
782009 Wakapatu
782010 Underwood
782011 New River Harbour
782016 Oreti Beach
782017 Otapiri Gorge
782023 Papatotara
782024 Tuatapere
782025 Orawia
782026 Monkey Island
782027 Clifton - Invercargill
782028 New River
782030 Merrivale
782031 Port Craig
782032 Omaui
782034 Orepuki
782035 Wallacetown
782038 Nightcaps
782039 Ohai

Region 783 - Bluff

783001 Bluff
783006 Mataura
783007 Kennington
783008 Winton
783009 Gore
783010 Gorge Road
783013 Cosy Nook
783015 Kapuka
783016 Edendale

Region 784 - Milford

784001 Barne Bay
784002 Blanket Bay - Milford
784003 Breaksea Sound
784004 Charles Sound
784005 Doubtful Sound
784006 Dusky Sound
784007 Milford Sound
784007 Milford - Milford Sound
784008 Big Bay - Milford
784009 Deep Cove
784010 Precipice Cove
784011 Te Anau
784013 Puysegur Point
784015 Queenstown
784016 Wanaka
784017 Dagg Sound
784018 Glenorchy
784019 Chalky Sound
784020 Martins Bay - Milford
784021 Gore River
784022 Preservation Inlet
785001 Halfmoon Bay

Region 785 - Stewart Island

785002 Saddle Point
785003 Stewart Island
785004 Oban
785005 Leasks Bay
785006 Horseshoe Bay - Stewart Island
785007 Paterson Inlet

Region 821 - Greymouth

821001 Bruce Bay
821002 Greymouth
821003 Hokitika
821004 Jacksons Bay
821005 Paringa
821006 Little River
821006 Whakapohai River
821007 Blue River
821008 Okuru
821009 Okarito
821011 Haast
821012 Lake Moeraki
821015 Moana

821016 Neils Beach

Region 861 - Westport

861001 Westport
861002 Woodpecker Bay
861003 Mokihinui
861004 Nikau Point
861005 Charleston
861006 Little Wanganui

Region 901 - Chatham Islands

901001 Chatham Islands
901002 Kaingaroa
901003 Owenga
901004 Pitt Island
901005 Port Hutt
901006 Waitangi - Chatham Islands
901007 Flower Pot

Region 999 - Unknown or Invalid

999999 Invalid

Note that this list does include some multiple entries for the same port code, however these are presumably different descriptions for the same place as supplied by fishers at the time.

Appendix 3 – Data Forms

The table below lists the forms that were used for the collection of FSU data in this **new_fsu** database

Form type	Form Header, or Form type name	Method codes
1	Trawl Fishing Return	BT, BPT, MW, MPT
2	Dredge Return	D
3	Danish Seine Fishing Return	DS
4	Rock Lobster Fishing Return	RLP
5	Line Fishing Return	LL, HL, BLL, DL, TL
6	Troll and Pole Fishing Return	T, PL
7	Pots Fishing Return	POT
8	Set Net Fishing Return	SN
9	Hand Ggathering Return	H, DI
10	Daily Purse Seine Log	PS
11	Eel Fishing Return	EP, FN
12	Other Nets Fishing Return	BS, L
14	Oyster Return (Foveaux Strait)	D
15	Landed Catch Form	
16	Trawl Log for Specified Vessels	BT, BPT
17	Catch Effort Logbook Trawl	ST
S	Catch Effort Logbook Squid Jigging	SJ
B		BLL

The following pages show the forms that were used for the collection of FSU data in this **new_fsu** database:

TRAWL FISHING RETURN

01

Registered no. | Name of vessel | Port of landing | Month | Year

Tick type of trawling:
1. Single bottom
2. Single midwater/surface
3. Pair bottom
4. Pair midwater/surface
5. Other ______________ (Specify)

If pair fishing give pair vessel
Registered no. | Name

Tick units:
1. Baskets, cases or bins
2. Strings
3. Kg
4. Other ______________ (Specify)

Factory supplied | Code

Date		Tick end of trip	*No. of tows	Area no. see map	Hours trawling	Estimated catch (in units as above)										Name of fishing grounds
						Total catch	Main species (up to 3)									
Day	Month						Name	Code	Quantity	Name	Code	Quantity	Name	Code	Quantity	

*Complete one line for each tow, or one line for each days fishing, whichever suits you best

----
SIGNATURE

02

DREDGE RETURN

Registered no.

Name of vessel

Week ending Saturday

Day Month Year 1 9

Port of landing

Tick units 1 Cases; 2 Sacks; 3 Other _____ (Specify)

Estimated weight of units in kg

Day	Area no. see map	Hours dredging	Catch (in units as above) Scallops	Oysters	Mussels	Other species	Name of fishing grounds
Sunday							
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Total landings for week							
			Kg of scallop meat	Dozens of oysters	Sacks/kg of whole mussels		

_____
SIGNATURE

03

DANISH SEINE FISHING RETURN

Registered no. | Name of vessel | Port of landing | Month | Year

If pair fishing give pair vessel

Registered no. | Name

Tick units: 1 ✓ Baskets, cases or bins; 2 Kg; 3 Other_____ (Specify)

Factory supplied | Code

Date Day	Month	Tick end of trip	*No. of shots	Area no. see map	Total rope length in metres	Estimated catch (in units as above) Snapper	John dory	Sand flounder	Trevally	Gurnard	Other species		Name of fishing grounds

*Complete one line for each shot, or one line for each days fishing, whichever suits you best.

SIGNATURE

ROCK LOBSTER FISHING RETURN

REGISTERED No. ..... NAME OF VESSEL ..... MONTH ..... 19.....

SHORE FISHING PERMIT No. ..... PORT OF LANDING ..... BASE PORT .....

Day of Month	Mark Each Day Fished (✓)	Area Number (see map)	Number of Pots Hauled	Weight Landed in Kg (for days you landed your catch)				
				Whole Reds	Tailed Reds	Packhorse	Other Species	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

Show Other Methods Used During Month:

.....

.....

.....

....

(Signature of Owner or Agent)

The rock lobster form in use from 1979 to 1982. In this database with a form type of '04'.

04

ROCK LOBSTER FISHING RETURN

Registered no.

Name of vessel

Month Year

Port of landing

Maximum no. of pots in water, at any one time during the month.

Day of month	Tick each day fished	Area no. see map	No. of pots hauled	Landed catch (weight in kg, to 1 decimal place)				Other species
				Whole reds	Tailed reds	Packhorse	Octopus	
1				.	.	.		
2				.	.	.		
3				.	.	.		
4				.	.	.		
5				.	.	.		
6				.	.	.		
7				.	.	.		
8				.	.	.		
9				.	.	.		
10				.	.	.		
11				.	.	.		
12				.	.	.		
13				.	.	.		
14				.	.	.		
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18				.	.	.		
19				.	.	.		
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21				.	.	.		
22				.	.	.		
23				.	.	.		
24				.	.	.		
25				.	.	.		
26				.	.	.		
27				.	.	.		
28				.	.	.		
29				.	.	.		
30				.	.	.		
31				.	.	.		
				.	.	.		

SIGNATURE

05

LINE FISHING RETURN

Registered no. _____

Name of vessel _____

Port of landing _____

Tick main method

1. Bottom longline
2. Drop or dhan line
3. Handline
4. Other_____ (Specify)

Month _____ **Year** _____

Fishing information				Landed catch (weight in kg and state, e.g. gutted, for days catch landed)										Name of fishing grounds
											Other species			
Day of month	Area no. see map	no. of hooks set OR	No. of hand-lines	Snapper SNA State	Hapuku HAP State	Rig SPO State	School shark SCH State	Ling LIN State	Blue cod BCO State	Gurnard GUR State	State	State	State	

_____ SIGNATURE

06

TROLL and POLE FISHING RETURN

Registered no. | **Name of vessel** | **Month** | **Year**

Port of landing

Tick main method 1 Trolling 2 Poling

No. of jigs

Fishing information									Landed catch				
Day of mth	Tick each day fished	Area no. see map	No. of hours fished	Albacore numbers	Skipjack numbers	Southern bluefin numbers	Other species		Albacore kg	Skipjack kg	Southern bluefin kg	Other species	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
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29													
30													
31													

SIGNATURE

POTS FISHING RETURN

(OTHER THAN ROCK LOBSTER)

07

Registered no.

Name of vessel

Month **Year**

Shore fishing permit no.

Name of Permit holder

Port of landing

Day of month	Tick each day fished	Area no. see map	No. of pots hauled	Landed catch (weight in kg, for days catch landed)				
				Whole Blue cod	Blue cod fillets	Crab	Other species	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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24								
25								
26								
27								
28								
29								
30								

SIGNATURE

08

SET NET FISHING RETURN

Registered no.

Name of vessel

Port of landing

Month Year

Fishing information			Landed catch (weight in kg and state, e.g. gutted)												Name of fishing grounds
										Other species					
Day of month	Area no. see map	Total length of net set (metres)	Rig SPO State	School shark SCH State	Sand flounder SFL State	Y. belly flounder YBF State	Blue moki MOK State	Snapper SNA State	State	State	State	State	State	State	

SIGNATURE

09

HAND GATHERING RETURN

Registered no.

Name of vessel

Port of landing

Month Year

Shore fishing permit no.

Name of Permit holder

Tick Units
1 Green weight (kg)
2 Meat weight (kg)
3 Sugar bags

Tick Method
1 Diving
2 Shore picking
3 Other..... *Specify*

Day of month	Area no. see map	People		Quantity landed (in units as above)								Other species		Name of fishing grounds
		No.	Hours each	Paua	Green mussels	Rock lobster	Kina	Pipis	Tuatua	Cockles	Seaweed			

SIGNATURE

10

DAILY PURSE SEINE LOG

Registered no.

Vessel name

Date

Day Month Year

19

Location

Tick if searching/fishing

1 a.m.

2 p.m.

If not searching/fishing tick reason

1 Travelling
2 Bad weather
3 Discharging/stores
4 Repairs/survey
5 Time off

Sets							Estimated catch (tonnes)								
	Location											Other species			
Set no.	Latitude Degrees	Latitude Minutes	Longitude Degrees	Longitude Minutes	Sea temp.	Start time	Finish time	Skipjack	Trevally	Blue mackerel	Jack mackerel	Kahawai			Wells	Remarks

Notes

SIGNATURE

11

EEL FISHING RETURN

Registered no.

Name of vessel

Month Year

Shore fishing permit no.

Name of Permit holder

Tick method 1 Fyke nets 2 Hinaki

Day of month	Tick each day fished	Area no. see map	No. of nets or pots hauled	Landed catch (weight in kg, for days catch landed)				
				Shortfin	Longfin	Elvers	Other species	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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24								
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26								
27								
28								
29								
30								
31								

SIGNATURE

12

OTHER NETS FISHING RETURN

Registered no.

Name of vessel

Port of landing

Month Year

Shore fishing permit no.

Name of Permit holder

Tick method

1 Beach seine/Drag net
2 Lampara nets
3 Other.....
Specify

Fishing information			Landed catch (weight in kg and state, e.g. gutted)										Name of fishing grounds
										Other species			
Day of month	Area no. see map	No. of hauls	Snapper	Trevally	Kahawai	Grey mullet	Garfish	Northern kingfish	Sand flounder				
			SNA	TRE	KAH	GMU	GAR	KIN	SFL				
			State	State	State	State	State	State	State	State	State	State	

SIGNATURE

OYSTER RETURN

MAFFISH COPY

VESSEL .....

DAY ..... DATE .....

OYS.BED AREA	SACKS	HOURS	LANDMARKS and DISTANCES

NIL RETURN: If you have not dredged today

☐ **Tick here.**

SEND TO:
MAFFISH
PRIVATE BAG
INVERCARGILL

.....
Signature of Master

At the end of each week in the pre-paid envelopes supplied.

Foveaux Strait Oyster Return form with a form type of '14'.

15

LANDED CATCH FORM

Registered no.

Vessel name

Port of landing

Factory name

Code

First day fished Day Month Year 19

Last day fished Day Month Year 19

Species	Code	State	Weight (kg)	Species	Code	State	Weight (kg)
Barracouta	BAR			Snapper - ordinary	SNA		
Blue cod	BCO			Snapper - premium	SNP		
Blue nose (Bonita)	BNS			N.Z. sole	ESO		
Elephant fish	ELE			Lemon sole	LSO		
Sand flounder (Dabs)	SFL			Sole - mixed	SOL		
Y. belly flounder	YBF			Squid	SQU		
Flounder - mixed	FLO			Stargazer (Monkfish)	STA		
Gemfish (S. kingfish)	SKI			Tarakihi	TAR		
Gurnard	GUR			Trevally	TRE		
Hake (English)	HAK			Common warehou	WAR		
Hapuku	HAP			Silver warehou	SWA		
Hoki	HOK						
John dory	JDO			Albacore	ALB		
Kahawai	KAH			Skipjack	SKJ		
Kingfish (Yellowtail)	KIN			Sth bluefin tuna	STN		
Leatherjackets	LEA						
Ling	LIN						
Jack mackerel	JMA						
Blue mackerel	EMA						
Moki	MOK						
Octopus	OCT						
Orange roughy	ORH						
Oreo dory	OEO						
Lookdown dory	LDO						
Red cod	RCO						
Red cod	RCO						
Rig (Spot'd dogfish)	SPO						
School shark	SCH						
Ghost shark	GSH						
Skate	SKA						

Please code state as follows

Green	GRE	Trunked	TRU
Gutted	GUT	Headed, gutted and skinned	HGS
Headad and gutted	HGU	Filleted	FIL
Gilled and gutted	GGU	Trimmed fillets	TRF

Total weight landed (kg)

SIGNATURE

16 | | START NEW SHEET FOR EACH TOW

Vessel Name

If pair fishing give pair vessel name

Date (Day / Month / Year)

Target Species | Code

START OF TOW

Time (NZST)

Latitude (Deg. / Min. / S)

Longitude (Deg. / Min. / E/W)

Depth (metres) net / bottom

OR Description of Fishing Grounds

END OF TOW

Time (NZST)

Headline Height (m)

Fishing Speed (kts)

ESTIMATED CATCH BEFORE PROCESSING

TOTAL CASES/ BASKETS

IF **NO** CATCH WRITE **NIL** IN BOX

MAIN SPECIES	Code	No. Cases/ Baskets
Orange roughy	ORH	
Hoki	HOK	
Barracouta	BAR	
Ling	LIN	
Hake	HAK	
Red cod	RCO	
Squid	SQU	
Gemfish (Sth. Kingfish)	SKI	
Gurnard	GUR	
Tarakihi	TAR	
Snapper	SNA	
Trevally	TRE	
Kahawai	KAH	
Bluenose (Bonita)	BNS	
Hapuku (Groper)	HAP	
School shark	SCH	
Rig	SPO	
Spiky dogfish	SPD	
Ghost shark	GSH	

MAIN SPECIES	Code	No. Cases/ Baskets
Jack mackerel	JMA	
Common warehou	WAR	
Silver warehou	SWA	
Black oreo dory	BOE	
Smooth oreo dory	SSO	
John dory	JDO	
Lookdown dory	LDO	
Mirror dory	MDO	
Alfonsino	BYX	
Stargazers (Monkfish)	STA	
Sea perch	SPE	
Rattails	RAT	
Cardinal	CDL	
Skate	SKA	

This form is from the 'Trawl Log for Specified Vessels'

START NEW SHEET FOR EACH TOW

DATE (DAY MONTH YEAR)

TARGET SPECIES

RADIO CALL SIGN

GEAR CODE

START OF TOW

TIME NZST	LATITUDE DEG	LATITUDE MIN		LONGITUDE DEG	LONGITUDE MIN	E/W	DEPTH NET	DEPTH BOTTOM	TEMPERATURE °C SURFACE	TEMPERATURE °C BOTTOM
			S							

END OF TOW

TIME NZST	FISHING SPEED KNOTS

ESTIMATED CATCH BEFORE PROCESSING

TOTAL WEIGHT KILOGRAMS	MAIN SPECIES NAME	WEIGHT KILOGRAMS

PROCESSED CATCH

SPECIES	WHOLE KILOGRAMS	HEADED AND GUTTED KILOGRAMS	FILLETED SKIN ON KILOGRAMS	FILLETED SKIN OFF KILOGRAMS	OTHER (SPECIFY) KILOGRAMS
TARAKIHI					
SNAPPER					
JACK MACKEREL					
LING					
HOKI					
HAKE					
SILVER WAREHOU					
WHITE WAREHOU					
COMMON WAREHOU					
SOUTHERN BLUE WHITING					
GEMFISH					
BARRACOUTA					
GROPER					
RED COD					
OTHER CODS					
GHOST SHARK					
SPINY DOGFISH					
OTHER SHARKS & DOGFISH					
SILVERSIDE					
RATAILS OR GRENADIERS					
SEA PERCH					
LOOKDOWN DORY					
SILVER DORY					
BLACK OREO DORY					
SMOOTH OREO DORY					
SQUID					
FROST FISH					

MEAL	
OIL	

This form is from the earliest version available of the 'Foreign Fishing Craft Catch Effort Record Trawl' logbook. This form has a form type of '17'.

DATE DAY MONTH YEAR

START NEW SHEET FOR EACH TOW

RADIO CALL SIGN

GEAR CODE

TARGET SPECIES

START OF TOW

TIME NZST	LATITUDE DEG	LATITUDE MIN		LONGITUDE DEG	LONGITUDE MIN	E/W	DEPTH NET	DEPTH BOTTOM	TEMPERATURE °C SURFACE	TEMPERATURE °C BOTTOM
			S							

END OF TOW

TIME NZST	FISHING SPEED KNOTS

ESTIMATED CATCH BEFORE PROCESSING

TOTAL WEIGHT KILOGRAMS

MAIN SPECIES	WEIGHT KILOGRAMS

PROCESSED CATCH

SPECIES	WHOLE KILOGRAMS	HEADED AND GUTTED KILOGRAMS	FILLETED KILOGRAMS	OTHER (SPECIFY) _____ KILOGRAMS	WEIGHT BEFORE PROCESSING KILOGRAMS
TARAKIHI					
SNAPPER					
JACK MACKEREL					
LING					
HOKI					
HAKE					
SILVER WAREHOU					
WHITE WAREHOU					
COMMON WAREHOU					
SOUTHERN BLUE WHITING					
GEMFISH					
BARRACOUTA					
GROPER					
RED COD					
GHOST SHARK					
SPINY DOGFISH					
RATTAILS OR GRENADIERS					
SEA PERCH					
LOOKDOWN DORY					
ORANGE ROUGHY					
SILVERSIDE					
FROST FISH					
SQUID					

MEAL	
OIL	

WEIGHT OF WHOLEFISH CONVERTED TO MEAL	
WEIGHT OF WHOLEFISH DISCARDED	

TOTAL WEIGHT **BEFORE PROCESSING** KILOGRAMS

From red covered trawl logbook, with a form type of 17.

START NEW SHEET FOR EACH TOW

DATE (Day / Month / Year)	TARGET SPECIES	CODE	GEAR CODE	HEADLINE HEIGHT (m)

START OF TOW

TIME N Z S T	LATITUDE DEG	LATITUDE MIN	S	LONGITUDE DEG	LONGITUDE MIN	E/W	DEPTH (m) NET	DEPTH (m) BOTTOM

END OF TOW

TEMPERATURE °C SURFACE	TEMPERATURE °C BOTTOM	TIME N Z S T	FISHING SPEED KNOTS	PAGE
				Nº 45

ESTIMATED CATCH BEFORE PROCESSING

TOTAL WEIGHT KILOGRAMS

IF NO CATCH FOR TOW PLACE NIL HERE

FILL IN WEIGHTS OF MAIN SPECIES

MAIN SPECIES	CODE	WEIGHT KILOGRAMS
SQUID	SQU	
TARAKIHI	TAR	
GEMFISH	SKI	
RED COD	RCO	
SILVER WAREHOU	SWA	
WHITE WAREHOU	WWA	
SPINY DOGFISH	SPD	
GHOST SHARK	GSH	
GROPERS	HAP	
MONKFISH or STARGAZER	STA	
SEA PERCH	SPE	
SILVER DORY	SDO	
FROSTFISH	FRO	
RED GURNARD	GUR	
ORANGE ROUGHY	ORH	
BLACK OREO	BOE	
LOOKDOWN DORY	LDO	
RIG	SPO	
SCHOOL SHARK	SCH	

MAIN SPECIES	CODE	WEIGHT KILOGRAMS
BARRACOUTA	BAR	
HOKI	HOK	
JACK MACKEREL	JMA	
LING	LIN	
COMMON WAREHOU	WAR	
SOUTHERN BLUE WHITING	SBW	
OTHER SHARKS & DOGFISH	OSD	
SMOOTH SKATE	SSK	
HAKE	HAK	
SNAPPER	SNA	
SMOOTH OREO	SSO	
JOHN DORY	JDO	
SILVERSIDE	SSI	
RATTAILS	RAT	
MIX or OTHERS	MIX	

This form is from the most recent 'Catch Effort Logbook Trawl for foreign licensed vessels, foreign chartered domestic vessels and specified NZ vessels'. This form and the acompanying form below have a form type of '17'.

PROCESSED CATCH WEIGHTS (Kilograms)

Species	Code	Whole	Headed and Gutted	Paste (or Block)	Dressed	Filleted	Other (Specify) Name	Other (Specify) Weight	Whole fish used for meal (tick species)	Calculated weight of each species before processing
SQUID	SQU									
BARRACOUTA	BAR									
TARAKIHI	TAR									
HOKI	HOK									
GEMFISH	SKI									
JACK MACKEREL	JMA									
RED COD	RCO									
LING	LIN									
SILVER WAREHOU	SWA									
COMMON WAREHOU	WAR									
WHITE WAREHOU	WWA									
SOUTHERN BLUE WHITING	SBW									
SPINY DOGFISH	SPD									
OTHER SHARKS AND DOGFISH	OSD									
GHOST SHARK	GSH									
SMOOTH SKATE	SSK									
GROPERS	HAP									
HAKE	HAK									
MONKFISH or STARGAZER	STA									
SNAPPER	SNA									
SEA PERCH	SPE									
SMOOTH OREO	SSO									
BLACK OREO	BOE									
SILVER DORY	SDO									
JOHN DORY	JDO									
FROSTFISH	FRO									
SILVERSIDE	SSI									
RED GURNARD	GUR									
RATTAILS	RAT									
ORANGE ROUGHY	ORH									
LOOKDOWN DORY	LDO									
RIG	SPO									
SCHOOL SHARK	SCH									

Total meal produced (kg)	Total oil produced (litres)	Main species discarded				Estimated total weight whole fish used for meal	Calculated total weight before processing
		Species	Code	Species	Code		

COMMENTS	

This form is from the most recent 'Catch Effort Logbook Trawl for foreign licensed vessels, foreign chartered domestic vessels and specified NZ vessels'. Form type = 17.

This form is from the 'Catch Effort Logbook Squid Jigging'. Form type = 'S'.

START A NEW SHEET EACH DAY
一日に一枚使用のこと

DATE: Day 日 | Month 月 | Year 年

NOT FISHING 無操業

RADIO CALL SIGN: コールサイン

FISHING OPERATION:

LATITUDE 緯度			LONGITUDE 経度			DEPTH 深さ		SEA SURFACE TEMPERATURE	WIND SPEED	WIND DIRECTION	TIME FISHING 操業時間	
度 °	分 '		度 °	分 '	E/W	Lowest Lure 最深漁具 m	Bottom 水深 m	表面水温 °C	風力 m/s	風向 °T	Day Hours 日中	Night Hours 夜間
		S										

CATCH: 漁獲

	TOTAL CATCH (KG) 総捕獲量(キロ)
Arrow Squid スルメイカ	
Other Squid その他のイカ	
Other (Specify) その他(明記のこと)	

	NUMBER CAUGHT 捕獲尾数
Octopus タコ	
Shark サメ	
Other (Specify) その他(明記のこと)	

TRAY TALLY: ケース数

Number of squid per tray 入尾数		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-150	151+	TOTAL 合計
Number of trays c/s ケース数	WHOLE 丸													
	WITHOUT LEGS ツボ抜き													