



Australian Government
Department of Agriculture
ABARES

Preparation of Australia's southern bluefin tuna catch and effort data submission for 2015

P.I. Hobsbawn

Research by the Australian Bureau of Agricultural
and Resource Economics and Sciences

August 2015



Working Paper CCSBT-ESC/1509/08 prepared for the CCSBT
Extended Scientific Committee for the 20th Meeting of the Scientific
Committee

1–5 September 2015, Incheon, South Korea

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Cataloguing data

Hobsbawn, PI 2015, *Preparation of Australia's southern bluefin tuna catch and effort data submission for 2015*, ABARES Canberra, August. CC BY 3.0.

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Postal address GPO Box 858 Canberra ACT 2601

Switchboard +61 2 6272 2010|

Facsimile +61 2 6272 2001

Email info.abares@agriculture.gov.au

Web agriculture.gov.au/abares/

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Acknowledgements

Work was supported by the Fisheries Resources Research Fund and ABARES. Ann Shepherd (AFMA) and Ilona Stobutzki (ABARES) are thanked for their input.

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Summary

The aggregated catch and effort, catch by fleet, raised catch, catch at size, and non-retained catch data sets submitted to the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), on behalf of the Australian Government, are compiled from a number of databases. The daily fishing logbooks, catch disposal records and fisheries observer reports, collected and managed by the Australian Fisheries Management Authority (AFMA), are the main data sources. The Australian catch of southern bluefin tuna (SBT) from the surface (purse seine) fishery is also sampled by contracted field staff prior to release into farm cages. The sample data includes size and weight measurements that are used to calculate representative size distributions and average weights.

Relational databases, spreadsheets and query scripts are used to integrate and process the source data sets and create the data files required for the CCSBT data exchange. This report provides facsimiles of data collection forms, as well as flow charts illustrating the data integration procedures. The paper also describes the data validation procedures.

1 Introduction

The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), within the Australian Government Department of Agriculture (the department), provides data reports each year to the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) as part of the annual data exchange (CCSBT 2012). In April 2015, the following reports were submitted to the data exchange:

- Aggregated Catch and Effort data 2013 and 2014
- Raised Catch 2013 and 2014
- Total Catch by Fleet 2013 and 2014 (quota and calendar year)
- Catch at Size data 2013 and 2014
- Non-retained Catches 2013 and 2014
- CPUE series (GAM)

The following reports are also provided directly to the data exchange by the Commonwealth Scientific and Industrial Research Organisation (CSIRO):

- Tag Releases/Recoveries and Reporting Rates
- Direct Ageing data
- Catch at Age data
- Indonesian Longline Fishery Age and Size Composition
- Raised Catch-at-Age for the Australian Surface Fishery
- CPUE series (nominal)

Preparation of the CSIRO data sets is described in separate papers (e.g. Preece et al. 2004; Eveson 2011).

2 Data Sources

For the 2015 data submission, there were four sources of data used to produce the data reports. These were: the Australian Fisheries Management Authority (AFMA) Daily Fishing Logs Database; Catch Disposal Database; Tow Cage Size Monitoring Database; and Fisheries Observer Database.

Daily Fishing Logs Database

The Daily Fishing Logs Database is maintained by AFMA and contains data collected from logbooks that fishers are required to complete. The logbooks of relevance to southern bluefin tuna (SBT) catch for the 2014 data submission were the AL06 (pelagic longline), TPB03 (purse seine and pole log for farmed SBT), and PS01A (purse seine log for non-farm SBT). See Appendix A for samples of these logbooks. Each fishing operation is given a unique identifier in the Daily Fishing Logs Database and tables are linked using this identifier. The following tables are required from this database:

- 1) **Operations** – contains information on each operation, including start latitude, start longitude and vessel identifier.
- 2) **Catch** – contains a separate record for each species caught, together with the number of fish caught and estimated weight of the catch.
- 3) **Fishing_Effort** – contains fishing method used and fishing effort information (e.g. number of hooks for longline operations; search hours for purse seine operations).
- 4) **Operation_Longline** – contains other information on longlining operations (e.g. length of mainline).
- 5) **Operation_Pole** – contains other information on poling operations (e.g. number of poles used).
- 6) **Vessel** – contains information on each licensed vessel; vessel name is used to identify individual vessels when determining the number of vessels that fished.
- 7) **Tow_Cage_Transfer** – contains information on each transfer of fish from the capture vessel to the tow cage in each purse seine operation. Provides the link between the Daily Logs Database and the OtherInfo table produced from the Tow Cage Size Monitoring Reports.

Catch Disposal Database

The Catch Disposal Database is used by AFMA for quota monitoring and contains data collected from the CR4A (SBT Catch Disposal Record; all methods except purse seining for farms), SBT02 (SBT Farm Catch Disposal Record – Purse Seine Boat) and SBT04B (SBT Farm Catch Disposal Record; purse seining for farms). See Appendix B for samples of these forms. The following tables are required from this database:

- 1) **Catch Disposal** – contains information on trip start and end dates.
- 2) **Landing** – contains information on species caught, numbers of fish caught and weight of catch.
- 3) **Fishing_Method** – provides the fishing method information.
- 4) **Tow_Catch_Transfer** – contains identification of capture vessel for purse seine operations.

Tow Cage Size Monitoring Database

Tow cage size monitoring data are collected by Protec Marine Pty Ltd, a company contracted to AFMA, and its primary purpose is for estimation of total weight of SBT in tow cages prior to transfer of fish to farm cages. In 2006, the then Bureau of Rural Sciences (now the Australian Bureau of Agricultural and Resource Economics and Sciences; ABARES) developed a database for Protec Marine to record this information, the Tow Cage Size Monitoring Database, replacing a series of spreadsheet forms. Data for the 2006–07 and previous fishing seasons were then entered into this database from the original spreadsheets. From December 2007, data were entered directly into the database rather than using spreadsheets as an intermediate step. The database has been used as the source of SBT length samples for the purse seine component of the Catch at Size reports for 2008 to 2014 submissions. A sample of one of the reports produced by the database is given in Appendix C.

For each tow cage, fish were sampled until 100 fish (40-fish prior to 2012) weighing 10 kg or more were measured and weighed. The length and weight of all fish sampled were entered into the database, including fish smaller than 10 kg, as were the total number of fish transferred to farm cages. Data were then collated to produce a table of statistics for each tow cage, named Analysis – OtherInfo, which was used in preparation of Raised Catch and Total Catch by Fleet reports (see Appendix D). The raw lengths and weights of all sampled fish for the year were combined and used in conjunction with the Daily Fishing Logs data to prepare the Catch at Size report.

In the 2010–11 fishing season, stereo video was used to measure fish lengths and determine the average weight for some of the tow cages. These data were initially recorded in another database. However, for the purposes of the data preparation, all necessary data were migrated to the Tow Cage Size Monitoring Database.

Fisheries Observer Database

AFMA employs fisheries observers to collect data on board fishing vessels in a number of fisheries. Observer coverage of pelagic longline vessels has been variable between 2001 and 2014, mainly concentrated in the Eastern Tuna and Billfish Fishery. A database of observed fishing operations is maintained by AFMA, including records of retained and discarded catch and biological data collection including length measurements. Length data collected by observers were used to compile the longline and trolling components of the Catch at Size reports for 2013 and 2014. The AFMA observer data were also used to produce the “Non-retained Catches” reports for 2013 and 2014. These reports provided numbers of non-retained fish observed in the longline fishery and were not raised or imputed from logbook data. The total longline fishing effort for each five degree cell is provided from the Aggregated Catch and Effort report with the corresponding observed effort and non-retained catch.

AFMA implemented a new Observer Database in September 2008, so this new database was used for the 2013 and 2014 data submissions. The following observer database tables contributed data to the Non-retained Catches report:

- 1) **Activity** – describes vessel activity (e.g. setting, hauling, searching and time, location, environmental conditions).
- 2) **Opn_Biological** – describes biological attributes of animals caught including life status of retained and discarded fish.
- 3) **Opn_Biological_Length** – gives the length type and length measurement of each sampled fish.
- 4) **Vyg_Project** – provides the name of the project under which the observer was operating.

3 Data Preparation

Raw data files of database tables from the AFMA Daily Fishing Logs, Catch Disposal Records and Observer databases are acquired late in the first quarter of each calendar year. The data are loaded into an Oracle relational database server to enable analysis using Structured Query Language (SQL) via Microsoft Access software on client workstations. The length data for the Catch at Size reports are processed at least partly in MS Excel to enable estimation of size distributions for month-location strata that have not been sampled by observers or Protec Pty Ltd. Standard queries and procedures have been established to produce the data reports that ABARES submits each year. These queries may require minor modification each year as changes, if any, are made to the source data collection process or CCSBT requirements.

See Appendix D for flow diagrams of data sources and tables used to produce the various reports.

Definition of Seasons

All data reports use date of capture to sort catch records by time period, except the catch by fleet – quota year statistics. The quota year statistics use tow end date (farm purse seining) or trip end date (other methods) to define whether a catch falls within a particular season/fishing period.

Spatial Definitions

Since the 2003 data exchange, raised catch or catch at size data have been provided by latitude/longitude grid cells (1x1 degrees for purse seine and 5x5 degrees for longline). This was made possible for the farm sector by the introduction of the SBT03 forms. The forms enable the linking of the Tow Cage Size Monitoring Database to the Daily Fishing Logs Database, thus providing capture location information for SBT transferred from tow cages. The Aggregated Catch and Effort Report also provides spatial information; all data for this report coming from the Daily Fishing Logs Database.

4 Data Validation

Data Management Systems

AFMA maintains two systems for tracking catches of SBT in Australian waters. One system is on MS Excel spreadsheets and the other is AFMA's main INGRES database that stores all logbook and catch disposal records. These two systems are cross-referenced to ensure that data entry is correct in both systems. This process ensures validity and plausibility of data during the data entry process.

ABARES obtains copies of the AFMA Daily Fishing Logs Database and Catch Disposal Database and stores it in an Oracle system. It is these copies that are used for the preparation of the annual data submission.

Cross-Verification of Datasets

All Commonwealth authorised receivers of SBT are required to complete reconciliation sheets at the end of each season that are then cross-checked against catch disposal records and catch documentation scheme records. This is called the Audit Level 1.

There are a number of triggers (such as discrepancies in the Audit Level 1) that can trigger the Audit Level 2, which involves AFMA officers examining the books and invoices of the company involved.

During the preparation of the annual data submission, data from the Tow Cage Monitoring Database are cross-referenced with data from the Daily Fishing Logs Database and Catch Disposal Database to ensure accuracy of results. Any discrepancies are tracked down to original forms, if required.

Lengths and weights in the Tow Cage Monitoring Database are graphed to identify any outliers.

5 Closing Remarks

The description of data preparation and submission in this report applies to the 2013 and 2014 commercial fishery catch and effort data supplied to the CCSBT. ABARES can provide more details of data collection and data processing methods upon request.

6 References

CCSBT, 2012, Report of the Seventeenth meeting of the Scientific Committee, 27–21 August 2012, Tokyo, Japan

Eveson P, 2011 Updated growth estimates for the 1990s and 2000s, and new age-length cut points for the operating model and management procedures, CCSBT-ESC16/1107/09, CCSBT 16th Meeting of the Scientific Committee, 19–28 July 2011, Bali, Indonesia

Preece A, Cooper S, Hartog J, 2004, Data post-processing for input to the 2004 stock assessments and comparisons of 2001 and 2004 assessment datasets, CCSBT-ESC9/0409/27, CCSBT 9th Meeting of the Scientific Committee, 13–16 September 2004, Jeju, Korea

Australian Purse Seine and Pole Daily Fishing Log - For Farmed Southern Bluefin Tuna Only TPB03

Indigenous Fisheries
Regulation Authority
Commonwealth of Australia

Log Book No: **0026** Page No: **02** Boat Name: **Sea Spray** Dist. Symbol: **LFB 12345** Master's Name: **C. Gavin**

TICK APPROPRIATE NON-FISHING (NF) CODE BOX AT RIGHT: 1 Bad Weather 2 In Port 3 Broken Down 7 Cage Towing Fishing Method Used? (tick appropriate box) Poleing Purse Seining

I did not work between: **28.5.98** and **28.11.98** 4 Starving 10 Rest Distinguishing No. of assisting vessels: **LFB023 (pub. boat)**
 NE State whether pole or seine boats

Date of Fishing (day/month)	NF Code? Codes listed above	Search Details				Fishing Details				Total Weight and Type of Bait				Estimated Catch Weights per Shot (kg)				Towing				
		Hours	Search Hours	Spotted Poles (Used? (Y/N))	Sea Temp. (C)	Start Time (24hr local time)	Latitude	Longitude	No. Poles Used?	Pole Boat Assisted (Y/N)	Seine Boat Assisted (Y/N)	Type	Kgs	SBT Weight	Other Species	Other Weight	Estimated % of total caught	Carrier Boat Name	Weight Transferred	Transfer Date	SBT 03 Book No.	Page No.
29/11	6			4	20	1300	32°40'	152°30'						4,000	-	-	90	Sea	4,000	29/11	036	09
30/11	4			4	21	1200	34°05'	151°08'					15,000	-	-	95	Sea	15,000	1/12	024	36	
1/12				5	19	1100	33°50'	151°20'					25,000	-	-	70	"	25,000	2/12	024	36	
2/12				2	19	1600	33°54'	151°11'					12,000	-	-	80	"	12,000	2/12	024	36	

Comments:

Wildlife Interactions:
 List any wildlife interacting with you during your fishing activities, including netted animals. If possible, list Species name, Interaction Date, No. of Animals and Life Status of any animals released after capture. Life Status Codes are listed on the writing template. Please record any extra details in the Comments section.

Species: _____ Date: _____ Qty: _____ Life Status: _____

Name: **C. GAVIN**
 Signature: **C. Gavin**

Note: There are tagged fish/wildlife recapture forms at the rear of this book.

WHITE COPY - send to AFMA BLUE COPY - retain for your records

Purse Seine Daily Fishing Log - PS01A

NOTE: IF FOLING PLEASE USE THE TUNA MINOR LINE LOGBOOK TO RECORD YOUR CATCH

Original Copy - Send to AFMA

Boat Name: **WATERCRESS** Dist. Symbol: **LFB 60** Disguising Nos. of assisting POLO vessels: **LFB 8071** Log No. **###** Page No. **##**

Did not work in this fishery between **7/1/10** and **15/1/10** TICK APPROPRIATE NON-FISHING (NF) CODE BOX AT RIGHT 1 Bad Weather 2 In Port 3 Broken Gear 4 Swarming 5 Searching 6 Other Fishery (specify)

Fishing Date	NF Code	Search Details (see sub-note)	Fishing Details				CATCH DETAILS - Estimated Weights per Shot (kg) - tick box below fish name to indicate target species				KINGFISH		BAIT/CHUM DETAILS		
			Time Zone used for log entries	EST	Latitude (dd mm)	Longitude (ddd mm)	Other Spec (for zone)	Estimated % of school caught	Estimated Yr (kg 400)	Estimated Yr (kg)	Let species of bait caught each day	Bait caught (kg)			
6/1/10	4														
7/1/10	6	5 N													
8/1/10	2	N	1015	3 7 3 0	1 5 0 2 0	Y	9,000			70	-				
8/1/10	1	N	1410	3 7 4 2	1 5 0 0 5	N				95	600				
9/1/10	3	N	1120	3 8 1 5	1 5 2 1 2	Y	7,500			60	300				
0/1/10	4														

EXAMPLE PAGE

Comments: **Approx. 300 kg Damaged Skipjack**

Complete at End of Trip:
 16.1.10 WALKER COVE
 21.1.10 WALKER COVE
 BASIL'S FRESH FISH

Concession Holder or Authorised Agent:
 Printed Name: **L Waller**
 Signature: *L Waller*
 Date: **21/1/10**

Please provide an estimate of the time taken to complete this form **8** mins

NB Did you have an interaction with any wildlife or other protected species? Please tick Yes No If yes, please enter details on a "Wildlife and Other Protected Species" Form at the back of this book.

NOTE • If tagged fish / animals or banded birds are captured, please complete tag form at back of book and return form and tag to AFMA.

Appendix B

Example Catch Disposal Forms (CR4A, SBT03B, SBT04B)

CR4A Form Southern Bluefin Tuna Fishery Catch Disposal Record

Book No.		Page No.	
----------	--	----------	--

Part A: SFR Holder or Authorised Representative to Complete

SFR Holder **Tuna International P/L** Boat Name **Hunter IV** Dist. Symbol **0999**

Area Fished Tas Vic NSW SA WA QLD

Fishing Method Pole Purse Seine Longline Trolling

Trip Start Date **8 / 7 / 04** Trip End Date **14 / 7 / 04**

Port Unloaded **Tuncurry** Date Unloaded **14 / 7 / 04**

Whole Catch Consigned Part Catch Consigned Book No. Page No. Other CR4A details

Name of Receiver **Tuna Exporters P/L**

Name of Transporter **Bradley Transport**

Type of Vehicle	Trailer Vehicle Reg	Date/Time of Departure of Consignment from point of Unloading
Truck	YLT-091	14 / 7 / 04 15:30

SOUTHERN BLUEFIN TUNA

Number of Fish	Total Accurate Weight Kg	Form Code
3	300	B

NORTHERN BLUEFIN TUNA

Number of Fish	Total Accurate Weight Kg	Form Code

Form Codes

W means Whole Weight – No Processing

A means SBT that has been gilled and gutted so that:

- the gill plates are removed; and
- the tail is wholly removed.

B means SBT that has been gilled and gutted so that:

- the gill plates are not removed; and
- the tail is not wholly removed.

I declare that the information I have provided in Part A to be a complete and accurate record.

SFR Holder or Authorised Representative
Printed Name
JOHN WELSH

Signature & Date
J. Welsh 14/7/04

Part B
I acknowledge that I have received for transportation the amount of fish referred to in Part A.

Printed Name of Driver
PETER BRADLEY

Signature & Date
Peter Bradley 14/7/04

Please provide an estimate of the time taken to complete this form.
Hrs. **5** mins

Forward White copy to AFMA within 24 hours of unloading.
Leave Green copy in book.
Send the Blue and Yellow copies with the fish to the receiver of your fish.

SBT03B
Southern Bluefin Tuna Fishery
Farm Transit Log

Log No:	Page No:
---------	----------

Section 1

Carrier Boat Name **MARY LOU** Dist. Symbol **DE 123**

Permit Holder **A B CUTTER** Carrier Boat Permit Number **400100**

Tow Cage ID Number **T800**

Fish Received From Purse Seine Boat – Complete Sections 1, 2, 4 and 7, then Section 5 or 6

Fish Received From Carrier Boat – Complete Sections 1, 3, 4 and 7, then Section 5 or 6

Section 2 **Transfer Details**

Name of Purse Seine Boat	Dist. Symbol	Date & Time First Transfer Started	Date & Time Last Transfer Finished	Estimate of Weight (Tonnes)	SBT02 Book No.	SBT02 Page No.
BLUE OCEAN	333	20 / 12 / 09 9:30	22 / 12 / 09 11:30	50	111	05

Section 3

Previous Carrier Boat Name Dist. Symbol

SBT03A Log No: Page No: A Record of Retained to Land Mortalities Recorded in Box "G3" of Previous SBT03B G1 A Record of Mortalities Recorded in Box "G" of Previous SBT03B E

Section 4 **Record of Mortalities During This Tow**

Date/Time **20 / 12 / 09 09:30** Record a Date + Number of Mortalities for Each 24 hr Period.

Date	20/12	21/12	22/12	23/12	24/12			
Number	5	1	3	4	2			
Date								
Number								
Date								
Number								

Total Mortalities During This Tow F **15** Progressive Total of Mortalities (E & F = G) G **15**

Total Mortalities Retained to Land During This Tow G2 **4** Progressive Total of Mortalities Retained to Land (G1 & G2 = G3) G3 **4**

Section 5 **Tow Cage Transferred To Another Carrier Boat**

Carrier Boat Name **MISTY MOON** Dist. Symbol **FJ308**

SBT03B Book No **333** SBT03B Page No **2** Date/Time Tow Cage Transferred **25 / 12 / 09 06:30**

Section 6 **Fish Transferred To Fish Receiver**

Date/Time Transfer Ended / / : Name of Fish Receiver Permit Holder Fish Receiver Permit Number

Section 7

I declare that the information which I have provided on this form to be a complete and accurate record.

Carrier Boat Permit Holder or their Agent

Print Name **JASON MANNING** Signature *J. Manning* Date **25 / 12 / 09**

SBT04B
Southern Bluefin Tuna Fishery
Farm Catch Disposal Record

Log No:
 Page No:

Part 1

Fish Receiver Permit Holder Name: **McNally Fresh Fish** Tow Cage ID Number: **T600**

Fish Receiver Permit Holder Number: **9999** Carrier Boat's SBT03B Log and Page No's: **Log No: 198, Page No: 15**

Progressive total of all mortalities during tow (G = SBT03B) **A 17**

Total number of mortalities recorded from date of receipt of tow cage **B 2**

Record the number of retained to land mortalities from the date of receipt of the tow cage. **B1 2**

Transfer from Tow Cage to Farm

Transfer Date	Farm Number Cage No.	Live Fish Count
29/01/10	C01	4,802
30/01/10	C02	1,098

Total Number of mortalities **F 35** (F = A + B + J)

Total Weight of mortalities **H 638.75** (H = F x E (E: Average Weight in Kg))

Total Weight of Fish in Kg **I 108313.75** (I = D + H)

Count Total **C 5,900**

Weight Total **D 107675** (D = C x E (E: Average Weight in Kg))

I have had the opportunity to witness the verified count conducted by AFMA's Agent and I agree with and verify the count taken. I declare that the information which I provide on the form to be a complete and accurate record.

Video Reference Number (1) **T600-1** FRP Holder: **E. Watson**

No. of Videos viewed (2) **4**

Video Reference Date **2 / 2 / 10** FRP Signature: **E. Watson** Date: **2 / 2 / 10**

Part 2 I authorise AFMA to deduct the SBT kilos of quota recorded in box I above from my/our quota holdings:

SFR Holder: **A. Brazil** SFR Signature: **A. Brazil** Date: **2 / 2 / 10**

Part 3

Purse Seine Boat Name: **TUNA 1** Boat 1 Boat 2 Dist. Symbol: **0253** Boat 1 Boat 2

SBT02 Log No: **12** Page No: **4** Boat 1 Boat 2 Log No: Page No: J **16** Number of mortalities during pursing and transfer to tow cage

Progressive total of retained to land mortalities during tow (G3=SBT03B) **A1 3** J1 **1** Number of mortalities retained to land during pursing and transfer to tow cage

Average Weight sample from Tow Cage

Sample Date: **28 / 1 / 10** Name of Person Sampling: **T. Smith** Signature of Person Sampling: **T. Smith**

Average Weight in Kg **E 18.25** No. of Fish taken from tow cage: **42** Farm Stocking Form No. **Boat 1: FSAU 10 00101** Boat 2:

I declare that the information which I provide on the form to be a complete and accurate record.

AFMA Agent's Name: **T. Poppy** AFMA Agent's Signature: **T. Poppy** Date: **3 / 2 / 10**

Appendix C

Tow Cage Size Monitoring Report

**Southern Bluefin Tuna Fishery
Farm Catch per Tow Cage**

2005/06

Tow Identification

Tow Cage ID _____	Book No. Page No. _____
Tow Number for Deacon _____	Fish Recorder Number _____

Catch Information

Catcher/Vessel _____	AFBA Form _____
Capture location _____	
Date of First Transfer to Tow Cage _____	
Date of Last Transfer to Tow Cage _____	
Tow Vessel _____	
Date Tow Ended _____	Total Weight of Fish Captured in this Tow Cage: _____
Number of Bortalls during Catching _____	Estimated Weight (kg) _____
Number of Bortalls during Tow _____	Total Number of Bortalls: _____
Number of Bortalls between end of Tow and Release to Farm _____	Total Number of Fish: _____

Average Weight Sample Information

Sample Date	Witness	Average Length	Average Weight
_____	_____	_____	_____

Fish Count Information

Transfer Date	Video Count	Tonnage	Static Cage ID	Static Cage Owner
_____	_____	_____	_____	_____

Total number of fish counted: _____

Appendix D

Flow of Data from Data Sources to Reports





