

National Fisheries Data Collection and Processing

Fisheries agencies in each of the States, Northern Territory and the Commonwealth collect information from commercial fishers in the form of logbooks or catch returns. Basic information usually includes some measure of the amount of fishing effort, the species composition of the catch and where the fishing took place. These records contributed by each jurisdiction were the foundation of the National database described here.

Scope

Each jurisdiction contributed data that addressed the following questions:

How much **catch** was taken?

Where was the **catch** taken?

What **species** were taken?

What **gear** was used?

In what **year**.

Specifically, the Atlas standards for data provision from each jurisdiction were for all marine and estuarine commercial fisheries as follows:

- | | | |
|------------------------|---|---|
| <i>class variables</i> | { | <ul style="list-style-type: none">• LOCATION (to the best resolution available for mapping purposes)• METHOD (fishing method as per agreed classes)• YEAR (the years 1996 to 2003)• TAXA (common name, species, Code for Australian Aquatic Biota) |
| <i>variates</i> | { | <ul style="list-style-type: none">• VESSELS (count)• CATCH (kg, unprocessed weight)• GVP (Gross Value of Product in A\$) |

Location and Spatial Processing

A wide range of spatial systems are used throughout Australia to report commercial fishing activity.

Spatial reporting falls into one of three classes:

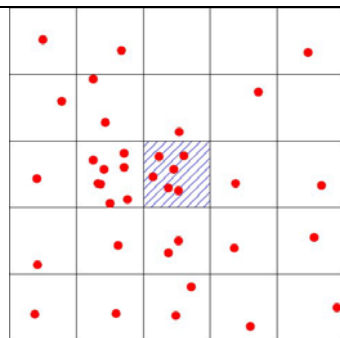
1. actual position of a fishing operation reported as a latitude longitude point.
2. actual position of a fishing operation reported as a line made up of a start and a finish position.
3. grid position reporting that refers to an area of ocean (eg a quarter-degree cell, or a segment of coastline).

The different spatial reporting systems were summarised or transposed onto a single half-degree (30-minute) spatial reporting system. This spatial scale was a compromise between some data that are reported at quite fine scale (eg individual operation position for Commonwealth fisheries) and other data that are reported at coarser scales (eg one-degree for NT and WA fisheries). The methods used to process spatial data are elaborated below.

Spatial Processing Techniques:

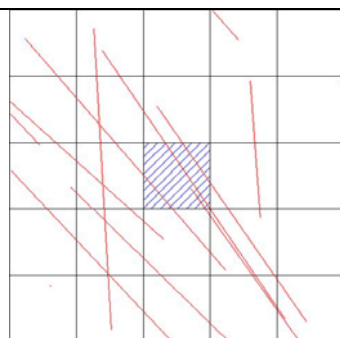
Reported as a latitude longitude point.

- Fishing operations are represented as points on the earth's surface.
- The half-degree square grid is overlaid.
- Catch and GVP are summed within each grid cell.
- Example: Commonwealth Northern Prawn Fishery.



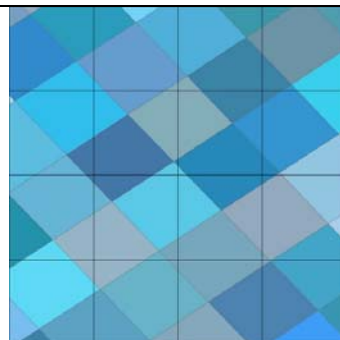
Reported as a line made up of a start and a finish position.

- The positioning, or track, of a gear is approximated by a straight line between start and finish positions.
- Lines are dissected at the intersection of the half-degree grid to create numerous smaller line segments that lie fully within a grid cell.
- Catch and GVP are apportioned to segments using: $\text{segment length} / \text{total length} \times \text{quantity}$.
- Segment statistics are summed for each cell.
- Examples: Most Commonwealth fisheries, including pelagic longline, trawl and gillnet fisheries.



Grid position reporting.

- Fishing operations are reported on a regular grid (such as quarter- or half-degree), or in some cases on an irregular spatial framework unique to a fishery or jurisdiction.
- This native reporting system is overlaid onto the common half-degree grid. Cells and statistics are assigned from the reported grid to the common half-degree grid using a demographic approach.
- Catch and GVP are assigned proportionally from the old framework to the new, based on the areas of intersection between the two: $\text{segment area} / \text{total area} \times \text{quantity}$.
- Examples: All State/Territory managed fisheries.



Fishing Methods

Depending on the classification scheme used, there are potentially hundreds of different fishing methods in use around Australia. For simplicity the Atlas used a simple scheme of seven fishing method classes based on a scheme developed by the United Nations Food and Agriculture Organisation (FAO 2005). Membership of the fishing classes is outlined in Table 1, with additional information from each jurisdiction available online.

Table 1; Atlas fishing method classes, with associated gears from the FAO International Standard Statistical Classification of Fishing Gear.

Hook and Line	Handlines and pole-lines (hand operated) Handlines and pole-lines (mechanised) Set longlines Drifting (pelagic) longlines Longlines (not specified) Trolling lines Pole and lines Vertical (drop) lines Hooks and lines (not specified)
Net	
SURROUNDING NETS	Purse seines Lampara Ring nets
SEINE NETS	Beach seines Other seines Seine nets not specified
LIFT NETS	Portable hand lift nets Boat-operated lift nets Shore-operated stationary lift nets Lift nets not specified
FALLING GEARS	Cast nets Cover pots Falling gears not specified
GILLNETS AND ENTANGLING NETS	Set gillnets Driftnets Encircling gillnets Fixed gillnets (on stakes) Trammel nets Combined gillnets-trammel nets Gillnets and entangling nets not specified
OTHER NETS	Push nets Scoop nets
Trap	Pots Fyke nets Stow nets Stationary uncovered pound nets Barriers, fences, weirs, corrals etc Aerial traps Traps (not specified)
Trawl	Bottom trawls (fish and prawn) Midwater trawls Otter twin trawls Pair trawls Other trawls
Dive/Hand	Dive Harpoons Clamps Rakes Tongs Spears Wrenching gears Hand pump
Dredge	Boat dredges
Other	Not elsewhere specified or unknown

Adapted from FAO (2005) *United Nations Atlas of the Oceans*. URL <http://www.oceansatlas.org>, October 2005.

Year

The range of years provided by jurisdictions was variable, with complete overlap for the three years 2000-02 only. Consequently these years were used throughout the Atlas.

Taxonomy

The assignment of a reliable taxonomic classification to fisheries catches can be quite problematic. In logbooks and fisheries databases, catches may be identified to species, genus, family or higher level taxons, or in some cases to artificial “bucket” taxa that include several species reported under a single name or code for the purpose of convenience. This is the case with, for example, “king prawns” that includes the species *Melicertus latisulcatus*, *M. plebejus* and *M. longistylus*. The Atlas uses the taxonomy described by the CSIRO Codes for Australian Aquatic Biota (CAAB). As far as possible, all taxa at all levels were assigned a CAAB code and these assignments are detailed, by jurisdiction, online. In cases where the species is uncertain then it was assigned to a genus, family or higher taxonomic level, or to a miscellaneous fishes category.

The scientific names were sourced from CAAB and the common names were sourced from the Standard Fish Names in Australia in the first instance and then from CAAB.

Vessels and Confidentiality

The number of vessels participating within combinations of Location, Method, Year and Taxa were tallied, usually based on vessel code information within the jurisdictions databases. The boat counts can be useful to gauge participation levels but are primarily used to assess confidentiality against the “five boat rule”.

Most fisheries management jurisdictions are required to maintain confidentiality of logbook and other data. In practice this is achieved by not reporting statistics where less than five fishing vessels are represented. In cases where less than five vessels are represented in a reporting cell, that cell's is tagged to indicate confidentiality and no quantity is indicated.

Catch

Catch was reported in kilograms of whole, unprocessed, weight.

Gross Value of Product (GVP)

GVP is defined as the assessed value at the point of landing for the quantity produced and excludes transport and marketing costs. Statistics on the mean market value of major fished species are collected annually by each State/Territory in the case of their fisheries, and by the Australian Bureau of Agricultural and Resource Economics (ABARE) in the case of the Commonwealth. The mean market value of a species is used to convert the catch of that species, at a particular location and year, into a value.

Data Structure

Data were structured within a relatively simple, flat table following the format adopted by Queensland's Coastal Habitat Resources Information System (CHRIS1). Catch and GVP are summarized against combinations of the categorical variables LOCATION, METHOD, YEAR and TAXA. In addition, contained within the tables structure are “summary records” that sum all members of the METHOD and SPECIES classes into super classes (“all methods” and “all species”). The summary records thus give total catch of a species for all methods, total catch of a method for all species and total catch for all species and all methods. The data structure is exemplified in Table 2.

¹ <http://chrisweb.dpi.qld.gov.au/CHRIS/>

The summary records tend to have significantly larger vessel counts and are less prone to confidentiality issues. Furthermore, the summary records are a means of facilitating fast and simple retrieval of detailed or summarised data during queries and online mapping. It should be noted that it is not possible to simply sum a variate field, such as catch, without multiple counting of catches because of the summary records. Simple filtering is required to undertake such summaries.

Table 2: Illustration of the flat table data structure, including summary records, used by the Atlas.

YEAR	AREA	METHOD	TAXA
2000	A	Net	Species 1
2000	A	Net	Species 2
2000	A	Line	Species 1
2000	B	Net	Species 1
2000	B	Net	Species 4
2000	B	Line	Species 2
2000	B	Line	Species 3
2000	A	Net	All species
2000	A	Line	All species
2000	A	All methods	Species 1
2000	A	All methods	Species 2
2000	A	All methods	All species
2000	B	Net	All species
2000	B	Line	All species
2000	B	All methods	Species 1
2000	B	All methods	Species 2
2000	B	All methods	Species 3
2000	B	All methods	Species 4
2000	B	All methods	All species