Exploitation Status - Defined

The NSW Department of Industry and Investment has adopted the following scheme to classify the exploitation status of key species. At the annual Resource Assessment Workshop (held in the second quarter of each year), departmental scientists review the information available on all key species and determine an exploitation status for each species (or group of closely related species). Scientific representatives from the Commonwealth and Queensland governments are also invited. Additional information on the assessment process is available in the report: NSW Department of Primary Industries, 2006. *Determining the biological sustainability of wild fisheries in NSW: Concepts and definitions*. An information paper by the Systems Research, Wild Fisheries Program. 27 pp.

With the recent inclusion of important recreational species in the assessment process, the characteristics for some of the status categories will be reviewed so as to include relevant recreational fishery indicators.

CATEGORY	CHARACTERISTIC
RECRUITMENT OVERFISHED	• Recruitment is being significantly or measurably suppressed as a result of a small spawning biomass • Other characteristics of an 'overfished' stock (see below) are likely to be evident • Unequivocal determination will require a well-calibrated population model or stock-recruitment relationship
OVERFISHED	• Fishing mortality rates are more than double natural mortality rates • Estimates of biomass are less than 30% of the estimated unfished stock • Catch rates are less than 30% of the initial catch rates • Length and age distributions unstable (excessively affected by recruitment, too few age or size classes in the exploitable population given a species' life history) • Trends in length/age compositions are evident which indicate increasing (and/or excessive) fishing mortality • The 'Spawning Potential Ratio' is less than 20%
GROWTH OVERFISHED	• Yield per recruit would increase if length at first capture was increased or fishing mortality decreased
FULLY FISHED	• Fishing mortality is approximately the same as natural mortality • Estimates of the biomass are greater than 30% of the estimated unfished biomass • Catch rates have been steady for 5-10 years and/or catch rates are greater than 30% of initial catch rates. • Length and age distributions are stable • Species are fished throughout their entire geographic range
MODERATELY FISHED	• Fishing mortality is less than half of natural mortality • Estimates of the biomass are greater than 70% of the estimated unfished biomass • Catch rates are greater than 70% of initial catch rates • Species are fished in most of their geographic range but non-fishing areas are known to exist
LIGHTLY FISHED	• Fishing mortality less than 25% of natural mortality • Estimates of the biomass are greater than 90% of the estimated unfished biomass • Catch rates are greater than 90% of initial catch rates • Only small proportions of the geographic range are fished • Markets would likely limit catch and effort
UNCERTAIN	• A significant amount of evidence has been collected and considered, but there are inconsistent or contradictory signals in the data that preclude determination of exploitation status
UNDEFINED	• Commercial catch data are available but no reasonable attempt has been made to determine exploitation status

Resource Assessment Classes - Defined

There is a range of socioeconomic values associated with harvested species in NSW. A species harvested in the thousands of tonnes by commercial and recreational fishers cannot be given the same priority for assessment as other species harvested in much smaller quantities. In addition to this, the conservation values associated with some species (such as sharks) are more acute than those of others (such as some invertebrates), therefore additional prioritisation is justified. To manage this situation, each key species is associated with a target and current (2008/09) Resource Assessment Class. The attributes of these classes are defined in the table below. The difference between the current and target assessment class is used in the management of the assessment program and is also a performance indicator within the Fishery Management Strategy for each of the multi-species commercial fisheries.

Attribute	Class of Resource Assessment				
	One	Two	Three	Four	Five
Time series estimate of biomass from dynamic models	●				
Time series estimate of total, natural and fishing mortality from dynamic models	●				
Quantitative risk analysis of future harvesting using dynamic models	●				
Biological reference points	●	●			
Estimates of total, natural and fishing mortality (from catch-curves)	●	●			
Credible indicator of abundance	●	●			
Representative time-series of commercial catch	●	●	●	●	
Credible estimate of recreational catch	●	●			
Time series of age composition data (finfish only)	●	●			
Local (NSW) information for growth, mortality, selectivity and maturity	●	●	●		
Time series of length-composition data	●	●	●		
Non-local (not NSW) information for growth, mortality, selectivity and maturity				●	●
Single biological species or stock	●	●	●	●	●
Complex of related species			●	●	●

How To Read The Species Reports

The Standard Fish Name for the species, genera, order or family that is represented by this report. In the case of some invertebrates (shellfish), a Standard Fish Name may not yet have been defined, so a common name is used. Standard Fish Names have been developed to improve reporting and marketing in Australia. For more information please visit the Standard Fish Names website.

The scientific name for the species, genera, order or family that is represented by this report.

The exploitation status of the species (or group of related species) as defined by Industry and Investment NSW at the end of the 2008/09 financial year. The quantitative and qualitative criteria that were used to specify exploitation status are described on page v. This exploitation status is updated each year, but only published in this report every second year.

A short comment summarising the status of the species (or group of related species) which provides additional context for the exploitation status.

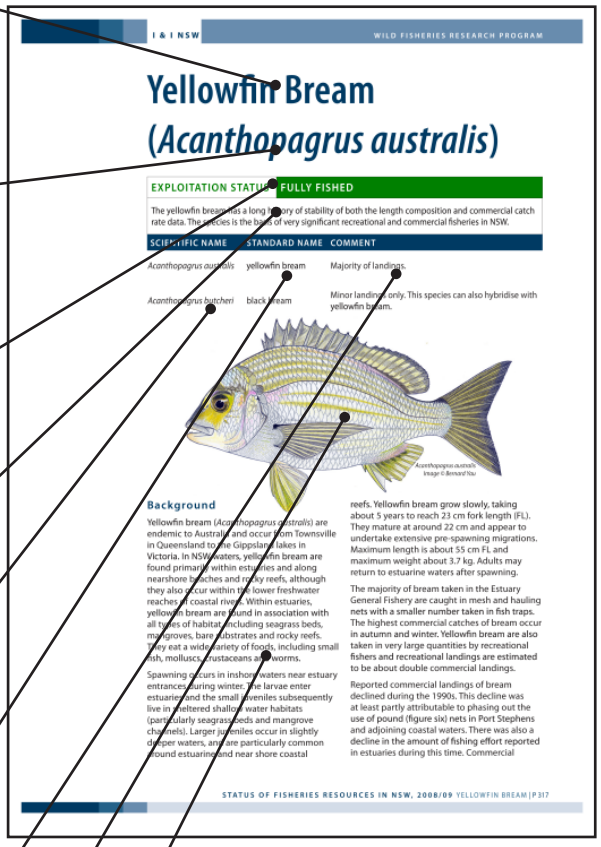
The scientific name of the individual biological species that constitute this report. Note that these names are subject to change as researchers refine the taxonomy of these species.

The Standard Fish Name of the individual biological species that constitute this report. In the case of some invertebrates, a standard name will not yet be available.

A short comment about the individual species that constitute this report. When only a single species is reported upon, this comment is usually excluded as the information is contained elsewhere in the report.

A copyright illustration of one of the species represented by this report. These colour pencil illustrations are under license from Bernard Yau and must not be reproduced without permission.

Background information about the species. This section contains a brief biological and ecological background to the species as well as summary information about the fisheries that harvest this species in NSW.



I & I NSW WILD FISHERIES RESEARCH PROGRAM

Yellowfin Bream

(*Acanthopagrus australis*)

EXPLOITATION STATUS: FULLY FISHED

The yellowfin bream has a long history of stability of both the length composition and commercial catch rate data. The species is the basis of very significant recreational and commercial fisheries in NSW.

SCIENTIFIC NAME	STANDARD NAME	COMMENT
Acanthopagrus australis	yellowfin bream	Majority of landings.
Acanthopagrus butcheri	black bream	Minor landings only. This species can also hybridise with yellowfin bream.

Acanthopagrus australis Image © Bernard Yau

Background

Yellowfin bream (*Acanthopagrus australis*) are endemic to Australia and occur from Townsville in Queensland to the Gippsland Lakes in Victoria. In NSW waters, yellowfin bream are found primarily within estuaries and along nearshore beaches and rocky reefs, although they also occur within the lower freshwater reaches of coastal rivers. Within estuaries, yellowfin bream are found in association with all types of habitat including seagrass beds, mangroves, bare substrates and rocky reefs. They eat a wide variety of foods, including small fish, molluscs, crustaceans and worms.

Spawning occurs in inshore waters near estuary entrances during winter. The larvae enter estuaries and the small juveniles subsequently live in sheltered shallow water habitats (particularly seagrass beds and mangrove channels). Larger juveniles occur in slightly deeper waters, and are particularly common around estuarine and near shore coastal reefs. Yellowfin bream grow slowly, taking about 5 years to reach 23 cm fork length (FL). They mature at around 22 cm and appear to undertake extensive pre-spawning migrations. Maximum length is about 55 cm FL and maximum weight about 3.7 kg. Adults may return to estuarine waters after spawning.

The majority of bream taken in the Estuary General Fishery are caught in mesh and hauling nets with a smaller number taken in fish traps. The highest commercial catches of bream occur in autumn and winter. Yellowfin bream are also taken in very large quantities by recreational fishers and recreational landings are estimated to be about double commercial landings.

Reported commercial landings of bream declined during the 1990s. This decline was at least partly attributable to phasing out the use of pound (figure six) nets in Port Stephens and adjoining coastal waters. There was also a decline in the amount of fishing effort reported in estuaries during this time. Commercial

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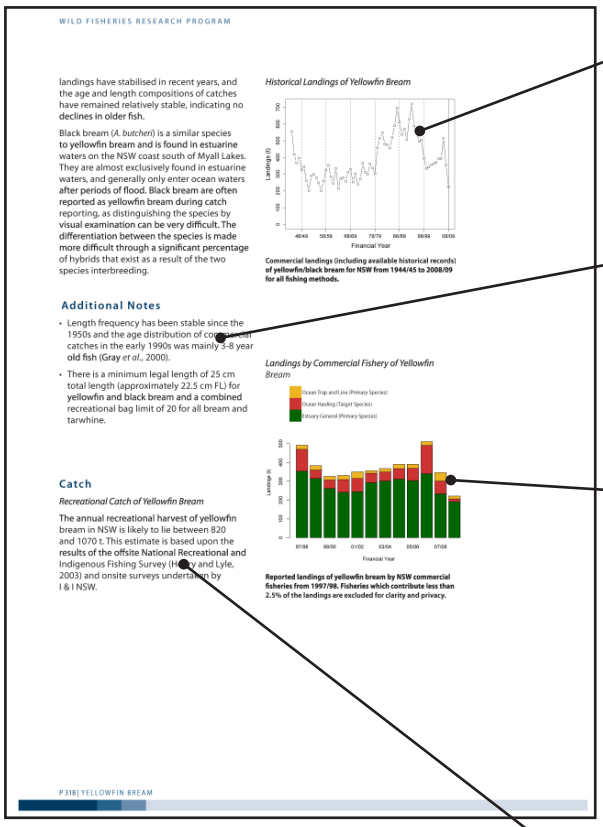

WILD FISHERIES RESEARCH PROGRAM

landings have stabilised in recent years, and the age and length compositions of catches have remained relatively stable, indicating no declines in older fish.

Black bream (*A. butcheri*) is a similar species to yellowfin bream and is found in estuarine waters on the NSW coast south of Myall Lakes. They are almost exclusively found in estuarine waters, and generally only enter ocean waters after periods of flood. Black bream are often reported as yellowfin bream during catch reporting, as distinguishing the species by visual examination can be very difficult. The differentiation between the species is made more difficult through a significant percentage of hybrids that exist as a result of the two species interbreeding.

Historical Landings of Yellowfin Bream

Commercial landings (including available historical records) of yellowfin/black bream for NSW from 1944/45 to 2008/09 for all fishing methods.

Additional Notes

- Length frequency has been stable since the 1950s and the age distribution of commercial catches in the early 1990s was mainly 3-8 year old fish (Gray *et al.*, 2000).
- There is a minimum legal length of 25 cm total length (approximately 22.5 cm FL) for yellowfin and black bream and a combined recreational bag limit of 20 for all bream and tarwhine.

Landings by Commercial Fishery of Yellowfin Bream

Reported landings of yellowfin bream by NSW commercial fisheries from 1997/98. Fisheries which contribute less than 2.5% of the landings are excluded for clarity and privacy.

Catch

Recreational Catch of Yellowfin Bream

The annual recreational harvest of yellowfin bream in NSW is likely to lie between 820 and 1070 t. This estimate is based upon the results of the offsite National Recreational and Indigenous Fishing Survey (H[illegible]y and Lyle, 2003) and onsite surveys undertaken by I & I NSW.

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Time-series graph of the commercial landings by NSW licensed commercial fishers. Note that there have been many significant changes to the reporting requirements of commercial operators in the last 50 years which can confound changes to actual landings. These issues are either commented upon in the figure caption, or only consistently reported data are presented. Fish that are discarded (i.e. caught but not landed) are not included.

Additional notes about the species. This section contains bullet points (which are easier to maintain and keep up-to-date) on recent issues that affect the species in NSW waters. Examples include changes to regulations or the finalisation of research projects.

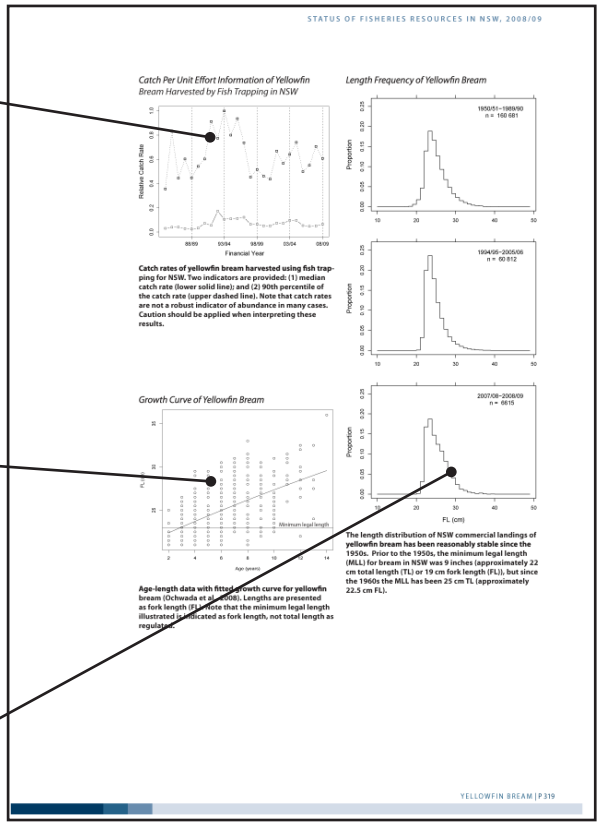
Bar graph of the commercial landings by NSW commercial fishery since 1997/98 (when these fisheries were gazetted). The legend for this figure also indicates the type of key species (primary, key secondary, target, byproduct or conditional target) that the reported species represents for each commercial fishery. Note that in some cases, the catch of a key species is so small that it cannot be included on the graph for reasons of clarity or privacy. Such fisheries are annotated with an asterisk*.

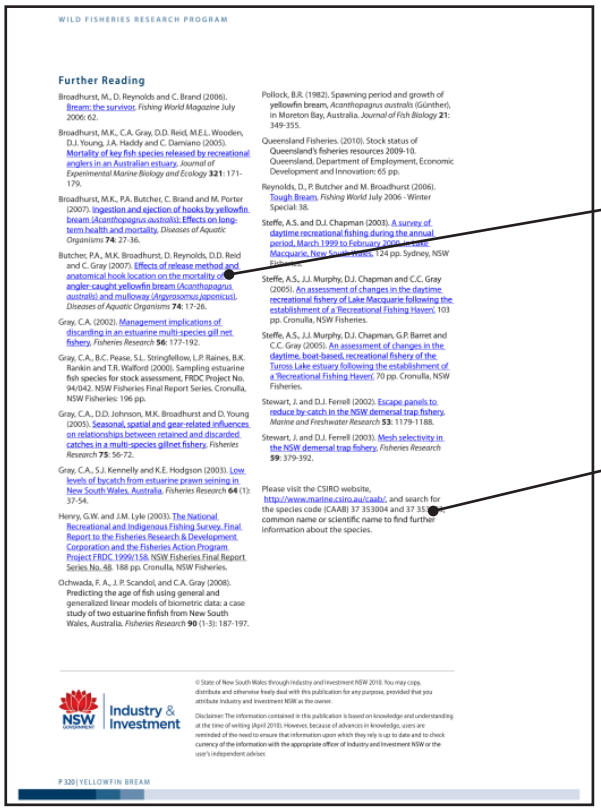
Statement on the recreational catch. There is a significant recreational catch of many species in NSW but obtaining this information is expensive and the results can be highly variable (especially for the less frequently harvested species). This section contains a state-wide estimate of the likely range of annual recreational catch based upon the results from the National Recreational and Indigenous Fishing Survey. Fish that are caught and released are not included in these estimates.

Time-series graph of the relative catch per unit of effort (CPUE or catch rate) for a suitable commercial fishing method. CPUE can be considered an indicator of abundance in some cases, but there are always significant caveats due to the behaviour of the fish and the fishers. Two time-series of CPUE are presented: the median which is the "middle-ground" of the catch rates experienced by all fishers (including those that take small incidental catches); and the 90th percentile which indicates the catch rates experienced by commercial fishers who are deemed to be targeting the species. The 90th percentile is likely to be a more sensitive indicator of abundance, but is inevitably more variable.

Growth information on individual fish. The relationship between the age and length of an individual fish provides valuable information on the productivity of a stock. The growth curve is plotted along with the raw data (if available).

Length composition histograms of landed fish. The length composition is an effective indicator of fishing pressure. For example, as fishing pressure increases, length compositions contract towards smaller fish as the larger individuals are removed from the population. In contrast, a stable length composition over decades indicates that the fishing pressure is likely to be sustainable.





A list of references for further reading. This list is not an exhaustive bibliography but rather an indicative guide as to where additional information on this species can be found. Recent publications by the Wild Fisheries Research Program are hyper-linked to the associated page on the DPI website. In some cases, the actual publication can be downloaded from this location.

The code or CAAB (Codes for Australian Aquatic Biota) of the individual biological species that constitute this report. In many cases, there is only a single species included on a report, but in other cases each report groups a number of species at a higher taxonomic level. The CAAB is a unique 8-digit code that maintained by the CSIRO Division of Marine and Atmospheric Research, Australia. Please visit the CAAB web site for more information.