Stock Status Summary 2021

NSW Stock Status Summary - Snapper
(Chrysophrys auratus)

Assessment Authors and Year

Stewart, J. 2020. NSW Stock Status Summary 2018/19 – Snapper (*Chrysophrys auratus*). NSW Department of Primary Industries. Fisheries NSW. 11 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Snapper are currently assessed as sustainable for the NSW component of the stock.

Stock Structure

Snapper (*Chrysophrys auratus*) landed off NSW belong mainly to the East Coast Biological stock that extends from Queensland down to southern NSW (Morgan et al., 2019). A proportion of Snapper landed in far southern NSW are likely to come from the Eastern Victorian Stock that extends from Wilsons Promontory north to southern NSW (Morgan et al., 2019); however the relative amount of landings from this stock has not been quantified and is likely to be minor. Snapper within the East Coast Biological stock are thought to be largely resident; however, some individuals do move long distances (Stewart et al., 2019; Harasti et al., 2015; Sumpton et al., 2003). In addition to the limited mixing within the stock, key biological traits of Snapper (such as the size and age at maturity) vary with latitude (Stewart et al., 2010). It has therefore been determined that it is appropriate to manage and report on stock status of the East Coast biological stock of Snapper at the jurisdictional level – being the Queensland and New South Wales stocks.

The data presented in this summary relate only to the NSW part of the stock.

Stock Status – New South Wales

Catch Trends

Commercial

Commercial landings of Snapper peaked at 960 t during 1974/75, but declined steadily between the early 1980s to the early 2000s (Fig. 1). Landings increased steadily to above 300 t p.a. during the late 2000s and have declined again to be averaging approximately 190 t p.a. between 2012/13 and 2018/19. Landings during 2018/19 were at a historically low 160 t.

More than 97% of commercial Snapper landings are reported from the ocean trap and line fishery (OTLF) (averaged since 1997/98). Within the OTLF, more than 85% of Snapper landed during 2017/18 and 2018/19 were reported using the method of fish trapping, with approximately 10% using the method of handlining.

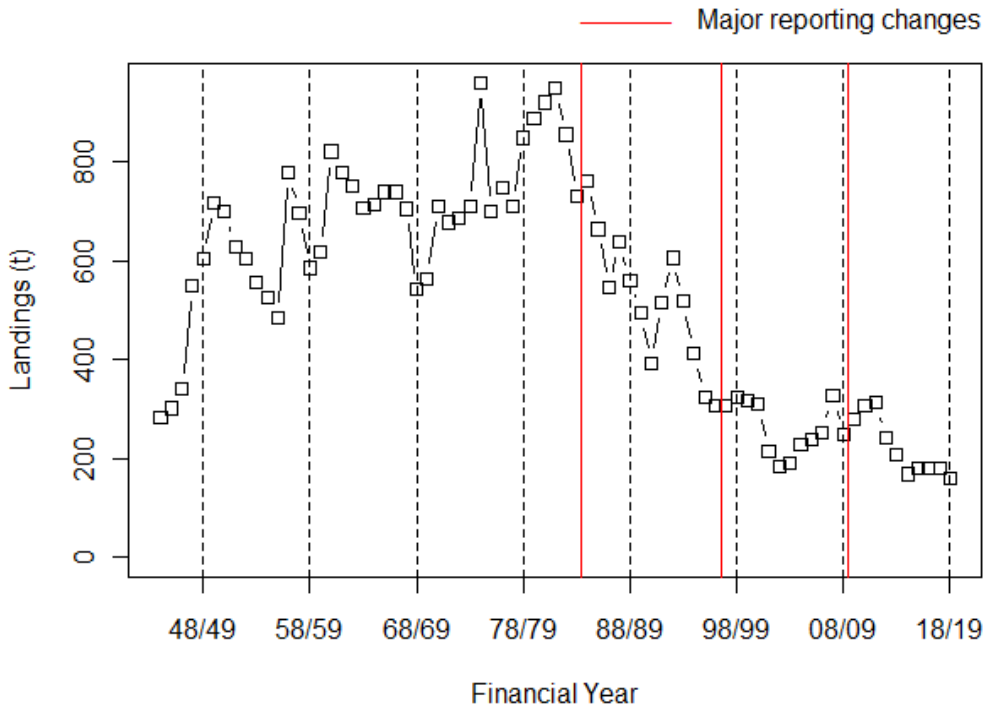


Figure 1. Commercial landings (including available historical records) of Snapper for NSW from 1944/45 to 2018/19 for all fishing methods.

Recreational and Indigenous

The most recent estimate of the recreational harvest of Snapper in NSW was approximately 157,500 fish at around 106 t during 2017/18 (Murphy et al. 2020). This estimate only encompasses households with a Recreational Fishing Fee licence holder. The previous estimate of approximately 186,000 Snapper retained by recreational fishers during 2013/14 was around 148 t (West et al., 2015). In 2000/01 the Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) estimated approximately 253,000 fish were retained by fishers in NSW at around 188 t. While these survey results are not directly comparable due to different sampling frames, and an increase in minimum legal length from 28 to 30 cm total length during July 2001, they likely represent a slight decline in recreational harvest since 2000/01.

There are no data on Aboriginal harvest.

Fishing effort trends

Commercial

Commercial fishing effort on Snapper is difficult to estimate prior to 2009/10 as the monthly catch returns listed days fished per month by method and had no direct link to the number of days within a month that a particular species was landed. The number of days fish trapping in the Ocean Trap and Line Fishery reported for when Snapper were also reported in a month have declined from nearly 15,000 during 1997/98 to fewer than 4,000 in recent years (Fig. 2). More accurate estimates of fishing effort are available after 2009/10 and show that the number of days using fish

trapping in the Ocean Trap and Line Fishery on which Snapper were landed have also declined during that time to a historical low during 2018/19 of just more than 3,000 (Fig. 3).

There has been a substantial decline in the number of days fished when Snapper were landed in the Ocean Trap and Line Fishery using the method of trapping in the more northern latitudes (north of 34°S), since 2009/10 (Fig. 4).

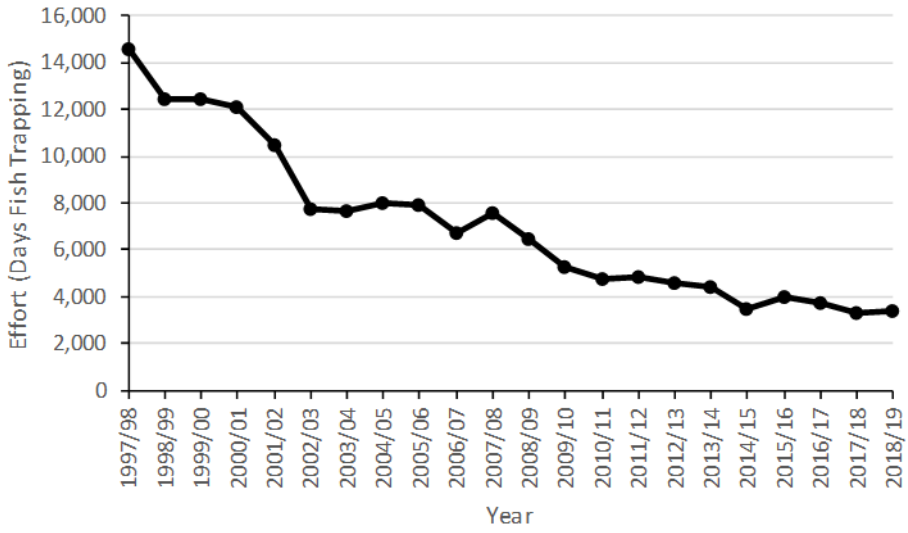


Figure 2. Annual reported days fished for months when Snapper were landed in the Ocean Trap and Line Fishery using the method of fish trapping 1997/98 to 2018/19.

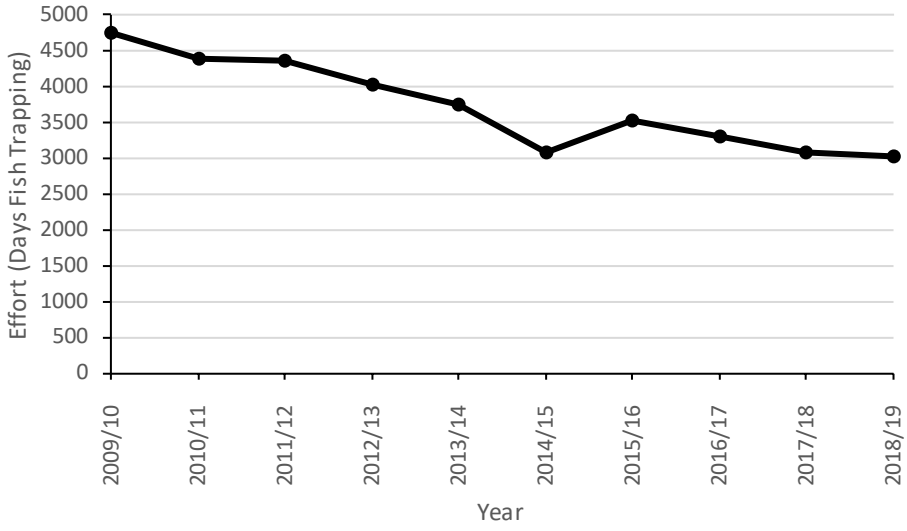


Figure 3. Annual reported days fished when Snapper were landed by in the Ocean Trap and Line Fishery using the method of fish trapping 2009/10 to 2018/19.

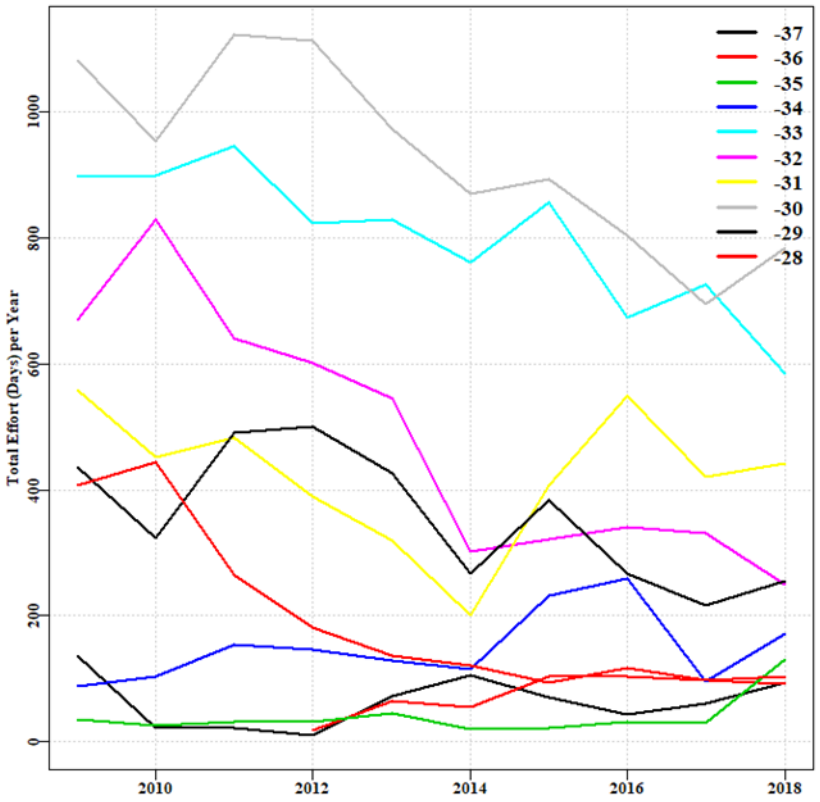


Figure 4. Annual reported days fished when Snapper were landed in the Ocean Trap and Line Fishery using the method of trapping 2009/10 to 2018/19 by band of latitude.

Catch rate trends

Catch rates of Snapper by the method of fish trapping in the Ocean Trap and Line Fishery were standardized for year, latitude, authorized fisher, month and depth of capture. Standardization was done using the r-package 'cede', with outputs standardized to 1.

Standardized catch rates since 2009/10 declined slightly until around 2013/14 and have increased since that time (Fig. 5).

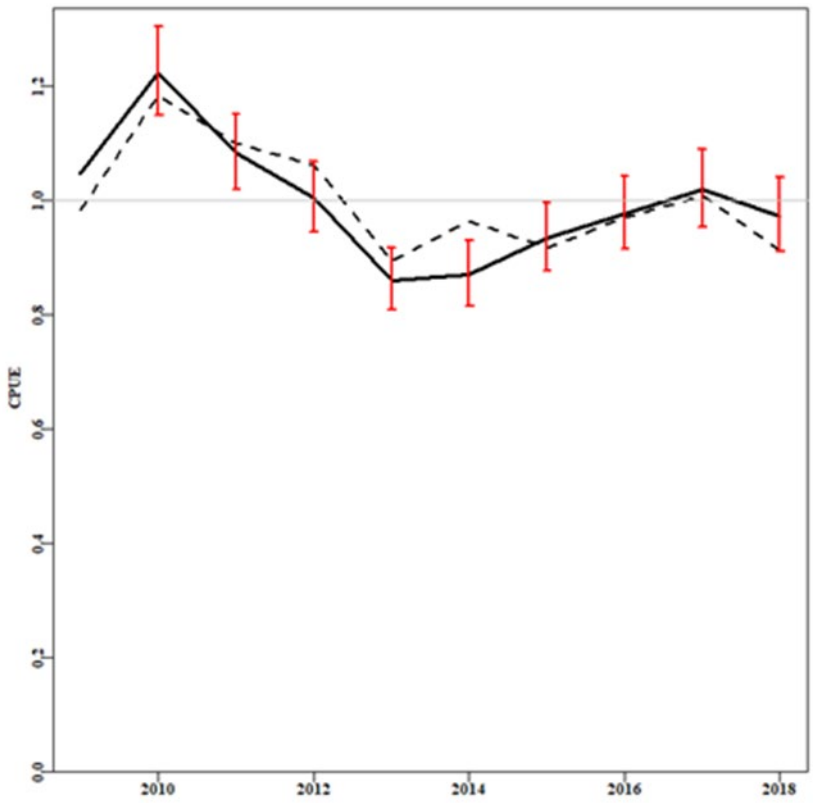


Figure 5. Standardized catch rates (kg/day fish trapping) for the period 2009/10 to 2018/19. Years are the first of the financial year.

Stock Assessment Methodology

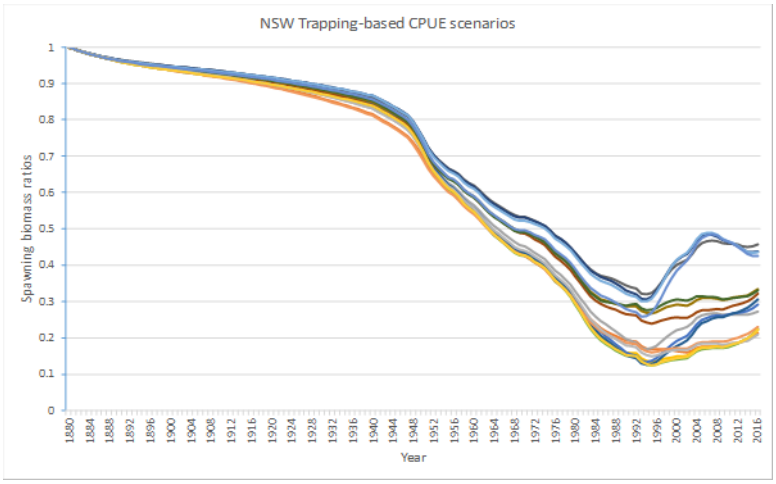
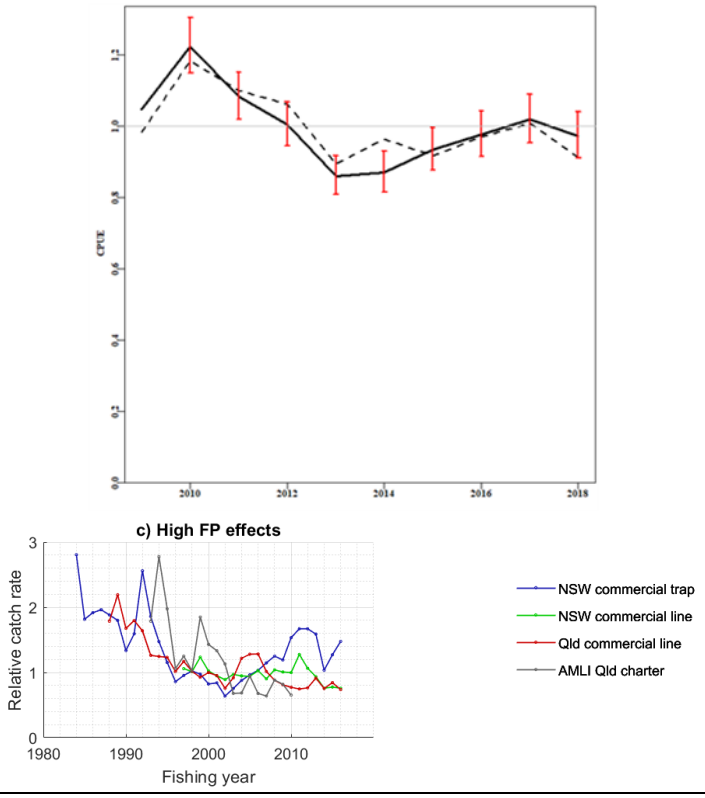
Year of most recent assessment	2020
Assessment method	1. Population model 1880 to 2016 ([Wortmann et al., 2018) 2. Standardized catch rates 3. Length composition in commercial landings 4. Age composition in commercial landings 5. Mortality estimates
Main data inputs	1. NSW and Queensland catch and effort data, biology, size and age compositions. 2. NSW commercial logbook data 3. NSW Port Monitoring length data 4. NSW Port Monitoring age data 5. Mortality estimates derived from catch curves and empirical equations based on maximum age (Then et al., 2015).

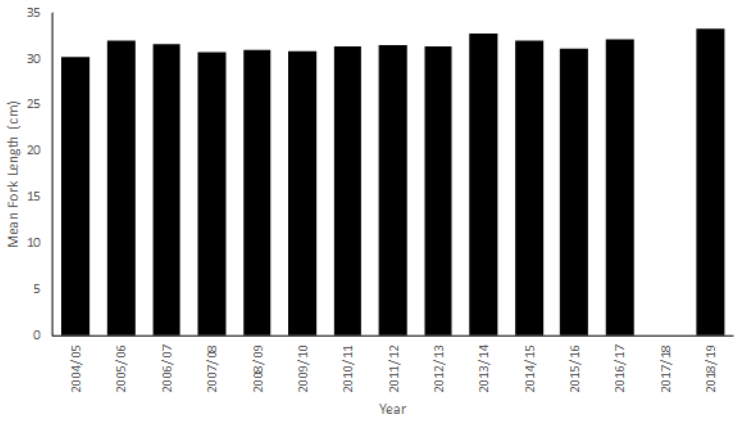
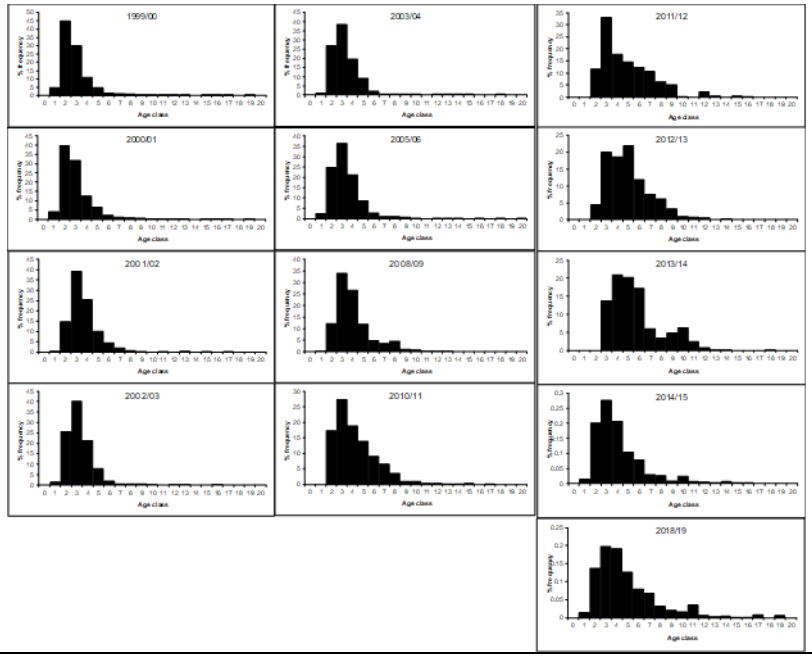
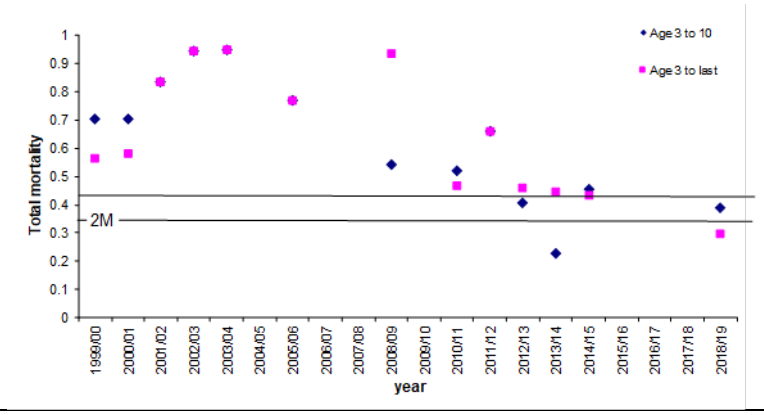
Key model structure and assumptions	1. Age-based population model. 2. Standardized catch rates - General Linear Models (which with log-normal errors give the same results as simple linear models). 3. Trends in size composition in the landed commercial catch assuming these are representative of the fishable stock. 4. Pattern of age composition in commercial catch assuming this is representative of the fishable stock. 5. Mortality estimates – assuming the catch curve was base on a sample representative of the fishable stock and that the empirical estimates of natural mortality are accurate.
Sources of uncertainty evaluated	The age-based population model was run with 72 scenarios using varying input parameters including catch rates and mortality.

Status Indicators and Limits Reference Levels

Biomass indicator or proxy	1. Mean annual biomass and depletion level, as estimated in these assessments. 2. Standardized catch rates
Biomass Limit Reference Level	Blim, expressed as 0.2 of B0. No formal reference level for catch rates; however, trends are assessed.
Fishing mortality indicator or proxy	1. Landed catch 2. Fishing effort 3. Size composition in landed catch 4. Age composition 5. Mortality rates
Fishing mortality Limit Reference Level	1.Landed catch: No formal reference levels determined. Trends in indicator through time are used to estimate trends in fishing mortality. 2. Fishing effort: No formal reference levels determined. Trends in indicator through time are used to estimate trends in fishing mortality. 3. Size composition in landed catch: No formal reference levels determined. Trends in indicator through time are used to estimate trends in fishing mortality. 4. Age composition: No formal reference levels determined. Qualitative assessment of age truncation. 5. Mortality: Ratio of F:M. F not to exceed M.

Stock Assessment Results

1.Model scenarios using NSW catch rates estimated relative spawning biomass in 2016 to be between approximately 20 and 45% of B_0.	
2. Catch rates of Snapper by the method of fish trapping in the Ocean Trap and Line Fishery since 2009/10 declined slightly until around 2013/14 and have increased since that time. Longer term standardized catch rates estimated during the most recent stock assessment (Wortmann et al., 2018) showed substantial increases in NSW since the early 2000s.	

3. Average lengths in commercial landings have been remarkably stable since the early 2000s but were slightly greater during the most recent sampling year 2018/19.	
4. Age composition in landed commercial catch has changed somewhat since the late 1990s, with a substantially greater proportion of the catch being older fish in excess of 5 years old.	
5. Mortality estimates derived from catch curve analyses in and the empirical equation of Then et al. 2015, using a maximum age of 41 years. A second estimate of M of 0.211 from the stock assessment as also used.	
Biomass status in relation to Limit	The age-based population model indicated that in 2016 the spawning biomass of Snapper in NSW was between 20 and 45% of B0. This is above the limit of 0.2.

<table>
<tr><td></td><td>Standardized catch rates increased slightly since the population model, despite a slight decrease during 2018/19. Therefore there are no indications that the available stock has declined since 2016.</td></tr>
<tr><td>Fishing mortality in relation to Limit</td><td>The landed commercial catch has declined substantially since the 1970s and 1980s during which time the stock was declining. Recent harvest, commercial and recreational combined, in NSW has seen the biomass increasing indicating that fishing mortality is not excessive.
Fishing effort has declined substantially and continues to do so.
The size composition in the landed commercial catch has remained stable since the 1990s, noting that the selectivity of the main fishing gear, demersal fish traps, precludes capture of many large (> 50 cm FL) Snapper.
The age composition in commercial landings has seen an increase in the proportion of ‘older’ (> 5 years) fish in landings despite little change in the size composition. This supports the population model estimates of an increasing biomass in recent times with subsequent increases in age range for any given size, especially at those sizes vulnerable to fish trapping.
Estimates of mortality suggest excessive fishing mortality (Z > 2 x M) until the 2010’s; however the selectivity of fish traps will bias such analyses towards over-estimates of Z.</td></tr>
<tr><td>Previous SAFS stock status</td><td>Stock status for Snapper through the NSW assessment framework were previously assessed as:

<table>
<tr><th>Year</th><th>Exploitation Status</th></tr>
<tr><td>2001/02</td><td>Overfished</td></tr>
<tr><td>2002/03</td><td>Overfished</td></tr>
<tr><td>2003/04</td><td>Growth Overfished</td></tr>
<tr><td>2004/05</td><td>Growth Overfished</td></tr>
<tr><td>2005/06</td><td>Growth Overfished</td></tr>
<tr><td>2006/07</td><td>Growth Overfished</td></tr>
<tr><td>2007/08</td><td>Growth Overfished</td></tr>
<tr><td>2008/09</td><td>Growth Overfished</td></tr>
<tr><td>2009/10</td><td>Growth Overfished</td></tr>
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	2010/11 — Growth Overfished 2011/12 — Growth Overfished 2012/13 — Growth Overfished 2013/14 — Growth Overfished 2014/15 — Growth Overfished Stock status for Snapper in NSW through the SAFS framework were previously assessed as: 2012 — Undefined 2014 — Undefined 2016 — Undefined 2018 — Sustainable
Current SAFS stock status	The stock in NSW is not considered to be recruitment impaired. The current level of fishing mortality is unlikely to cause the biological stock to become recruitment impaired. On the basis of the evidence provided above, Snapper in New South Wales is classified as a sustainable stock

Qualifying Comments

The Queensland component of the East Coast Biological Stock is classified as being depleted. This determination may be difficult to reconcile given that the assessment is done on the entire biological stock. Nevertheless, NSW takes, and has always done so, the vast majority of the catch from this stock. The NSW data in terms of catch rates are far more reliable than those from the relatively small line fisheries in Queensland and provide a more accurate assessment of the stock as a whole.

References

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