Stock Status Summary 2021

NSW Stock Status Summary Pearl Perch
(*Glaucosoma scapulare*)

Assessment Authors and Year

Stewart, J. 2020. NSW Stock Status Summary 2018/19 – Pearl Perch – (*Glaucosoma scapulare).* NSW Department of Primary Industries. Fisheries NSW. 10 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Pearl Perch is currently assessed as **Depleted** for the NSW component of the stock.

Stock Structure

Pearl Perch (*Glaucosoma scapulare*) have a limited distribution from Rockhampton in Queensland (23°20'S) south to Port Jackson in New South Wales (NSW) (33°50'S), but rarely occur south of Coffs Harbour (30°18'S) (Stewart et al., 2013). Inhabiting coastal and continental shelf waters (depths 10-150 m) they are generally found close to submerged reefs, rock ledges or rough bottom. Limited information exists on movement patterns or the life-history of Pearl Perch; however there is some evidence that Pearl Perch move northwards to spawn as no maturing fish have been observed in NSW waters. Due to the limited distribution and influence of the prevailing southerly flowing Eastern Australian Current in distributing larvae across this area (Ridgway and Dunn, 2003), Pearl Perch are considered to be a single biological stock (Stewart et al., 2015).

Here the assessment of stock status is presented at the biological stock level—Eastern Australia.

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

Stock Status – New South Wales

Catch Trends

Commercial fisheries

NSW commercial landings peaked at approximately 17 tonnes in 1995/96 (Fig. 1). Since that time landings have fluctuated but have declined overall to an average of 7.2 tonnes p.a. during the previous 5 years. The majority of the catch is reported by the Ocean Trap and Line fishery (Fig. 2).

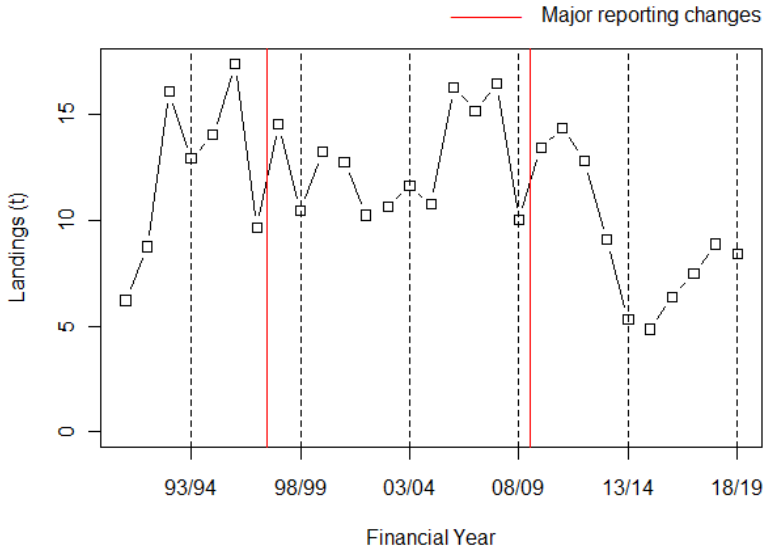


Figure 1. Commercial landings of Pearl Perch for NSW from 1990/91 to 2018/19 for all fishing methods.

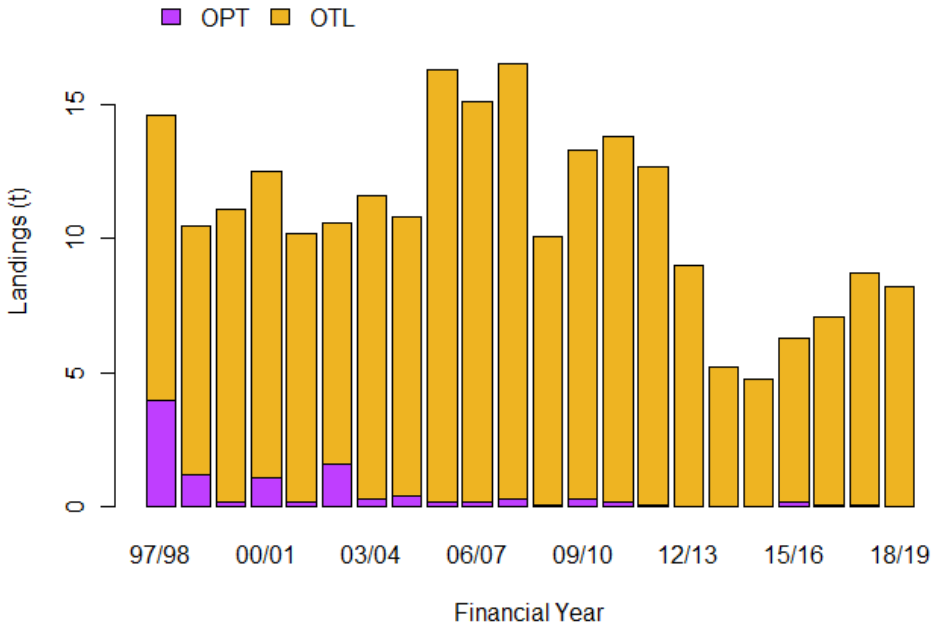


Figure 2. Landings by Fishery of Pearl Perch in NSW for years 1997/98 to 2018/19. OPT = Ocean Prawn Trawl; OTL = Ocean Trap and Line.

Recreational and Indigenous

The most recent estimate of the recreational harvest of Pearl Perch in NSW was made for 2017/18 and was approximately 13,700 fish (Murphy et al., 2020). The previous estimate was of 4,434 fish retained during 2013/14 (West et al., 2015).

There are no data on aboriginal harvest.

Fishing effort trends

Fishing effort (days fished when Pearl Perch were reported) has declined in both the line and trap fisheries since the early 2000s (Fig. 3). Commercial fishing effort on Pearl Perch 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. More accurate estimates of fishing effort are available after 2009/10 and show that the number of days using line fishing and fish trapping on which Pearl Perch were landed have declined slightly for line fishing and been variable with no overall trend for fish trapping (Fig. 4).

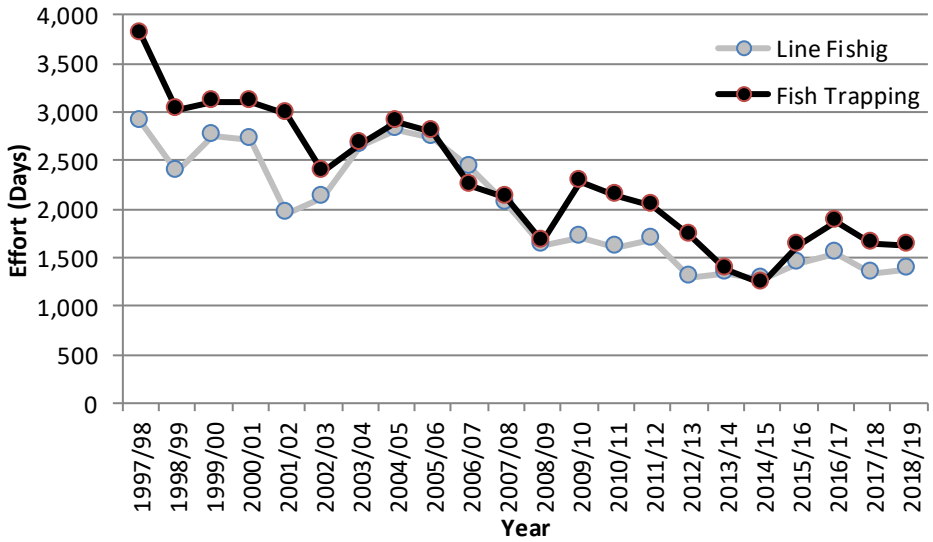


Figure 3. Annual reported days fished in the line and trap fisheries when Pearl Perch were reported 1997/98 to 2018/19.

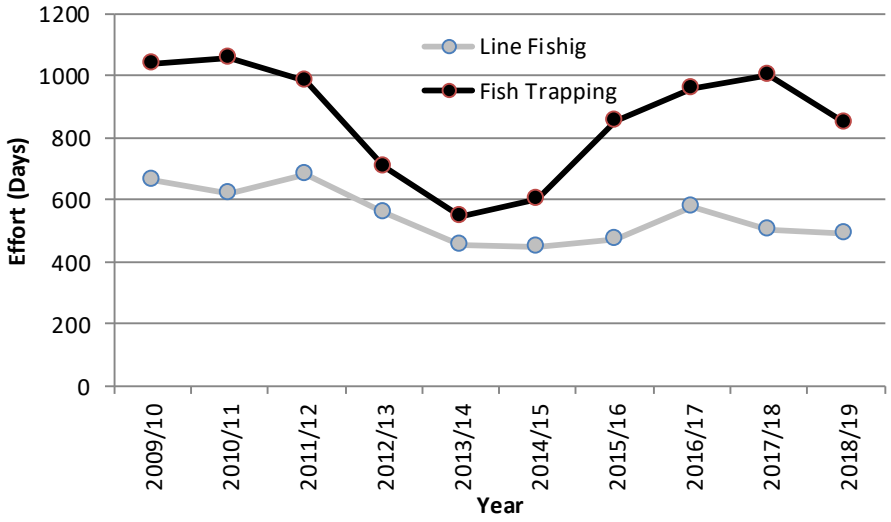


Figure 4. Annual reported days fished when Pearl Perch were landed by line fishing and fish trapping 2009/10 to 2018/19.

Catch rate trends

Median nominal catch rates of Pearl Perch (kg per day all lining methods and fish trapping) have remained low and stable since 1997/98 (Figs. 5 & 6). The jump in fish trapping catch rates after 2008/09 are due to a change in logbook reporting. There has been a slight increase in catch rates using fish traps in recent years.

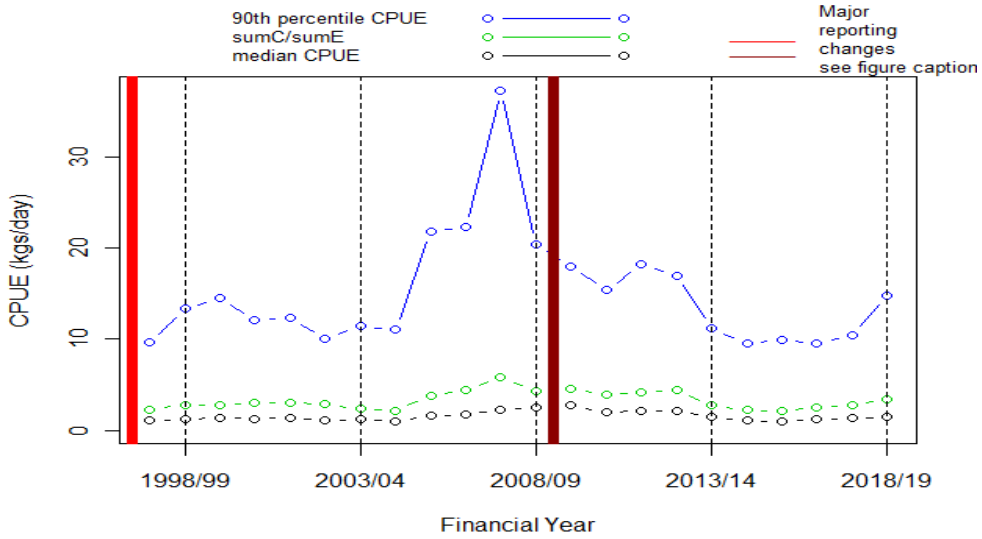


Figure 5. Commercial catch rates of Pearl Perch using all lining methods for years 1997/98 to 2018/19 in NSW. Three indicators are provided: (1) median catch rate from available monthly records (solid line); (2) sum of the catch divided by the sum of the effort (dotted line); and (3) 90th percentile of the catch rate from available monthly records (dashed line). Records with a zero catch rate (i.e. no catch recorded) are not included in these analyses.

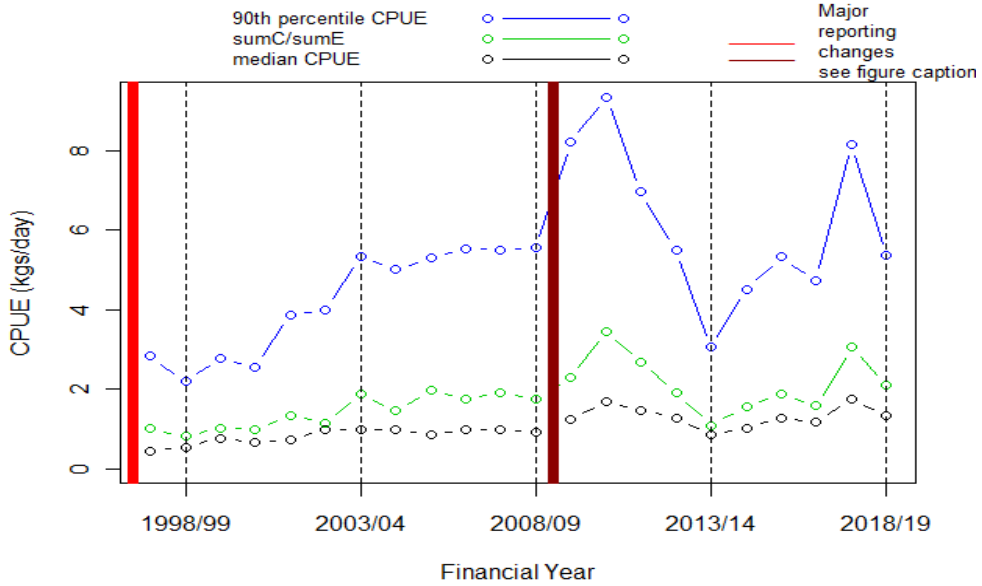


Figure 6. Commercial catch rates of Pearl Perch using fish trapping for years 1997/98 to 2018/19 in NSW. Three indicators are provided: (1) median catch rate from available monthly records (solid line); (2) sum of the catch divided by the sum of the effort (dotted line); and (3) 90th percentile of the catch rate from available monthly records (dashed line). Records with a zero-catch rate (i.e. no catch recorded) are not included in these analyses.

Stock Assessment Methodology

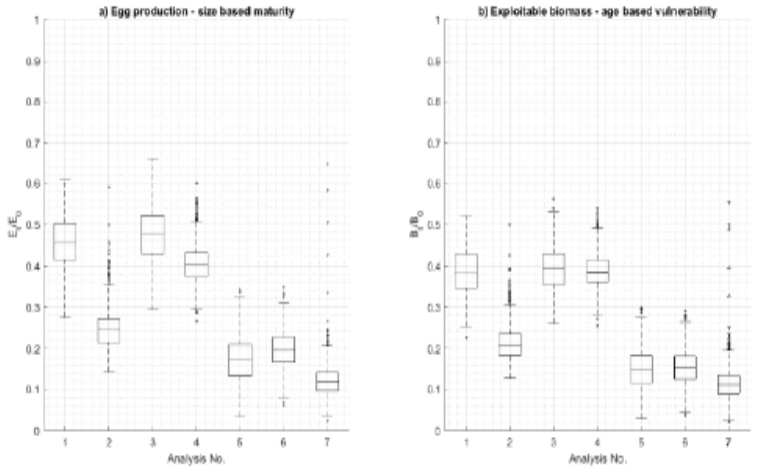
Year of most recent assessment	2020 on data up to and including 2018/19
Assessment method	Weight of evidence. 1. Population model. 2. Catch. 3. Catch rate. 4. Fishing effort. 5. Size composition. 6. Age composition.
Main data inputs	1. Population model to 2014 (Sumpton et al., 2017). 2. Landed catch 1990/91 to 2018/19. 3. Catch rates 1997/98 to 2018/19. 4. Fishing effort 1997/98 to 2018/19. 5. Size composition in landed catch 2004/05 to 2018/19. 6. Age composition in landed catch 2005/06.
Key model structure and assumptions	1. Integrated statistical stock assessment using catch, effort, length and age frequency data up until 2014.
Sources of uncertainty evaluated	1. Variation in M, proxies for recreational fishing effort.

Status Indicators and Limits Reference Levels

Biomass indicator or proxy	1. Estimated exploitable biomass in 2014. 2. Catch rates.
Biomass Limit Reference Level	1.Biomass not to be below 20% of virgin levels with a greater than 10% probability. 2. Trends in catch rates are used to estimate trends in exploitable biomass since 2014.
Fishing mortality indicator or proxy	1. Model derived estimates of F relative to M. 2. Harvest in relation to MSY. 3. Fishing effort.

	4. Size composition. 5. Age composition.
Fishing mortality Limit Reference Level	F < M

Stock Assessment Results

1. Four of the 7 model scenarios indicated that biomass was below the 20% LRP with > 10% probability (scenarios 2, 5 ,6, 7) (Fig. 7). Scenarios 1, 3 and 4 were above the LRP; however each of these used boat licences as a proxy for recreational fishing effort since 1996.	 Figure 7. The estimated stock status ratios of pearl perch for a) egg production in the t = 2014 fishing year compared with virgin egg production t = 0 and b) exploitable biomass compared with virgin biomass. Each boxplot illustrates the distribution around the median (line in the middle of each box). The bottom and top of each box were the 25th and 75th percentiles. The whisker lengths indicate about 99% coverage of the MCMC simulations; outlying estimates are represented by small circles. From Sumpton et al. (2017).

5. The length composition in landed commercial catches in NSW between 2004/05 and 2018/19 suggest relatively very poor recruitment into the fishery until 2016/17 (Fig. 8), with the average size increasing in every year until 2016/17 when recruitment of more just legal fish was detected (Fig. 9).

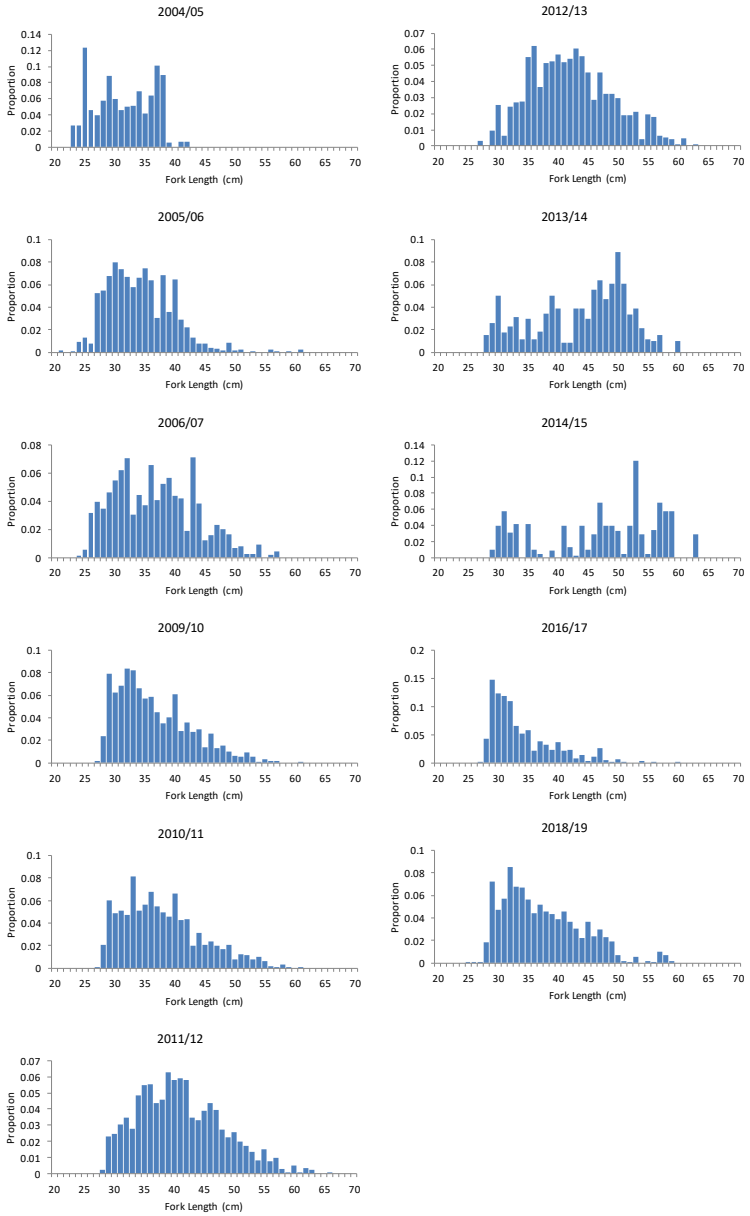
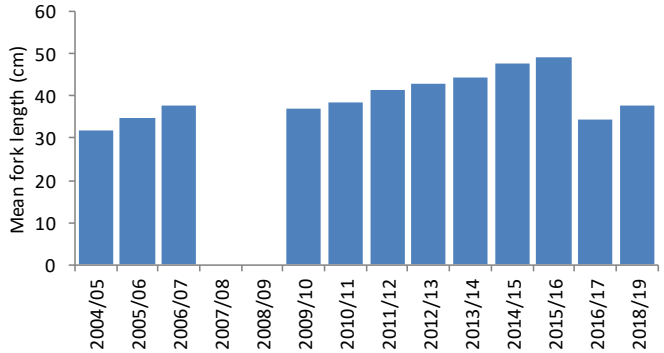
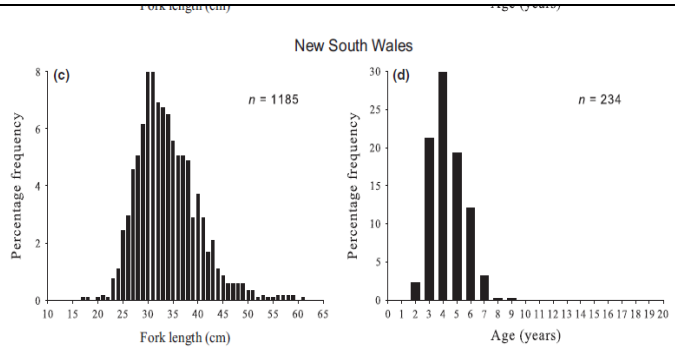


Figure 8 The length distributions of commercially landed Pearl Perch in NSW 2004/05 to 2016/17.

	 Figure 9. The mean lengths of commercially landed Pearl Perch in NSW 2004/05 to 2018/19.
6. The age composition in commercial landings in 2005/06 indicated potential age-class truncation, with relatively few older fish in landings considering a maximum age of at least 19 years (Stewart et al., 2011; 2013) (Fig. 10).	 Figure 10. The size and age compositions of commercially landed Pearl Perch in NSW 2005/06. From Stewart et al., 2013.
Biomass status in relation to Limit	The four most plausible model scenarios indicated that the biomass of Pearl Perch was below the 20% LRP with > 10% probability in 2014. Since that time catch rates in NSW have remained low, but with a slight overall increase. Indications of stronger recruitment into the fishery in 2016/17 in NSW suggest that the population may be increasing; however there are no indications that the available biomass has yet increased above the limit.
Fishing mortality in relation to Limit	Fishing mortality on the Eastern Australia stock of Pearl Perch was assessed as being excessive during the most recent stock assessment including data to 2014 (Sumpton et al., 2017). Historical landings greatly exceeded the estimated maximum sustainable yield from the stock, and fishing mortality was estimated at above or similar to natural mortality. Since that time effort targeting Pearl Perch has continued to decline, with the commercial harvest in NSW increasing slightly from historically low levels. The recreational harvest in NSW may have increased 3-fold since 2013/14 (consistent with a recruitment pulse into the fishery during 2016/17); Each jurisdiction has minimum legal lengths for Pearl Perch (35 cm total length in Queensland and 30 cm

<table>
<tr><td></td><td>total length in New South Wales) that afford only limited protection to juveniles. Despite these reductions in fishing effort the stock shows no signs of recovery.</td></tr>
<tr><td>Previous SAFS stock status</td><td>SAFS 2018. Depleted.
Within the NSW assessment framework, Pearl Perch were previously assessed as:
<table>
<tr><th>Year</th><th>Exploitation Status</th></tr>
<tr><td>2003/04</td><td>Undefined</td></tr>
<tr><td>2004/05</td><td>Undefined</td></tr>
<tr><td>2005/06</td><td>Undefined</td></tr>
<tr><td>2006/07</td><td>Uncertain</td></tr>
<tr><td>2007/08</td><td>Uncertain</td></tr>
<tr><td>2008/09</td><td>Undefined</td></tr>
<tr><td>2009/10</td><td>Fully Fished</td></tr>
<tr><td>2010/11</td><td>Fully Fished</td></tr>
<tr><td>2011/12</td><td>Uncertain</td></tr>
<tr><td>2012/13</td><td>Uncertain</td></tr>
<tr><td>2013/14</td><td>Uncertain</td></tr>
<tr><td>2014/15</td><td>Uncertain</td></tr>
</table></td></tr>
<tr><td>Current SAFS stock status</td><td>The above evidence indicates that the biomass of this stock is likely to be depleted and that recruitment is likely to be impaired.
The above evidence indicates that current fishing mortality levels are expected to prevent the stock recovering from a recruitment impaired state.
On the basis of the evidence provided above, the biological stock is classified as a depleted stock.</td></tr>
</table>

Qualifying Comments

Four of the 7 model scenarios indicated that biomass was below the 20% LRP with > 10% probability (scenarios 2, 5, 6, 7). Scenarios 1, 3 and 4 were above the LRP; however each of these used boat licences as a proxy for recreational fishing effort since 1996. The trend was one of increasing numbers of boat licences through time and in direct contrast to fishing effort directly estimated through recreational fishing surveys that showed a decline through this period. Model scenarios using the actual estimated recreational fishing effort as estimated through surveys produced pessimistic outputs (scenarios 5 and 7). It could be argued that model scenarios using the effort proxy rather than the actual estimates are overly optimistic and therefore should be down-weighted in considering the overall stock assessment report.

Model scenarios:

1. Used boat registrations as proxy for recreational effort which showed opposite trend to actual rec survey data that showed decline in effort since 1996.

4. Used boat registrations as proxy for recreational effort which showed opposite trend to actual rec survey data that showed decline in effort since around 1996. Estimated M in model at 0.383 which is unreasonably high.

Models 5 and 7 may be the best as they use for recreational fishing effort the data as adjusted according to actual recreational fishing surveys that showed declines in recent years; whereas the proxies of boat registrations show continual increase.

References

Murphy, J.J., Ochwada-Doyle, F.A., West, L.D., Stark, K.E. and Hughes, J.M., 2020, The NSW Recreational Fisheries Monitoring Program - survey of recreational fishing, 2017/18. NSW DPI - Fisheries Final Report Series No. 158.

Ridgway, K.R. and Dunn, J.R. 2003. Mesoscale structure of the mean East Australian Current System and its relationship with topography. Progress in oceanography, 56(2), pp.189-222.

Stewart, J. 2011. Evidence of age-class truncation in some exploited marine fish populations in New South Wales, Australia. Fisheries Research, 108 (1): 209-213.

Stewart, J., Sumpton, W., Lockett, M. and Hughes, J.M. 2013. Age-based demographics of the pearl perch *Glaucosoma scapulare* (Ramsay, 1881). Journal of Applied Ichthyology, 29(4), 801-807.

Stewart, .J, Hegarty, A., Young, C., Fowler, A.M. and Craig, J. 2015. Status of fisheries resources in NSW 2013–14, NSW Department of Primary Industries, Mosman, 391 pp.

Sumpton, W., O'Neill, M.F., Campbell, M., McLennan, M. and Campbell, A.B. 2017. Stock assessment of the Queensland and New South Wales pearl perch (*Glaucosoma scapulare*) fishery, Department of Agriculture and Fisheries, Brisbane.

West, L.D., Stark, K.E., Murphy, J.J., Lyle J.M. and Doyle, F.A. 2015. Survey of recreational fishing in New South Wales and the ACT, 2013/14. Fisheries Final Report Series.