

Assessment Authors and Year

Hall, K.C. 2020. NSW Stock Status Summary 2018/19 – Sand Whiting (*Sillago ciliata*). NSW Department of Primary Industries, Fisheries NSW, Coffs Harbour. 11 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Sand Whiting is currently assessed as Sustainable for the NSW component of the stock.
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Stock Structure

Sand Whiting (*Sillago ciliata*) occurs along the east coast of Australia and is most abundant in southern Queensland and northern New South Wales (NSW). Tagging studies have shown movement of adult fish between estuaries, but information on biological stock boundaries remains incomplete. The unknown nature of biological stock composition means no formal assessment of the entire biological stock has been completed. Separate assessments of Sand Whiting are completed in Queensland and NSW (McGilvray and Hall 2018).

Assessment of stock status is presented at the jurisdictional level—Queensland and NSW.

The data presented in this summary relate to the NSW jurisdiction.

Stock Status – New South Wales

Catch Trends - Commercial Fisheries

Annual commercial catches of Sand Whiting in NSW state waters are available from 1952/53 to 2018/19 (Fig. 1). Catches steadily increased from 50.8 t in 1952/53 to a peak of 229.4 t in 1982/83 and then remained above 130 t until 2007/08. Since 2008/09 catches have steadily decreased to record the lowest catches in five decades of 74.9 t in 2017/18 and 75.1 t in 2018/19. The biggest decrease in catches coincided with the introduction of recreational fishing havens in 30 estuaries in 2006.

Most of commercial catch of Sand Whiting from NSW waters is taken by hauling and mesh netting sectors of the Estuary General Fishery (EGF) (Figs 2 and 3). Catches in both sectors remained fairly stable between 1997/98 and 2007/08, with the hauling sector taking approximately two thirds of the total EGF catch. However, since 2008/09 catches in the mesh netting sector have decreased slowly, while those of the hauling sector have undergone greater declines.

The relative proportions of commercial catch taken in different regions and estuaries have varied temporally for both the hauling and mesh netting sectors of the EGF (Figs 4 and 5). For the hauling sector, catches from region 4 have consistently accounted for a large proportion of the total catch; whereas, catches from region 2 and 6 were historically important, but have gradually decreased over time. Similar trends are evident in mesh-netting catches, with region 4 dominating and catches in region 2 gradually declining over time, but catches in region 6 show a reverse trend, increasing and remaining steady in recent years. Most of the commercial catch is taken from 10 main estuaries.

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Sand Whiting are also targeted by commercial net fishers in Queensland, with catches on average much larger than those taken in NSW. The total commercial catch in Queensland averaged 277 t between 1990 and 2016 (McGilvray and Hall 2018).

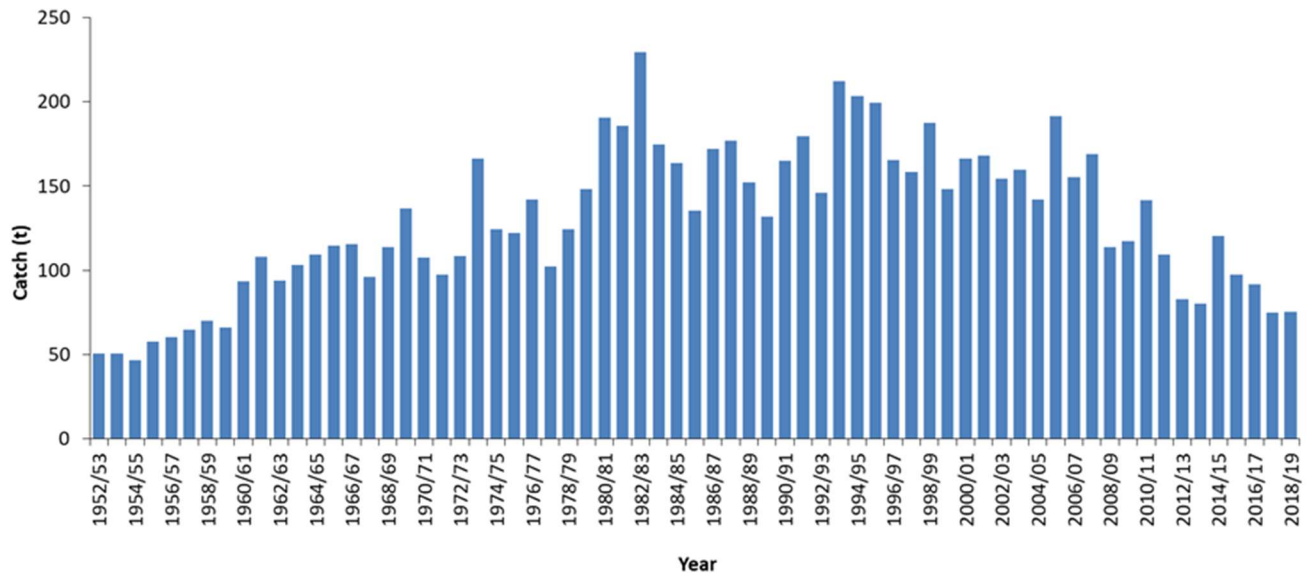


Figure 1. Annual commercial catches of Sand Whiting in NSW waters from 1952/53 to 2018/19 for all fishing methods.

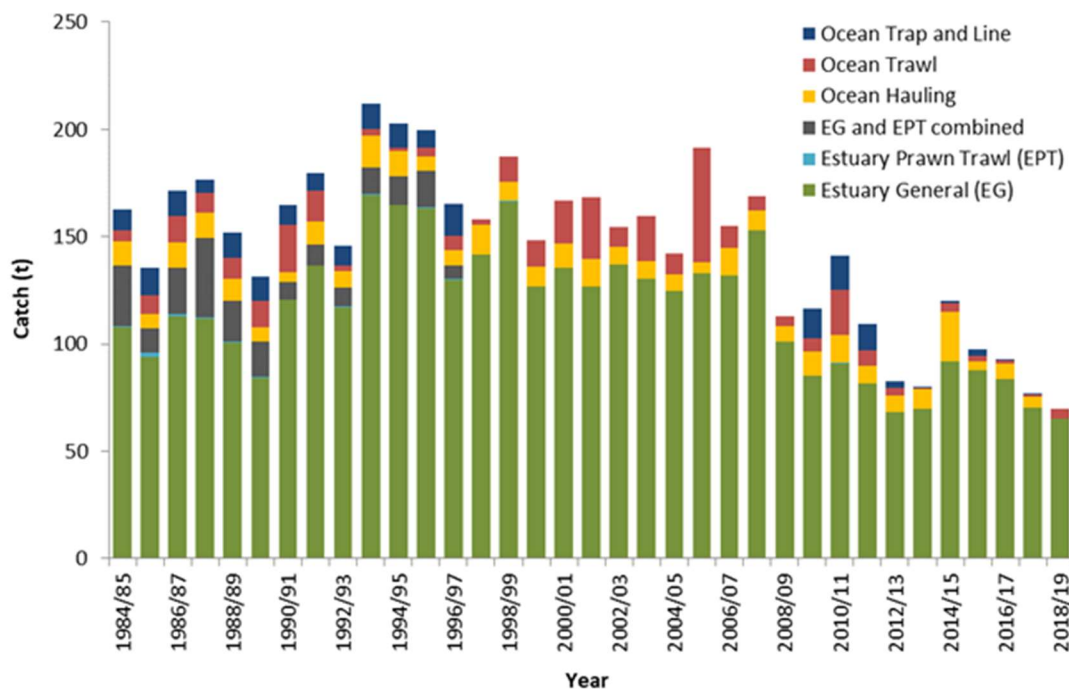


Figure 2. Annual commercial catches of Sand Whiting by fishery in NSW waters from 1984/85 to 2018/19.

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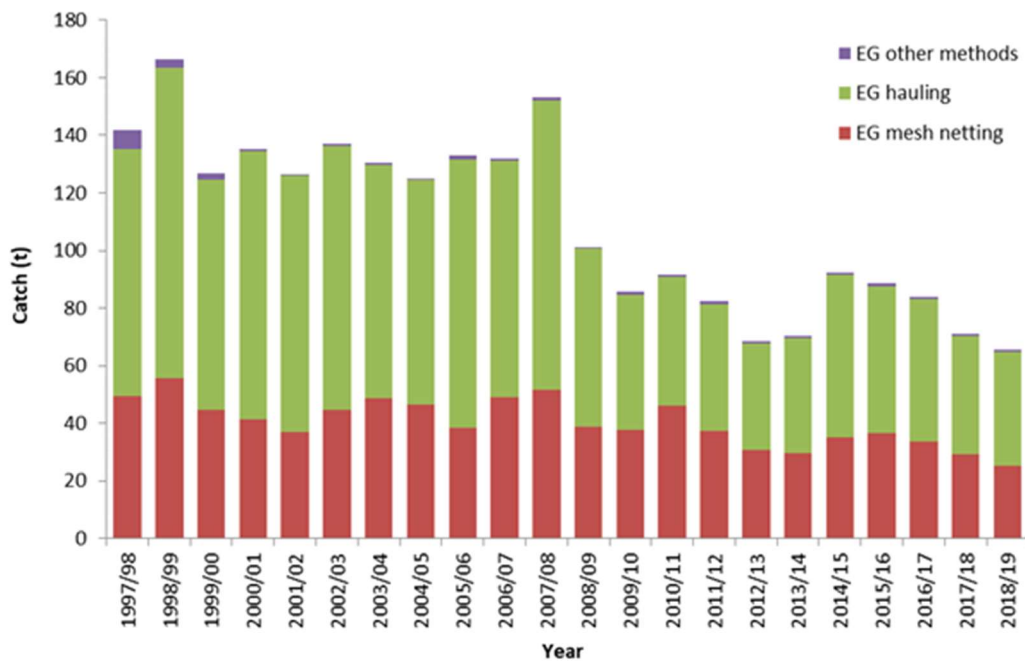


Figure 3. Annual commercial catches of Sand Whiting by the hauling and mesh netting sectors of the NSW Estuary General Fishery from 1997/98 to 2018/19.

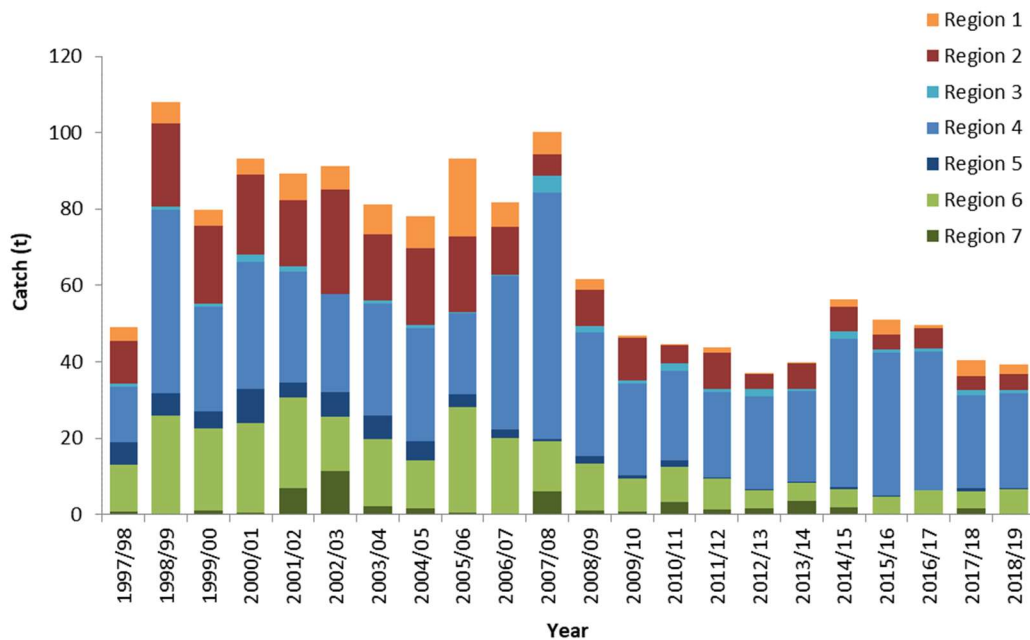


Figure 4. Annual commercial catches of Sand Whiting by the hauling sector in different regions of the NSW Estuary General Fishery from 1997/98 to 2018/19.

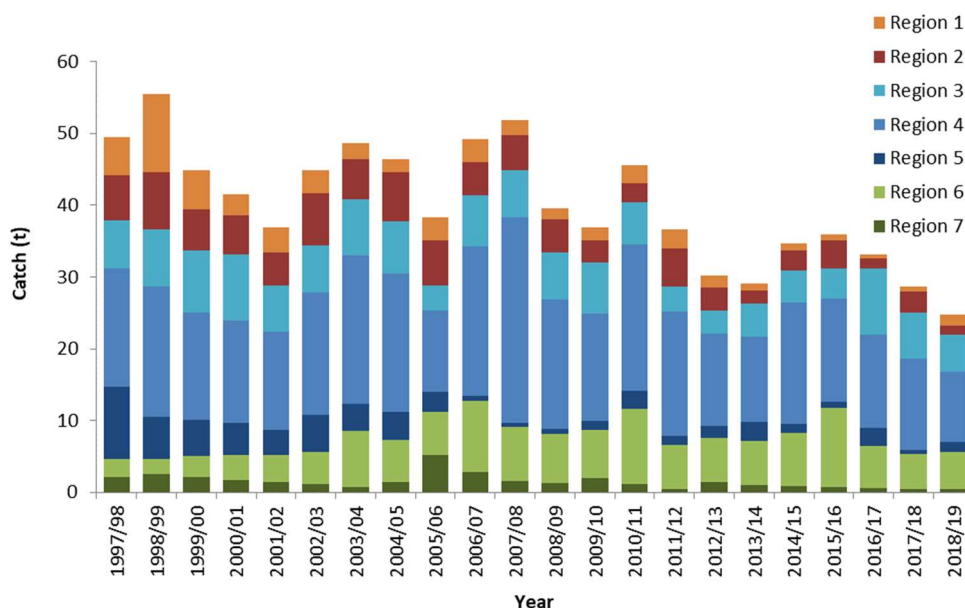


Figure 5. Annual commercial catches of Sand Whiting by the mesh netting sector in different regions of the NSW Estuary General Fishery from 1997/98 to 2018/19.

Catch Trends - Recreational and Indigenous

The most recent estimate of the recreational harvest of Sand Whiting in NSW was approximately 280,064 fish or around 33.6 t during 2017/18 (Murphy et al. 2020). This estimate was based on a survey of Recreational Fishing Licence (RFL) Households, comprised of at least one fisher possessing a long-term (1 or 3 years duration) fishing licence and any other fishers resident within their household. The equivalent estimated recreational harvest in 2013/14 was 38% smaller at around 172,941 fish (Murphy et al. 2020). Relative to the commercial catch, these recreational catches comprised approximately 46.3% of the total harvest from NSW waters in 2013/14.

A survey of Aboriginal cultural fishing in the Tweed River catchment identified Sand Whiting as one of the top 10 most important species numerically in catches, which was estimated to account for 14.2% of the total finfish catch (Schnierer and Egan 2016). Total catches in the region were estimated to range between 2,085–4,940 Sand Whiting per annum (Schnierer 2011). Statewide estimates of the annual Aboriginal harvest of Sand Whiting in NSW waters are unknown, but are assumed to be significant.

Fishing Effort Trends - Commercial Fisheries

Commercial fishing effort for Sand Whiting was collected as number of days fished on monthly records prior to July 2009 and as numbers of daily fishing events after July 2009. To form a longer time series of effort, recent daily events were re-aggregated, with effort in days fished estimated from the number of fishing events entered for each fisher in each month where Sand Whiting was reported on at least one day.

Nominal effort levels (in total number of days fished) over the past 11 years have been well below historical levels (Fig. 6). In 2018/19, effort was 7,969 days for mesh netting and 950 days for hauling compared with peaks of 23,093 and 8,012 days, respectively, in 1999/00 and 1998/99, respectively. Changes in catch reporting from monthly to daily records in July 2009 significantly altered effort distributions and account for some of the rapid decrease in effort in 2009/10 for each time series (Figs 7 and 8).

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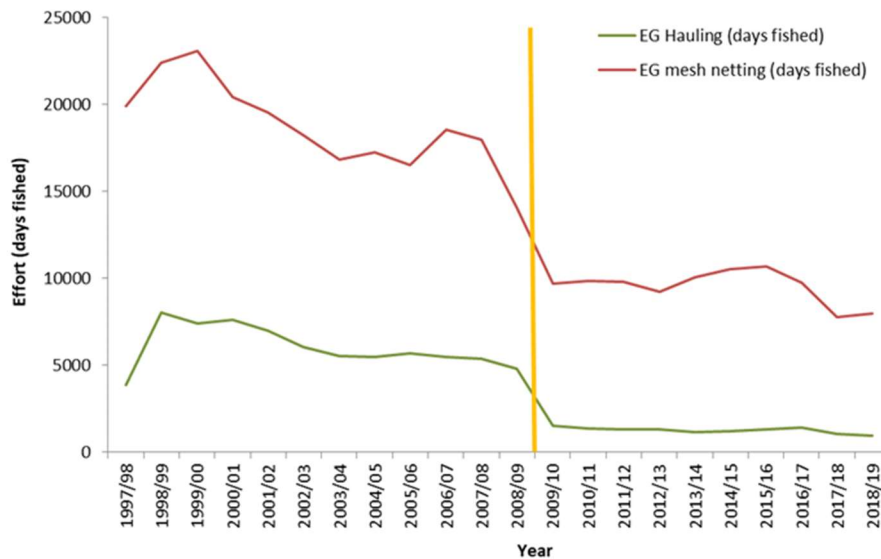


Figure 6. Annual effort (in days fished) for the hauling and mesh netting fishers of the NSW Estuary General Fishery that reported landing Sand Whiting on at least one day in each month. The gold vertical line indicates the change from monthly to daily catch reporting.

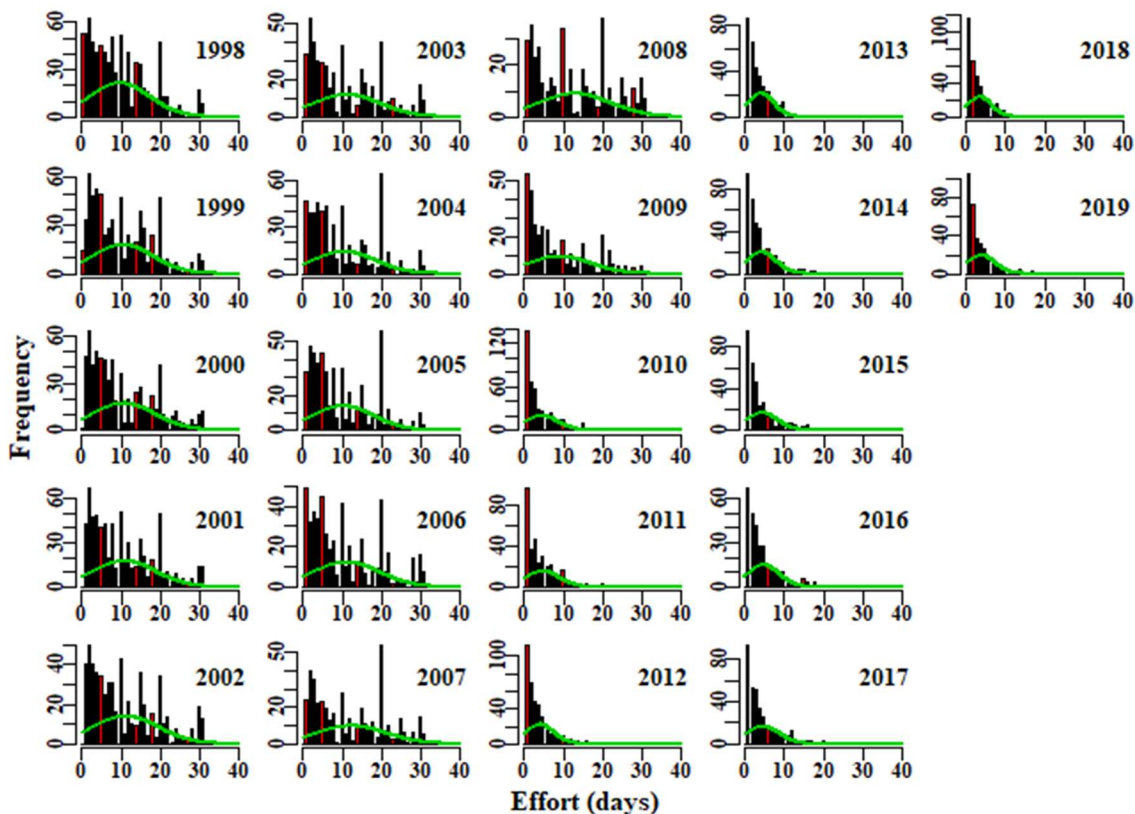


Figure 7. Distribution of monthly fishing effort (in days fished) for Sand Whiting by the hauling sector of the NSW Estuary General Fishery, estimated from monthly records (1998–2009) and re-aggregated daily records (2009–2019) following a change in catch reporting requirements in July 2009.

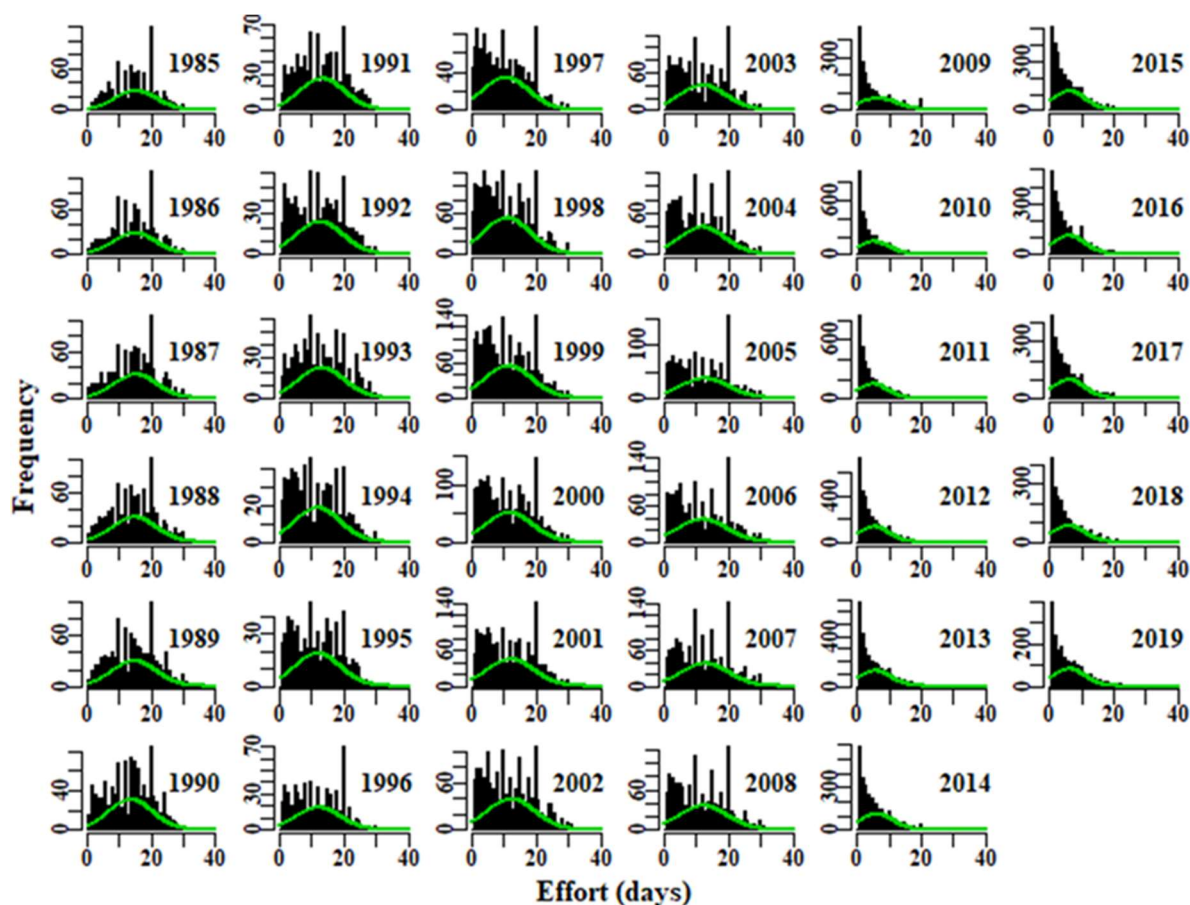


Figure 8. Distribution of monthly fishing effort (in days fished) for Sand Whiting by the mesh netting sector of the NSW Estuary General Fishery, estimated from monthly records (1998–2009) and re-aggregated daily records (2009–2019) following a change in catch reporting requirements in July 2009

Catch Rate Trends - Commercial Fisheries

Monthly catch rates (catch-per-unit-effort, CPUE) in kg per day fished for Sand Whiting taken by hauling and mesh netting in the EGF were compiled from monthly records between 1998 and 2009 and 1985 and 2009, respectively, and re-aggregated daily records between 2010 and 2019. Catch rates were standardized for month, estuary region and authorised fisher using the r-package ‘cede’ (Haddon 2018). Continuity of the time series across the catch reporting change in July 2009 is considered invalid because of significant changes in effort reporting (Figs 7 and 8). The longer combined time series of monthly catch rates is provided for comparison purposes only (Figs 9 and 10). Daily catch rates in kg per shot for hauling and kg per day for mesh netting were also compiled from daily fishing event records from 2010 to 2019 and standardised for month, estuary region, authorised fisher and net length (the last for mesh netting only).

The mean standardised catch rates of Sand Whiting have been consistently lower for mesh netting relative to hauling (Figs 9 and 10), despite the two sectors operating in similar estuaries and regions. Monthly catch rates of both sectors increased historically from 2000 to 2006 for hauling and from 1986 to 1995 and again from 2000 to 2005 for mesh netting. Catch rates in both sectors then decreased in the early 2010s followed by another period of increasing rates. Recent catch rates over the last five years have remained near the long-term averages. In particular, mesh netting catch rates standardised by net length have remained very stable (Fig. 10).

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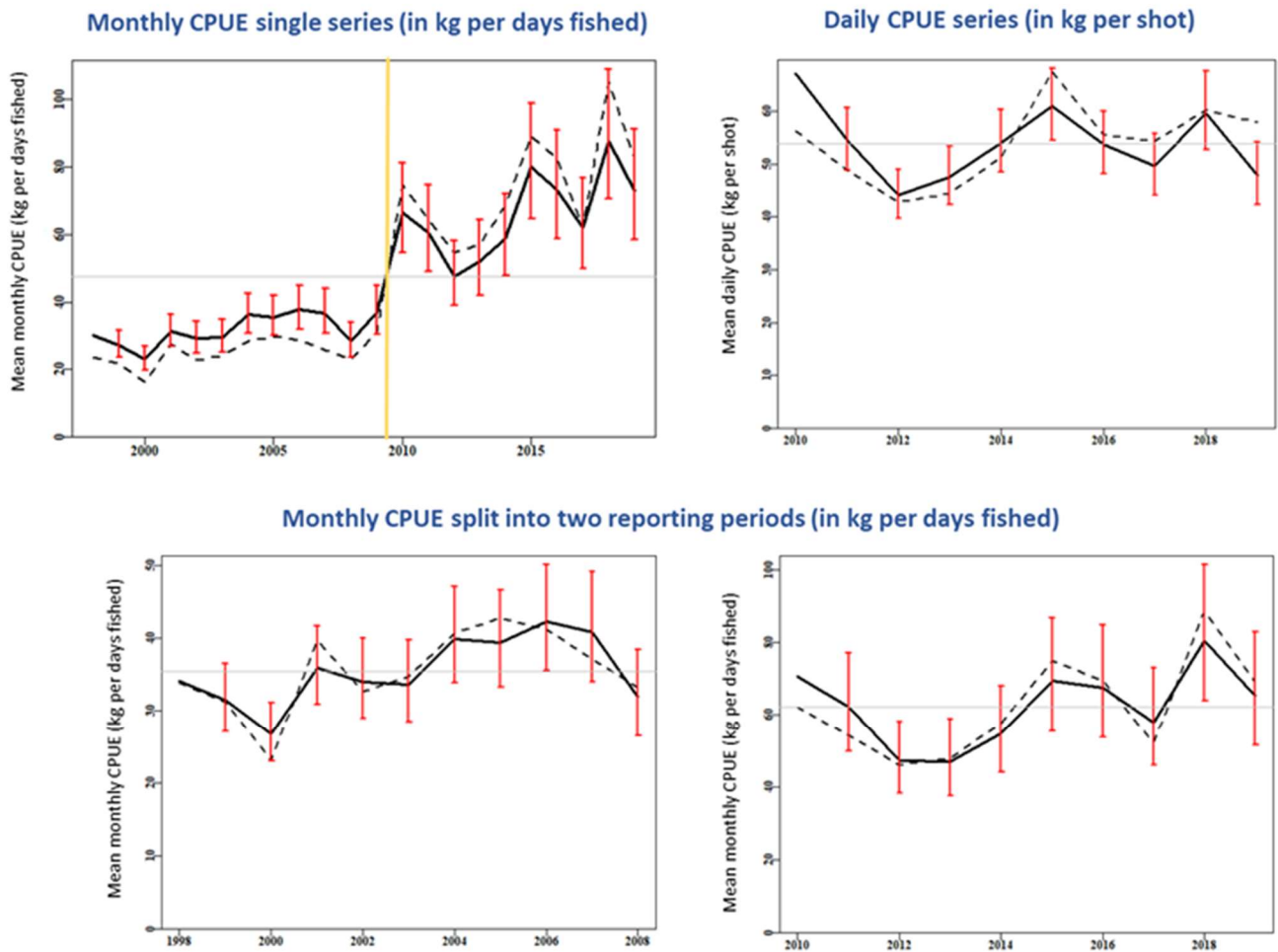


Figure 9. Mean standardised catch rates (catch-per-unit-effort, CPUE) of Sand Whiting for the hauling sector of the NSW Estuary General Fishery, estimated from monthly records (1998–2009) and re-aggregated daily records (2010–2019) in kg per days fished (top left and bottom) and from daily fishing event records in kg per shot (top right). The dashed and solid lines indicate the nominal and standardised mean CPUE, respectively; the gold vertical line indicates the change from monthly to daily catch reporting and the grey horizontal line indicates the long-term averages for each series.

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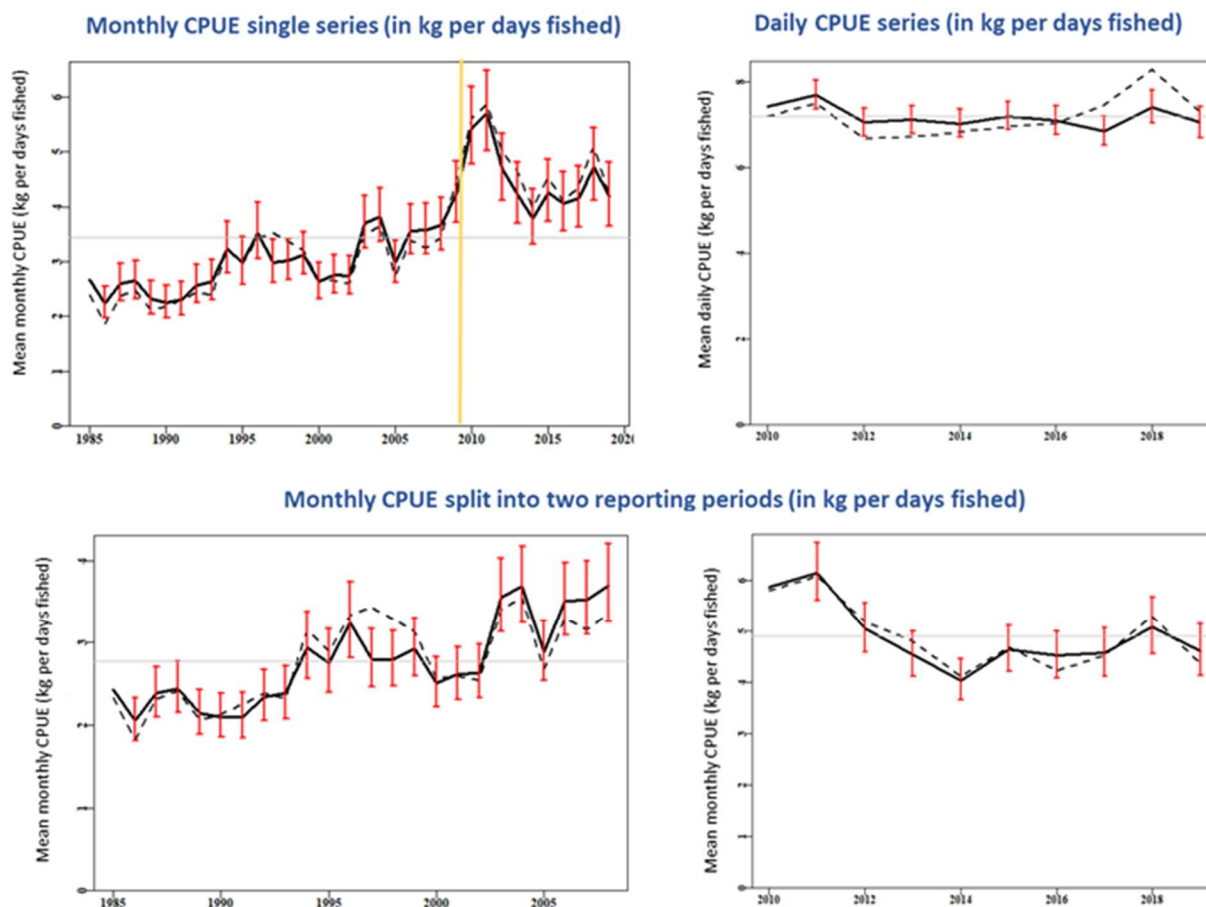


Figure 10. Mean standardised catch rates (catch-per-unit-effort, CPUE) of Sand Whiting for the mesh netting sector of the NSW Estuary General Fishery, estimated from monthly records (1998–2009) and re-aggregated daily records (2010–2019) in kg per days fished (top left and bottom) and from daily fishing event records in kg per days fished (top right). The dashed and solid lines indicate the nominal and standardised mean CPUE, respectively; the gold vertical line indicates the change from monthly to daily catch reporting and the grey horizontal line indicates the long-term averages for each series.

Stock Assessment Methodology

Year of most recent assessment	2020 No quantitative joint stock assessment of the entire biological stock is undertaken.
Assessment method	A weight-of-evidence approach was used for this stock status assessment of Sand Whiting in NSW waters. It relies on analyses of standardised catch rates for the two main commercial fishing sectors, mesh netting and hauling in the EGF, pooled across all estuaries.
Main data inputs	Commercial catch and effort data – for all NSW commercial fisheries by fiscal years (1952/53–2018/19).

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	<p>Recreational catches – estimated annual catches from three periods – national recreational and indigenous fishing survey (2000/01) and NSW recreational fishing surveys (2013/14 and 2017/18).</p> <p>Commercial catch rates historical – reported annual CPUE data for the hauling and mesh netting sectors of the EGF by calendar years in kg per days fished (1985–2019) from monthly records – standardised.</p> <p>Commercial catch rates recent – reported annual CPUE data for the hauling and mesh netting sectors of the EGF by calendar years in kg per shot and kg per fishing event, respectively (2009/10–2018/19) from daily records – standardised.</p>
Key model structure and assumptions	<p>The CPUE standardisations and analyses assume that the annual catch rates are a relative index of abundance and are not unduly influenced by other factors that are not accounted for through standardisation.</p> <p>Catch rates were standardised for the influences of different months, estuary regions, authorised fishers and net length (mesh netting records only).</p> <p>Using fishing effort as an indicator of relative fishing pressure assumes that fish catchability and fishing power have not changed significantly over the monitoring period.</p>
Sources of uncertainty evaluated	<p>Changes in fishing effort distribution following catch reporting changes from monthly to daily event reporting in July 2009.</p>

Status Indicators and Limit Reference Levels

Biomass indicator or proxy	<p>None specified in a formal harvest strategy.</p> <p>In the interim, for the purposes of this assessment the trend in commercial catch rates of the hauling and mesh netting sectors of the EGF were selected as indices of relative abundance.</p>
Biomass Limit Reference Level	<p>None specified in a formal harvest strategy.</p> <p>In the interim, for the purposes of this stock assessment current catch rates were assessed relative to long-term averages of each time series.</p>
Fishing mortality indicator or proxy	<p>None specified in a formal harvest strategy.</p> <p>In the interim, for the purposes of this assessment the trend in annual total commercial fishing effort for the hauling and mesh netting sectors of the EGF were selected as indicators of relative fishing pressure.</p>
Fishing mortality Limit Reference Level	<p>None specified in a formal harvest strategy.</p> <p>In the interim, for the purposes of this stock assessment current fishing effort levels were compared against historic levels.</p>

Stock Assessment Results

<p>Biomass status in relation to limit</p>	<p>Current standardised catch rates, while variable, have remained near the 11-year averages. The longer-term catch rates must be interpreted with caution due to the potential influence of catch reporting changes on effort distributions in July 2009. The recent decreases in catches have coincided with similar declines in effort, such that the standardised commercial catch rates for both the hauling and mesh netting sectors, while variable, have remained near long-term averages over the last 11 years. The longer-term catch rate series are not appropriate for this species due to the potential influence of catch reporting changes on effort distributions in July 2009. The length compositions of the commercial landings for this species have been relatively stable since the late-1960s (although the time-series has many missing years) (Hall 2015). Local populations that have been studied are predominantly comprised of fish that are between two and five years of age (Ochwada-Doyle et al. 2014).</p> <p>The weight of evidence indicates that the biomass of the stock is unlikely to be depleted and that recruitment is unlikely to be impaired.</p>
<p>Fishing mortality in relation to limit</p>	<p>Nominal effort levels (in total number of days fished) over the past 11 years have been well below historical levels. Although changes in catch reporting from monthly to daily records in July 1997 significantly altered effort distributions and account for some of the historical decrease. The minimum legal length for both commercial and recreational fishers (270 mm TL), and spatial closures in New South Wales estuaries also reduce fishing pressure on the spawning stock. Previous estimates of mortality from catch curves indicate that the rate of fishing mortality is likely to be less than that of natural mortality, although these estimates need to be updated (Ochwada-Doyle et al. 2014).</p> <p>The weight of evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.</p>
<p>Previous SAFS stock status</p>	<p>Sand Whiting was previously assessed as a sustainable stock under the SAFS framework in 2018 (McGilvray and Hall 2018).</p>
<p>Current stock status</p>	<p>On the basis of the evidence above, which includes stable trends in standardised catch rates over the last 11 years and current low levels of fishing effort, Sand Whiting is currently assessed as a Sustainable stock.</p>

Qualifying Comments

- Overall, the data collated in this stock assessment suggest that the input controls used to manage effort in the commercial OTF have proved effective at reducing effort levels between 1997/98 and 2018/19 and consequently fishing pressure on Sand Whiting.
- The potential influence of catch reporting changes on commercial catch rates (especially during the transition from monthly to daily reporting around July 2009) limits their application as an index of relative abundance.
- In particular, pronounced decreases in effort are evident in 2009/10 that are likely influenced by the catch reporting changes and a single time series of monthly catch rates spanning this period is not recommended for this species.
- Size, age and fishing mortality evidence used in the current stock assessment are quite dated for a relatively short-lived species.
- Size and age sampling of the commercial catch was completed for Sand Whiting via port monitoring in 2018/19 and will be analysed to provide updated numbers-at-age and fishing mortality estimates for the next stock assessment.

References

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