Stock Status Summary – 2021

NSW Stock Status Summary – Yellowtail Scad (*Trachurus novaezelandiae*)

This stock-status summary presents information to inform criteria required to determine a stock status consistent with the Status of Australian Fish Stocks reports (www.fish.gov.au)

Where data are unavailable or insufficient to reliably inform the SAFS criteria outlined below, this has been indicated by 'Na', rather than removing the criteria. This has been done to clearly indicate what data are, or are not, available for assessment and to highlight areas where alternate or additional data sources or analyses may be required to improve species-status determination in the future.

Assessment Authors and Year

Broadhurst, M.K. 2021. NSW Stock Status Summary 2020/21 – Species *(Trachurus novaezelandiae).* NSW Department of Primary Industries, Fisheries. 9 pp.

Stock Status

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

Stock Structure

Yellowtail Scad have an Australian distribution from southern Queensland to northern Western Australia, and also occur off New Zealand. While Yellowtail Scad's distribution encompasses Victoria and South Australia, only negligible catches and effort are reported from these states. The biological stock structure of Yellowtail Scad remains unknown; but in New South Wales there is evidence of spatial differences in growth rates which might be indicate subpopulations. Similar spatial population variability has been observed for Yellowtail Scad in New Zealand.

Here, assessment of stock status is presented at the biological stock level—Eastern Australia; and jurisdictional—Western Australia.

Stock Status and assessment method

On the basis of the evidence provided, the Eastern Australia biological stock is classified as a sustainable stock.

The above conclusion was derived from peer-reviewed and weight-of-evidence approaches. In particular, formal stock assessment has indicated the species currently has a very low catchability and that fishing mortality is substantially lower than natural mortality. A predicted five-fold increase in effort would be required to inflict a fishing mortality approaching the estimated natural mortality. The estimated natural and fishing mortalities imply the biomass is close to virgin state.

Fishery statistics summary

Catch Trends

Commercial

Partitioned annual reported commercial catches of Yellowtail Scad in NSW are available from 1997–98 to the present and encompass six fisheries (Fig. 1). Total reported annual commercial catches have ranged from 298 (2009–10) to 600 t (1997–98), but mostly have remained fairly stable at 450–520 t (mean of 472 ± 44 t; Fig. 1). Typically, around 80–90% of all landed Yellowtail Scad are purse seined by vessels working in the NSW ocean-haul fishery or caught using submersible lift nets and/or purse seines in the Commonwealth tuna-bait fishery (the latter under a Section 37 permit). Within these two fisheries, NSW ocean-haul purse seiners have historically landed at least 60% of the total catch for a mean of 307 ± 69 t p.a. Commonwealth vessels land 104 ± 44 t p.a.; although data are unavailable prior to 2008–09, and have been populated in Figure 1 based on the average of recent reported fiscal years.

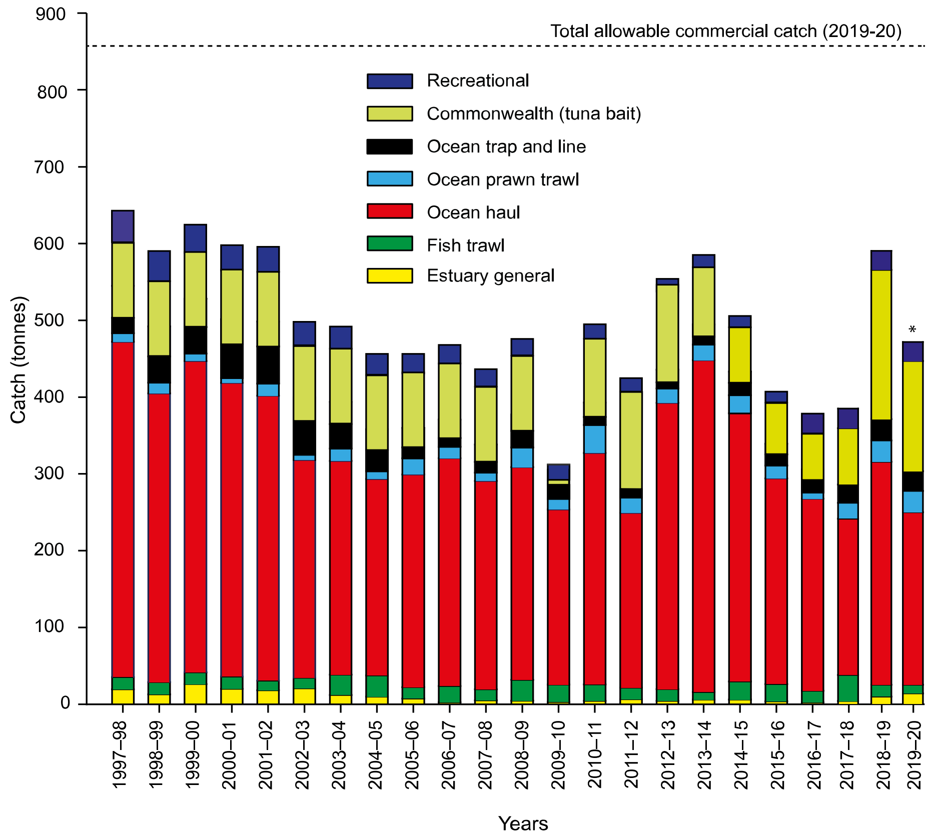

Fig. 1. Annual catches (t) of Yellowtail Scad reported by all sectors for which there are data in NSW waters by fiscal year from 1997–98 to 2019–20. Recreational catch data are only available from surveys completed in 2000–01, 2013–14 and 2017–18 with preceding, intervening and subsequent years interpolated based on these two-point differences. * some data remain outstanding owing to a small percentage of fishers not submitting catch returns at the time of writing.

Reported fish- and ocean prawn-trawl catches have remained fairly consistent among years at means of 19 ± 6 and 17 ± 7 t p.a. By comparison, estuary general and ocean trap-and-line catches peaked at 21 and 49 t p.a. respectively before 2006–07, and then stabilised at 4 ± 1 and 14 ± 4 t p.a. over the subsequent decade, although estuarine catches did rise to 10 t in the last financial year (Fig. 1).

Recreational and Indigenous

Estimates of the recreational harvest (hook-and-line) of Yellowtail Scad are available from three recreational fishing surveys and also charter-boat catches and are minimal compared to commercial catches. All three recreational surveys estimated catches in terms of numbers, which have been crudely transformed to weights using mean sizes. Specifically, in 2000–01, the estimated harvest was ~152 000 fish weighing 33 t, while in 2013–14 and 2017–18, some 90 000 fish or 16 t and 150 000 fish or 30 t were retained.

Yellowtail Scad are also caught from charter boats (hook-and-line) in NSW, but until recently (2016) catches had not been separated from Jack Mackerel (*Trachurus declivis*) and therefore are excluded. More recent charter-catch data pertaining only to Yellowtail Scad suggest steady annual catches. Specifically, the estimated total number over the past three financial years was ~13,000, 12,000 and 13,600 individuals.

The indigenous catch is unknown; but presumed to be negligible.

Illegal, Unregulated and Unreported (IUU)

Given there is no minimum legal size for Yellowtail Scad and a very large recreational bag limit, their reported recreational catches might be fairly representable for that sector. By comparison, commercial logbook reporting might be prone to some misreporting, particularly among fishers targeting Yellowtail Scad for bait (i.e. which are never landed). However, there is no formal evidence to negate the existing catch and effort data.

Effort Trends

Commercial

Historical effort data describing the targeting of Yellowtail Scad are only available for vessels in the NSW ocean-haul and Commonwealth tuna-bait fisheries, and the latter only date to 2009–10. Further, prior to 2009, logbook effort data in the NSW ocean-haul fishery were calculated on monthly rather than daily returns, and so to standardize comparisons, data have been adjusted accordingly.

New South Wales (ocean haul) purse-seine effort peaked at over 2000 days in 1999–00, fell sharply the following year to 1300 days, and then steadily declined within a range of 950–680 days over the subsequent 15 years following reductions in vessel numbers. By comparison, estimates of Commonwealth tuna-bait effort show this has remained quite low and fairly steady, but did peak at 287 days in the last year.

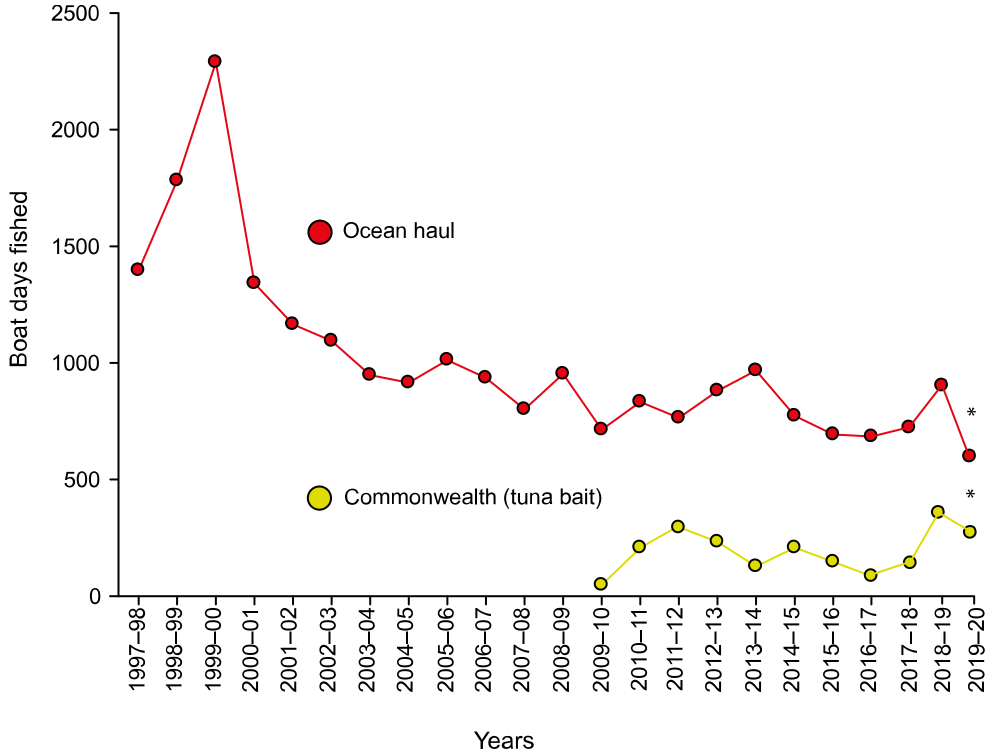

Fig 2. Purse-seine effort (days fished) for New South Wales ocean-haul (red) and purse-seine/lift-net effort for Commonwealth tuna-bait (green) fishers that reported targeting Yellowtail Scad. *some data remain outstanding owing to a small percentage of fishers not submitting catch returns at the time of writing.

Recreational and Indigenous

Along with catches, state-wide estimates of recreational fishing effort are limited to the three surveys: 2000–01, 2013–14 and 2017–18. Further, these effort estimates are not species-specific, but rather encompass broad spatial (e.g. coastal region, fresh vs. saltwater, boat- vs. shore-based, etc.) and technical categories (gear type). Nevertheless, for saltwater fishing, annual effort has decreased from ~4 000 000 to 2 500 000 and more recently 1 500 000 fisher days.

For charter boats, there were no separated effort data catching only Yellowtail Scad until 2016, because these data were combined with those for Jack Mackerel. A revision of reporting requirements means the two species now have to be separated, which confounds any historical trends. Nevertheless, the historical effort has been quite low at < 1500 boat-hours fished each year.

Catch rate information - Commercial

Since 1999, the purse-seined catch rate (kg per boat-day fished) of Yellowtail Scad in the NSW ocean-haul fishery steadily increased to 2011–12, but more recently remained at 300–450 kg per boat day (Fig. 3). The reported catch rates of fishers in the Commonwealth tuna-bait fishery are only available post 2008–09. While catch rates also increased until 2011–12, there was a subsequent reduction that appeared slightly (and negatively) correlated to the catch rate by purse seiners in the NSW ocean-haul fishery (Fig. 3).

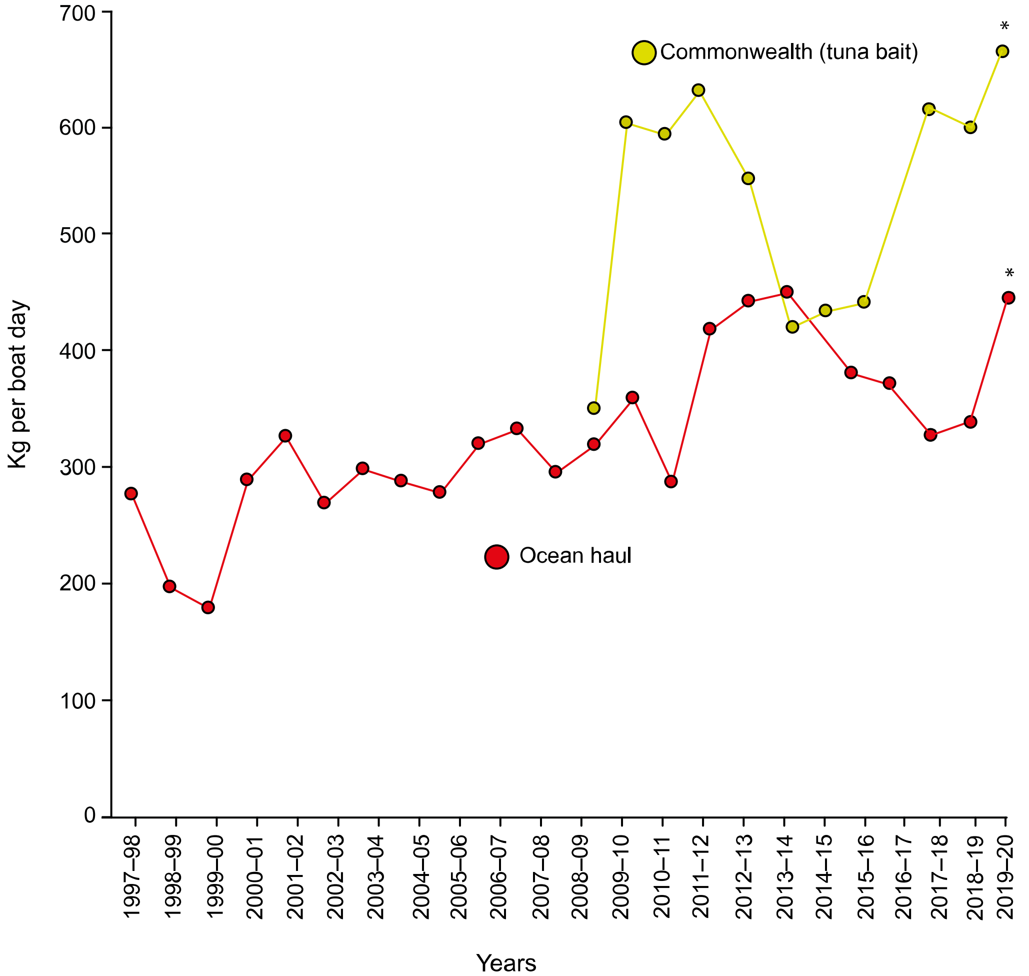

Fig 3. Standardized commercial catch rates (kg per boat day) of Yellowtail Scad purse seined in the New South Wales ocean-haul fishery and caught in the Commonwealth tuna-bait fishery. *some data remain outstanding owing to a small percentage of fishers not submitting catch returns at the time of writing.

Stock assessment methodology

Year of most recent assessment	2020
Assessment method	Published stock assessment, weight of evidence, and interpolation.
Main data inputs	Commercial fishing catches: reported annual catches for all sectors by fiscal years (1997–98 to 2019–20); Recreational fishing catches: interpolated annual catches preceding, intervening and subsequent to two survey points (national recreational and indigenous fishing survey in 2000–01 and NSW state-wide recreational fishing surveys in 2013–14 and 2017–18);

	Charter-boat fishery catches: reported annual catches by fiscal year (2000–2019); Size-at-age data comprising 2347 otoliths of fish ages 0+ to -18 years; Estimated discards: all fisheries and based on published single time point observer-based accounts extrapolated among years using ratios to retained catches; Commercial catch rates: reported annual catch-and-effort data for purse seiners (responsible for 80–90% of the total catch); Length compositions: port monitoring (2000–2015); and Growth: estimated from otoliths and sizes.
Main data inputs (rank)†	Size at age: high Commercial fishing catches: high Recreational fishing catches: medium Estimated discards and rates: low Commercial fishing catch rates: high Length compositions: high
Key model structure and assumptions	The published stock assessment involved hazard functions applied to two decades of data to enable survival analyses. Models were rerun in 2020 with two-additional years data, but outputs remained the same. Key assumptions are that: 1. Annual intervals among collected size-at-age data did not affect modelling outputs (not evident based on model convergence and fits); 2. Purse-seine selectivity is defined by a logistic regression (needs to be formally assessed); Fishing mortality was not overly affected by variable fishing power.
Sources of uncertainty evaluated	The models were successfully converged, and not affected by variable inputs within the above assumptions.

† Main data inputs (rank)

1 – High quality: data have been subjected to documented quality assurance and peer review processes, are considered representative and robust and provide a high level of confidence to support fisheries management decisions.

2 – Medium quality: data have been subjected to some internal quality assurance processes, have some documented limitations, but are still considered sufficiently accurate and informative to be useful to inform management decisions with some caveats.

3 – Low quality: data have been subjected to limited or no quality assurance processes, may be compromised by unknown or documented limitations that have not been fully explored, but are considered the best available information and require a high level of precaution to be exercised when interpreted to inform management decisions.

Status indicators and limits - reference levels

Biomass indicator or proxy	Formal stock assessment indicated very low catchability and that fishing mortality was substantially lower than natural mortality (0.22 p.a.). These are the proxies for biomass. A predicted five-fold increase in effort would be required to inflict a fishing mortality approaching the estimated natural mortality.
Biomass limit reference level	None specified in a formal harvest strategy, but natural mortality ≤ fishing mortality.
Fishing mortality indicator or proxy	Fishing mortality compared to natural mortality.
Fishing mortality limit reference level	The estimated natural mortality of 0.22 p.a and this would be the limit for fishing mortality.
Target reference level	NA

Stock Assessment – list of indicators

Biomass status in relation to limit	Results of the stock assessment indicate that natural mortality comprises much of the total mortality, and so the biomass apparently is close to virgin state.
Fishing mortality in relation to limit	Negligible
Previous stock status	Yellowtail Scad was assessed under the SAFS framework for the first time in 2018. For the preceding 15 years, the species was assessed as 'fully fished' under the NSW RAW framework. Quotas of 864 t were set for 2019 and 2020, but were not achieved (short falls of >300 t).
Current stock status	Sustainable

Qualifying Comments

Based on formal stock assessment, there appears to be minimal fishing mortality on Yellowtail Scad, implying an underutilised fisheries resource, albeit with some caveats. First, the collected size-at-age data use in the stock assessment were sporadic. Ideally, the chosen modelling approach (survival analysis) supports long-term (5–7 consecutive years) of size-at-age data, although based on meaningful model convergences, gaps between years clearly are feasible. Second, purse-seine catchability and selectivity should be validated, which would be best done by applied work following empirical methods used among similar fishing gears. Third, it is important to appreciate that various factors can affect fishing mortality, including chronological variations (typically an increase) in fishing power. Certainly, the observed increase in catch rate by the NSW ocean-haul purse-seine fleet among recent years supports an enhanced capacity to target Yellowtail Scad. But, information concerning variable fishing power remains unavailable, and an annual increase in fishing power of 2 and 4% failed to improve model fit.

Like most species subject to quota, ongoing size-at-age, and catch-and-effort data are required to inform future decisions regarding management. Another consideration is that ~90% of the commercial catch is reported from only 5 degrees of latitude (32–37oS). The importance of this area to life-history (e.g. reproduction) warrants assessment; particularly given the observed differences in growth rates among sampled specimens between northern and southern regions. Pelagic species like Yellowtail Scad are quite vulnerable to capture in purse seines and appropriate spatial consideration of effort might be required.

References

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